

**AN INTERVENTION TO REDUCE ADOLESCENT HOOKAH PIPE
USE AND SATISFY THEIR BASIC PSYCHOLOGICAL NEEDS**

Zainab Kader

Student Number: 2930198

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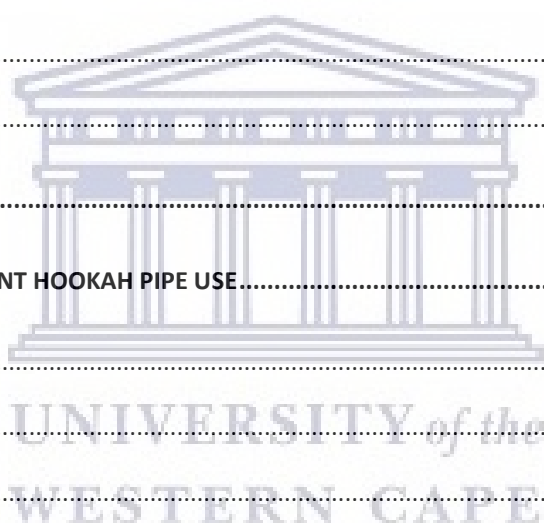


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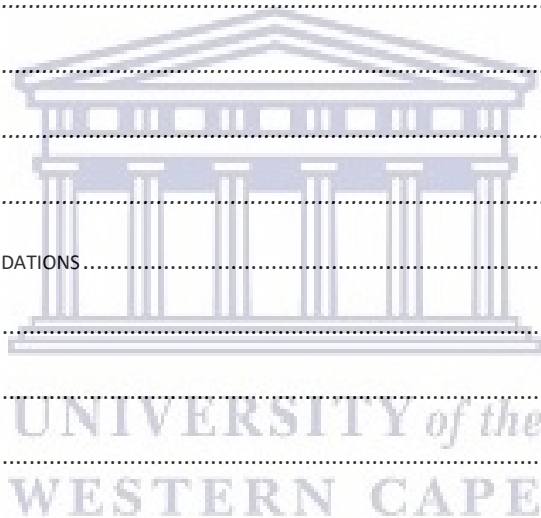
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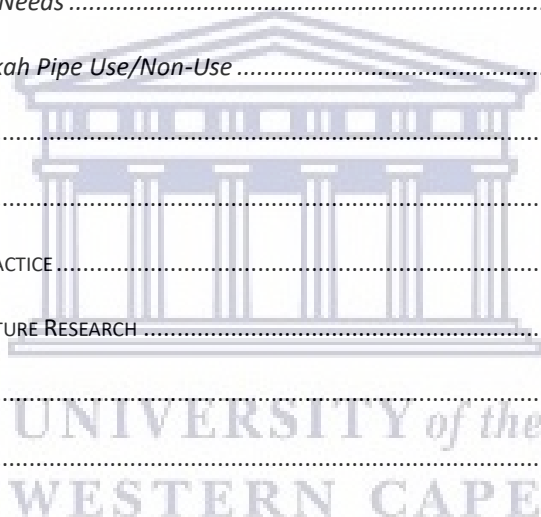


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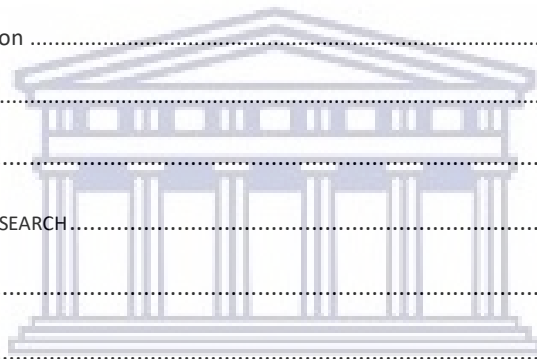
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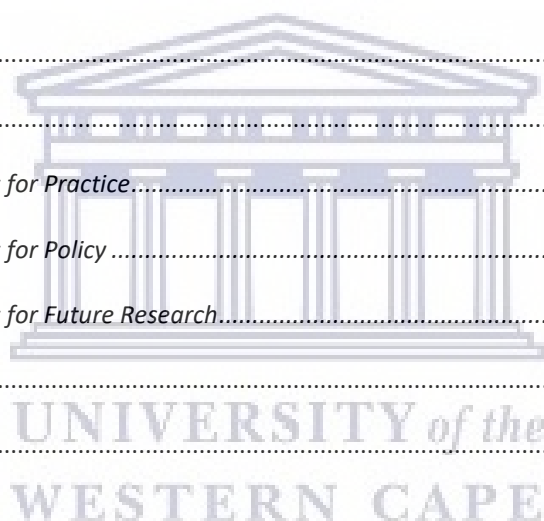


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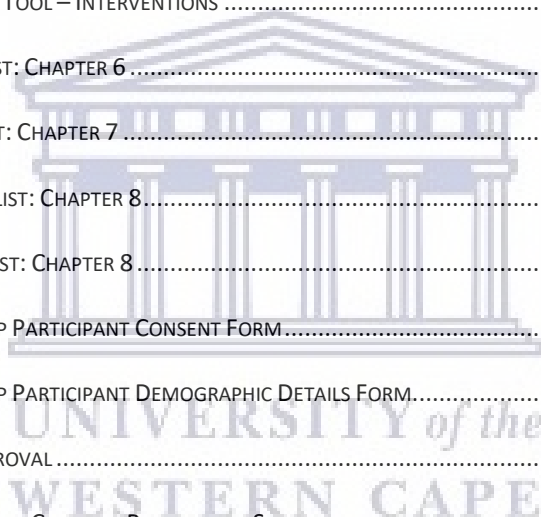
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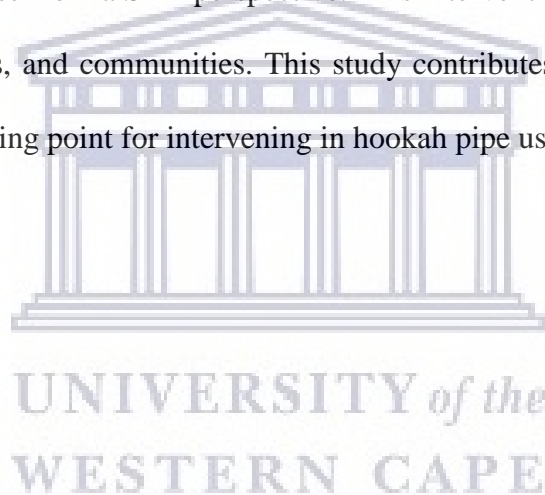
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ABSTRACT

Background: Adolescent hookah pipe use is a public health concern because it poses several health, environmental, and economic risks. Self-determination theory (SDT) posits that people are motivated to engage in certain behaviours in an attempt to satisfy their basic psychological needs (BPN). **Aim:** This study aimed to design an intervention to reduce adolescent hookah pipe use and satisfy their BPN. **Method:** This study was located in the Western Cape, South Africa. A mixed methods methodology using a sequential explanatory research design and intervention mapping framework was employed in this study. This study consisted of two phases: Phase 1 identified the problem and comprised three stages: (1) systematic reviews focusing on determinants and interventions; (2) assessing prevalence of hookah pipe use and comparing users' and non-users' harm perception, needs, motivation, and the role of the family using a battery of tests; and (3) exploring users' and non-users' motivation and needs by using semi-structured interviews. Phase 2 focused on the design of the intervention using a modified Delphi approach. **Results:** Adolescent hookah pipe use is determined by an interplay of family factors, peer/friends factors, individual factors, school factors, the actual hookah pipe mechanism, advertisements, and awareness of hookah pipe lounges or bars. Existing hookah pipe cessation interventions focused solely on the user and were mainly supportive, educational or counselling sessions. Based on the current study, 21% of adolescents were users. Users and non-users had similar views in terms of the dangers of smoking the hookah pipe. Users and non-users were intrinsically motivated to either smoke or not smoke. There were no significant differences between users' and non-users' BPN. These findings were contradicted in the qualitative stage of the study where adolescents revealed that satisfaction or frustration of BPN, in particular, competence and relatedness, influences their decision to smoke or not smoke the hookah pipe. Users experienced more needs frustration compared to non-users. Also, users were more extrinsically motivated to smoke, whereas non-users were intrinsically motivated not to

smoke. Family, lack of parental involvement, substance abuse in the family, trauma, violence, and approval of hookah use by family members had an important role in adolescents' decision to smoke the hookah pipe. Therefore, a four-pronged approach focusing on (1) the hookah pipe user, (2) the family, (3) after school recreation activities, and (4) the teacher and community was designed as an intervention. The intervention was described using the RE-AIM Framework which considers reach, efficacy, adoption, implementation, and maintenance of the intervention. **Conclusions:** This study revealed important conclusions. The idea to focus on the internal factors, the role of family, the school and community when intervening in adolescent hookah pipe use is a relatively new perspective. There have been no known studies that try to understand hookah pipe use from a SDT perspective. This intervention would be beneficial to adolescents, their families, and communities. This study contributes to the growing body of knowledge and it is a starting point for intervening in hookah pipe use.



LIST OF KEYWORDS

Self-Determination Theory (SDT)

Basic Psychological Needs (BPN)

Adolescent

Hookah Pipe

Tobacco

Motivation

Family

Intervention

Harm Perception

Autonomy

Competence

Relatedness



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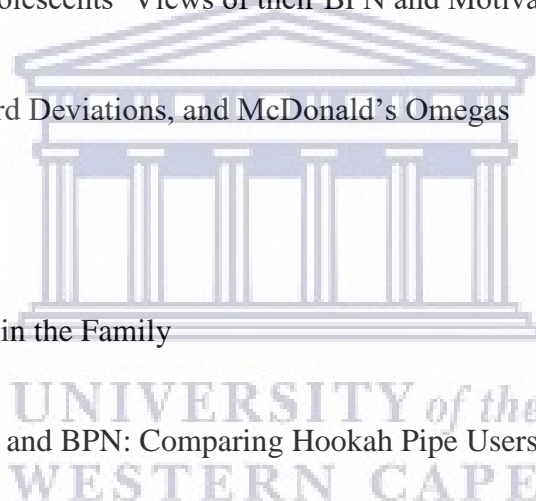


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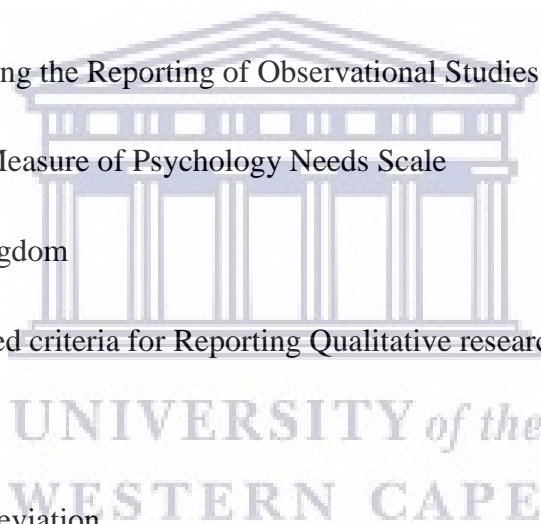


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ABBREVIATIONS

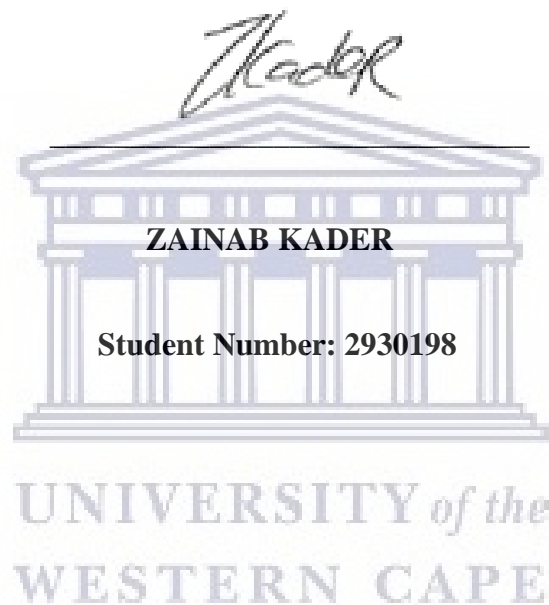
WHO	World Health Organization
USA	United States of America
SDT	Self Determination Theory
BPN	Basic Psychological Needs
WHO FCTC	World Health Organization Framework Convention on Tobacco Control
CO	Carbon Monoxide
COPD	Chronic Obstructive Pulmonary Disease
COHb	Carboxyhaemoglobin
COVID-19	Coronavirus Infectious Disease 2019
µm	Micrometre
CET	Cognitive Evaluation Theory
OIT	Organismic Integration Theory
COT	Causality Orientations Theory
BPNT	BPN Theory
GCT	Goal Contents Theory
RMT	Relationships Motivation Theory
APA	American Psychological Association
RE-AIM	Reach, Efficacy, Adoption, Implementation and Maintenance
IMI	Intrinsic Motivation Inventory
TSRQ	Treatment Self-Regulation Questionnaire

SPSS	Statistical Package for the Social Science
NGO	Non-Governmental Organisation
FBO	Faith Based Organisation
SACENDU	South African Community Epidemiology Network on Drug Use
PRISMA	Preferred Reporting Items for Systematic Reviews
CI	Confidence Interval
OR	Odds Ratio
Mg	Milligram
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology
BMPN	Balanced Measure of Psychology Needs Scale
UK	United Kingdom
COREQ	Consolidated criteria for Reporting Qualitative research
M	Mean
SD	Standard Deviation
MI	Motivational Interviewing



DECLARATION

I, **Zainab Kader**, declare that the thesis entitled, “**An Intervention to Reduce Adolescent Hookah Pipe Use and Satisfy Their Basic Psychological Needs**”, submitted for the PhD degree at the University of the Western Cape, is my own work. All the sources that I have used, or cited, have been indicated and acknowledged by means of complete references. This research project has never been submitted, previously, for any degree to any other institution.



November 2020

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DEFINITION OF KEY TERMS

- Adolescent:** A person aged 13–19 years old.
- Adolescent Development:** The process of adolescence is a period of preparation for adulthood during which time several key developmental experiences occur. This process is known as adolescent development (WHO, 2016).
- Autonomy:** The need that regulates one’s behaviour and allows the individual to feel as though he or she is not being controlled by others or the external environment (Deci & Ryan, 2000).
- Basic Psychological Needs (BPN):** According to SDT, three BPN are imperative for psychological growth, well-being, and integrity. The three BPN are autonomy, competence, and relatedness (Ryan, Huta and Deci, 2008).
- Competence:** The need to engage in experiences and challenges that would result in a sense of mastery in social and physical worlds (Deci & Ryan, 2000).
- Family:** “A societal group that is related by blood (kinship), adoption, foster care or the ties of marriage (civil, customary or religious), civil union or cohabitation, and go beyond a particular physical residence” (Department of Social Development, 2013).
- Harm Perception:** How people view physical or psychological harm (Kasperbauer, 2017).
- Hookah Pipe:** The hookah pipe is a mechanism used to smoke tobacco (Wasim, 2008).

- Hookah Pipe User:** In the context of this study, a hookah pipe user is someone that smokes or has smoked the hookah pipe within the last six months.
- Hookah Pipe Non-User:** In the context of this study, a hookah pipe non-user is someone that has never or has not smoked the hookah pipe within the last six months.
- Intervention:** “An alteration of the contingencies of reinforcement so as to bring about a desired alteration in behavior”
(Matsumoto, 2009, p. 79).
- Motivation:** “The hypothetical physio-mental force that leads humans and other animals to act; the process or action of convincing others to make an effort in the pursuit of a goal” (Matsumoto, 2009, p. 319).
- Relatedness:** The need to experience feelings of intimacy, security and belonging with others as well as seeking positive attachments (Deci & Ryan, 2000).
- Self-Determination Theory (SDT):** Theory that views people as naturally inclined to act, engage in interesting activities, and move toward personal and interpersonal coherence. SDT claims that three BPN are essential for ongoing growth. However, if needs are not satisfied, dysfunctional consequences typically follow (Deci & Ryan, 2000).
- Tobacco:** Nicotine-rich leaves that are dried and fermented for smoking or chewing (WHO, 2016).

CHAPTER 1

INTRODUCTION TO THE STUDY

1.1 Introduction

This chapter introduces the growing trend of hookah pipe smoking in South Africa. The first section provides a background to the phenomenon and highlights the identified problem. The research questions, aim, objectives and hypotheses are also described. This is followed by a discussion of the significance of the study. The conference papers and publications that emanated from this study are presented near the end of the chapter. Finally, the thesis layout is presented.

1.2 Background and Rationale

Tobacco use is one of the leading avoidable causes of health problems and death globally (Santoro et al., 2019). In 2005, the World Health Organization (WHO) released an advisory note about the growing concerns of tobacco use with specific emphasis on hookah pipe use. Hookah pipes originated more than 500 years ago but its revival began in the late 1990s (Ray, 2009). Its resurgence was mainly market-driven and targeted at young adults. Experimentation of hookah pipe use appears to occur mainly in adolescence (Yu et al., 2018). Although the common perception among hookah pipe users is that hookah pipe use is less harmful than cigarettes or other forms of tobacco (Cavazos-Rehg et al., 2015), the WHO (2005) disagrees by highlighting negative health effects such as mouth ulcers, lung cancer, heart disease, and addiction. Even though the negative consequences of hookah pipe use are apparent, of particular concern to the WHO (2015) is the increasing prevalence of hookah pipe use globally. This could be attributed to the misconceptions of relative harmlessness, popularity, social activity, and sense of relaxation (Cavazos-Rehg et al., 2015).

In Canada, hookah pipe smokers viewed smoking as an alternative to more expensive nights out in bars. They were attracted to the communal activity and novelty of smoking the

hookah pipe. They did not think too much about the health risks as warnings about hookah use are not as widespread as for cigarette and cannabis use (Roskin & Aveyard, 2009). Studies in Syria (Hammal et al., 2008) and the United States (Mays et al., 2015) showed similar results. These studies also highlighted the lax perception of users that hookah pipe smoking is relatively harmless to themselves and to others. Hookah pipe smokers generally use the hookah pipe for entertainment, escape, and leisure. In addition, frequent users admitted feeling addicted in a similar way to cigarette smokers (Mays et al., 2015).

A South African study by van der Merwe et al., (2013) found that 67% of the participants began smoking the hookah pipe in high school (age 14–18); 65% smoked occasionally, usually at friend's house (for 30–60 minute sessions); 11% smoked cigarettes concurrently; and 30% added other substances, mainly cannabis with the tobacco. The hookah smokers had no interest in quitting (84%). Only 30% of participants had prior health information about hookah pipe smoking. A study in the Western Cape, South Africa, indicated that the hookah pipe is a gateway substance, revealing that participants used the hookah pipe along with other substances, such as alcohol and cannabis (Roman, Jacobs & Schenk, 2015). Moreover, Daniels and Roman (2013) found that hookah pipe users perceived the health risks as being exaggerated and considered it less addictive than non-users' perceptions. This finding is consistent with international studies in Canada, Syria, and the USA, who all found that hookah pipe smoking is more likely to occur in social settings. The study also found that tobacco use was readily available and the most common reason for use was for relaxation (Daniels & Roman, 2013). According to Combrink et al (2010), 60% of South African adolescents indicated that they had used or were using the hookah pipe, and 33% reported using it daily (Combrink et al., 2010). It appears that hookah pipe smoking is common amongst adolescents, despite its harmful effects.

Adolescence is an overwhelming period in one's life where one prepares for adulthood. It is a period of learning, experimenting, and experiencing. During adolescence,

there is an intense period of physical, social, and psychological development (Sugar, 2014). Adolescence is characterised by conflicts with parents and other authority figures, moodiness, and high-risk behaviours, such as experimentation with tobacco products. Adolescents experience significant changes in their ability to assess and comprehend complex situations and information, and desire to become independent, unique individuals (Sugar, 2014). They wish to belong but still have their own identity (Gilmore & Meersand, 2014). As adolescents develop, they establish norms and lifestyles congruent with the values and culture of their peers, their families, and their communities; therefore, it is not uncommon that experimenting with the hookah pipe occurs during adolescence. Adolescents may also have a perceived invulnerability and they are more impulsive than other age groups. Consequently, they may be more focused on the benefits of smoking the hookah pipe than on the negative health risks (Mays et al., 2015). While these factors may be true, it is important to understand what motivates adolescents to smoke the hookah pipe.

Self-determination theory (SDT) is a motivation theory which is applied to understand hookah pipe smoking behaviour by determining how basic psychological needs (BPN) contributes and impacts adolescent hookah pipe use. According to Deci and Ryan (2000), the satisfaction of three BPN, namely, *autonomy* (sense of free will), *competence* (sense of achievement), and *relatedness* (sense of intimacy, security and belonging) is needed for optimal well-being, development, and having socially integrated behaviours. These needs are universal, and satisfaction of these needs are essential. People are therefore motivated to pursue behaviours in an attempt to satisfy these needs (Deci & Ryan, 2000). However, individuals are not solely able to satisfy these needs because their contexts, specifically their family contexts, which either promote or hinder the satisfaction of needs through their perceptions, actions, and belief systems (Curry et al., 2019). Basically, SDT argues that behaviours (positive or negative) are more likely to occur or be perpetuated if they satisfy a need/s (Deci & Ryan, 2000), for example, using or not using the hookah pipe. So, in the

context of this study, that behaviour could be using as well as abstaining from the hookah pipe. Thus, the difficulty is engaging in or abstaining from the behaviour (smoking the hookah pipe) to satisfy needs.

Understanding the adolescent developmental perspective and applying SDT to gain insight into this human behaviour is well suited for this study because it can provide an understanding of how adolescents attempt to participate in interesting activities, exercise competencies, and pursue attachments in social groups (Deci & Ryan, 2000) through hookah use. These perspectives will also determine how hookah use contributes to adolescents BPN (autonomy, competence, and relatedness). The insights are important to ultimately determine how hookah pipe use can be reduced amongst adolescents. To date, there is limited research about why adolescents are motivated to smoke the hookah pipe, interventions to reduce adolescent hookah pipe use, and the role of the family in determining hookah use or non-use. No known studies have studied hookah pipe use from a SDT perspective. Through the different stages of this study, these gaps have been addressed in order to design an intervention to reduce adolescent hookah pipe use and satisfy their BPN.

1.3 Problem Statement

Hookah pipe use is on the rise among youth (WHO, 2005; 2015). It could be considered a global epidemic as it is found to be a gateway to other substances, such as cigarettes, cannabis, and alcohol (Roman et al., 2016). Many hookah pipe users are oblivious to the negative effects of hookah pipe use or disregard it (Roskin & Aveyard, 2009). Instead, they focus on the collateral gains, such as social connectedness, relaxation, and experiencing the novelty (WHO, 2005; Daniels & Roman, 2013; Mays et al., 2015). Karimy and colleagues (2013) allude to hookah pipe use as a means to escape or even cope with life's stressors. This is corroborated by the views of adolescents who claim that hookah pipe use is used for recreation and relaxation purposes (Roskin & Aveyard, 2009). Research shows that adolescents do not view hookah pipe use as a major health or social concern (Mays et al.,

2015). It is not only adolescents that are oblivious to the hazardous effects, but families too. Many families find hookah pipe smoking in the home and in their presence acceptable (Casteñeda et al., 2016). In some cases, family members smoke together (Curry et al., 2019). This is concerning, as it sends a message to the younger children in the family that hookah pipe smoking is acceptable.

Hookah pipe research predominantly focuses on the negative health effects, adolescents view on knowledge, risk, and desire to stop. No known studies focus on how the hookah pipe contributes to BPN (autonomy, competence, and relatedness), and few studies focus solely on an intervention to reduce adolescent hookah pipe use. Limited research exists on understanding the motivation for using the hookah pipe. This is important because if there were no gains, people would not smoke the hookah pipe. This study aimed to identify the need for an intervention and then design an intervention to reduce hookah pipe use amongst adolescents by meeting their BPN.

1.4 Research Questions

The research questions for this study were:

1. What are the determinants of adolescent hookah pipe use?
2. What are the existing interventions aimed at reducing hookah pipe use?
3. What are the prevalence rates of adolescent hookah pipe users in the Western Cape, South Africa?
4. How do adolescent hookah pipe users and non-users differ in terms of (a) harm perception, (b) motivation for hookah use/non-use, and (c) BPN?
5. What role do families have on adolescents' decision to smoke the hookah pipe and their BPN?
6. Is there a need for an intervention to reduce hookah pipe use?
7. What type of programme should be designed to reduce adolescent hookah pipe use and satisfy their BPN?

1.5 Research Aim

The aim of the study was to design an intervention to reduce hookah pipe use and satisfy their BPN.

1.6 Research Objectives

The objectives of this study were:

1. Review determinants of adolescent hookah pipe use (addressed in Chapter 4);
2. Review interventions aimed at reducing hookah pipe use (addressed in Chapter 5);
3. Determine the prevalence of hookah use in the Western Cape, South Africa (addressed in Chapter 6);
4. Compare (a) harm perception, (b) motivation for hookah use/non-use, and (c) BPN of adolescent hookah pipe users and non-users (addressed in Chapters 6 and 7);
5. Explore and determine how families influence the decisions of adolescents to smoke the hookah pipe and how they contribute to the satisfaction of BPN (addressed in Chapter 8);
6. Explore and describe the need for an intervention to reduce hookah pipe use (addressed in Chapter 9);
7. Design a programme to reduce hookah pipe use and satisfy their BPN (addressed in Chapter 9).

1.7 Hypotheses

- **H1:** The BPN of hookah pipe users are more satisfied than non-users.
- **H2:** Hookah pipe users view hookah use as the least harmful substance compared to alcohol, cigarettes, and cannabis.
- **H3:** Hookah pipe users do not consider smoking a problem and do not think that an intervention is necessary.

1.8 Significance of the Study

Substance abuse is a rising concern internationally (WHO, 2015). Substance abuse remains a growing problem in South Africa with 7.06% of the population abusing narcotics of some kind (Reagon, 2016). Although there is much awareness about cigarette, alcohol, and cannabis use amongst youth, little concern and awareness is raised about the hookah pipe as it is not considered a narcotic. The hookah pipe contains tobacco and can be considered a gateway drug to other substances as it is not uncommon to add cannabis or alcohol to the pipe. This could be attributed to ignorance or because it is acceptable in some family homes. On the other hand, despite awareness of the health hazards, it provides a feeling of satisfaction and possibly meets a need. The latter – understanding the need fulfilment one gets when smoking the hookah pipe – was of particular interest to this study. Once this need was established, the researcher was interested in designing an intervention to meet the needs and minimise hookah pipe use.

By doing so, it was believed that it would contribute to the health of the users; become less appealing to experiment; families and teachers would understand the negative effects of smoking the hookah pipe, and therefore become more vigilant and discourage use. It is intended that this study can guide policy and prevent tobacco, coals, and hookah pipes being as accessible as they are to adolescents. It is hoped that older family members understand the concerns around allowing their younger family members to experiment or smoke with them. The intervention intended to provide an alternative that is appealing to adolescents and thus not have a need to smoke the hookah to meet the needs of feeling autonomous, competent, or have a sense of relatedness. By reducing adolescent hookah pipe use, adolescents will be healthier, and by meeting their BPN, they can lead more fulfilled lives. The ensuing ripple effect will be felt across the lives of adolescents, families, and even society. Refraining from smoking the hookah pipe would potentially discourage younger siblings from starting the habit, and maybe even older siblings too. Family members, teachers, and community leaders

will also be more cognisant of the dangers of hookah pipe smoking and be more apt to foster BPN, and thereby support adolescents better and create conducive contexts that can satisfy needs. In the long run, it is expected that discouragement will lower the burden of substance abuse in South Africa.

1.9 Publication and Dissemination

1.9.1 Conferences

Kader, Z., Crutzen, R., & Roman, N. V. *Interventions aimed at reducing hookah pipe use: A systematic review*. Oral presentation: SACENDU Meeting hosted by the Medical Research Council (MRC), 24 April 2018, Cape Town, South Africa.

Kader, Z., Crutzen, R., & Roman, N. V. *The role of family on adolescent hookah pipe use: Implications for policy and practice*. Oral presentation: Annual National Doctoral Conference hosted by the National Institute for Humanities and Social Sciences (NIHSS), 29 October 2019, Johannesburg, South Africa.

1.9.2 Publications

Kader, Z., Crutzen, R., & Roman, N. V. (2019). Interventions aimed at reducing hookah pipe use: A systematic review. *South African Medical Journal*, 190(6), 392–405

Kader, Z., Roman, N. V., & Crutzen, R. (2020). Determinants of Adolescent Hookah Pipe Use: A Systematic Review. *Journal of Child & Adolescent Substance Abuse*, 1–20.

Kader, Z., Crutzen, R., & Roman, N. (2020). Intervention to reduce adolescent hookah pipe use and satisfy BPN. *Cogent Psychology*, 7(1), 1782099.

1.10 Thesis Layout

Chapter One introduced the reader to the field of study, discussing the main variables – hookah pipe and BPN. In addition to describing the background to the study, the rationale, problem, research questions, hypotheses, and aim and objectives were also provided. The chapter concluded with the significance of the study, and outline of the chapters.

Chapter Two presented existing literature on tobacco, hookah smoking, and the effects of smoking the hookah pipe, the self-determination theory (SDT), and developmental perspective that guided this study. The chapter looked at the theoretical assumptions and propositions as well as the main constructs of the theory, with the aim being to provide the reader with insights regarding the theories and literature underpinning this study.

Chapter Three focused on the mixed method methodology, data collection, context, sampling and population that was used in this study, providing insights into the processes that were followed. This study was conceptualised in two phases: Phase 1 was interested in identifying the need – it included two systematic reviews, a quantitative component, and a qualitative component. Phase 2 was interested in the design of the intervention – it included a Delphi study. The research phases were sequential, “building” on each other to achieve the aim of the study.

Chapter Four addressed objective 1 of this study: *Review determinants of adolescent hookah pipe use*. This chapter forms part of Phase 1 of the study, which was interested in knowing why adolescents use the hookah pipe. This chapter is published in the Journal of Child and Adolescent Substance Abuse.

Chapter Five addressed objective 2 of this study: *Review interventions aimed at reducing hookah pipe use*. This chapter forms part of Phase 1 of the study, which was interested in the reach, efficacy, adoption, implementation, and maintenance of the results in the various interventions. The aim of this chapter was to provide insight into existing interventions, which would be fundamental when designing an intervention to reduce hookah pipe use among adolescents. The strengths and weaknesses of the interventions were also discussed. This chapter is published in the South African Medical Journal.

Chapter Six addresses objectives 3 and 4: *Determine the prevalence of hookah use and compare (a) harm perception, (b) motivation for hookah use/non-use, and (c) BPN of adolescent hookah pipe users and non-users*. These objectives were met using a quantitative

inquiry. The chapter was interested in determining the number of users and non-users in the Western Cape to assess the severity of the problem (adolescent hookah pipe use). Hookah pipe users' and non-users' perception of harm was studied to ascertain how much knowledge they have about hookah pipe smoking. This chapter also investigated why hookah pipe users smoke the hookah pipe and why hookah non-users do not smoke the hookah pipe. Furthermore, it compared hookah pipe users' and non-users' needs frustration and needs satisfaction. This formed the basis for the next chapter and the qualitative inquiry. This chapter is under review at HealthSA Gesondheid.

Chapter Seven partially addresses objective 4 of this study: *Compare (a) motivation for hookah use/non-use and (b) BPN of adolescent hookah pipe users and non-users*. This chapter was interested in understanding what motivates adolescent hookah pipe users to smoke the hookah pipe and what motivates adolescent hookah pipe non-users to not smoke the hookah pipe. This chapter built on the process and findings of Chapter 6. These findings were needed for the development of the intervention as it guided what satisfies and frustrates adolescents' BPN and it honed it on what motivates adolescents to pursue behaviours such as hookah pipe smoking. This chapter is under review at the Journal of Humanistic Psychology.

Chapter Eight focused on meeting objective 5 of this study: *Explore and determine how families influence the decisions to smoke the hookah pipe and how they contribute to the satisfaction of BPN*. Chapter 8 used a mixed methods methodology to study the role families had on adolescents' decision to smoke or not smoke the hookah pipe as well as the role families had on their BPN. This was important because adolescents are guided by their family environment, thoughts, and behaviours. These findings were needed to determine the role of the family when designing the intervention to reduce adolescent hookah pipe use and satisfy BPN. This chapter is under review as a book chapter in the book: *Children in Africa: Opportunities and Challenges*.

Chapter Nine focused on meeting objectives 6 and 7 of this study: *explore and describe the need for an intervention to reduce hookah pipe use and design a programme to reduce hookah pipe use and satisfy their BPN*. This chapter formed part of Phase 2 of the study. It consolidated the findings from the previous inquiries and then presented these to a group of expert stakeholders in order to co-create the intervention. This chapter discusses the process to design the intervention and it presents the intervention using a RE-AIM framework. This chapter is published in Cogent Psychology.

Chapter Ten presented the summary of the previous phases and provided an overall discussion and integration of the findings. The intervention is illustrated by integrating SDT, the developmental perspective, and the intervention mapping design. Lastly, the implications, the limitations, and recommendations for future research, practice, and policy were provided.

Having introduced the research topic and main elements of the study, attention now shifts to the conceptual understanding of the study.

1.11 References

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CHAPTER 2

CONCEPTUAL FRAMEWORK

2.1 Introduction

Whilst a plethora of theories describing human behaviour exist, this study advocates that the pragmatic nihilism perspective is the most useful for understanding and changing behaviours, such as hookah pipe use. This perspective is able to make sense of both theory and empirical findings (Peters & Crutzen, 2017). In this process, pragmatic nihilism suggests that the most important goal is to identify all relevant aspects of an adolescent's makeup concerning behaviour and not only focus on a single theory. Although the latter might be insightful, Peter and Crutzen (2017) argue that it is limiting because it is unlikely to address all aspects of human behaviour. However, incorporating too many theories to explain all variances of behaviour may be overwhelming and undesirable. Therefore, these authors assert that pragmatic nihilism fosters better behavioural prediction, thereby contributing to developing a more effective behaviour change intervention. For this reason, the conceptual framework used in this study comprised (a) empirical evidence, which provided knowledge and understanding of observed and measured phenomena from actual experiences; (b) the developmental perspective, which provided insight into the development stage of adolescence; and (c) SDT, which created awareness about BPN and categories of motivation.

The current chapter introduces the conceptual framework of the study by discussing the empirical evidence, developmental perspectives, and SDT.

2.2 Tobacco

Tobacco is one of the most important preventable causes of premature death in the world (Drope & Schluger, 2018). Yet, the WHO (2015) has found that tobacco use is responsible for the death of approximately six million people across the world each year. Tobacco use is a major public health concern globally and in South Africa (Reddy et al.,

2015). Tobacco use is often associated with ill-health, disability, and death from non-communicable chronic diseases. Drope and Schluger (2018) identified how tobacco affects all aspects of health. Figure 2.1 below highlights the harmful effects of tobacco use:

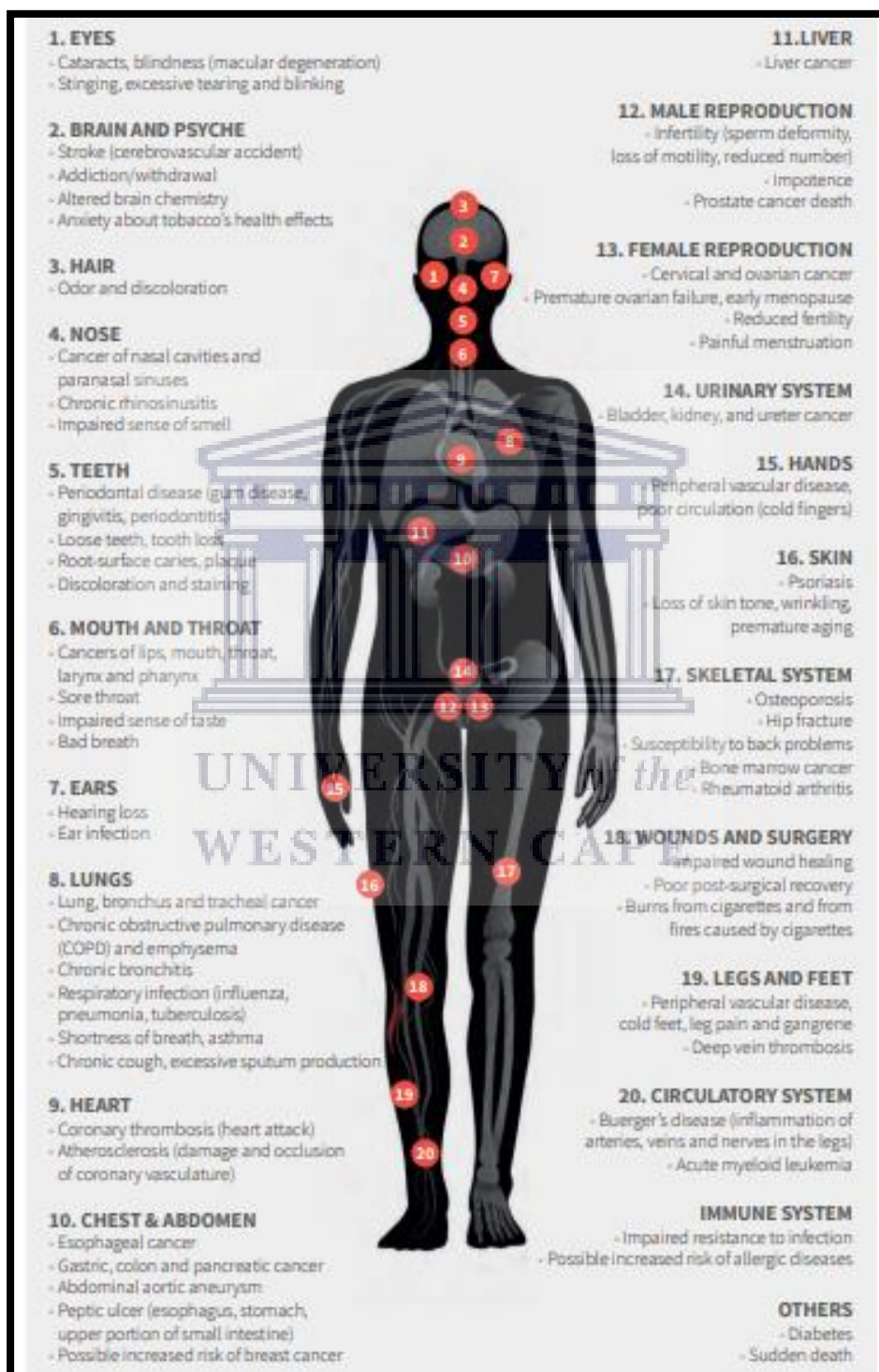


Figure 2.1: Harmful Effects of Tobacco Use

Source: Drope & Schluger (2018)

While tobacco use has many health consequences, the negative health risks are not the only dangers of tobacco use. Tobacco harms the world's sustainable development (Drope & Schluger, 2018). The economic cost of smoking globally amounts to nearly 2 trillion dollars annually (Goodchild et al., 2017). Tobacco use contributes to the loss of production at school and work because of the health care related challenges of either being too sick to perform or needing to respond to healthcare related costs (Maciosek et al., 2017). Notably, healthcare facilities globally and in South Africa are impacted by an increased demand for health care services in order to treat smoking-attributable diseases. In addition, tobacco smoking affects the environment, for example, health damages from tobacco farming, smoking-related fire hazards, and cigarette butt littering (Smith & McDaniel, 2011). Lastly, smoking can create strain, suffering, and immeasurable pain for tobacco victims and their families (Drope & Schluger, 2018).

Even though tobacco has been used for centuries, the ways and means of using tobacco have differed. Tobacco can be smoked, chewed, or sniffed (if powdered). The most popular way of using tobacco is smoking it (Chatterjee et al., 2011). Cigarette smoking is considered the most common form of smoking; however, Salloum, Osman, Maziak and Thrasher (2015) have recognised the increasing popularity of the hookah pipe (illustrated in Figure 2.2. below) as a vessel to smoke tobacco in the last decade, with a steady increase since 2004.



Figure 2.2: Graphical Representation of the Hookah Pipe (Source: Google Images)

2.3 The Hookah Pipe

The hookah pipe (also referred to as water pipe, shisha, narghile, argileh, goza, and hubbly-bubbly) is a smoking vessel using flavoured tobacco (also known as shisha or maassel). Originating in the court of Emperor Akbar, in India, in the late 16th century, it was recommended by royal physicians as a way of reducing potential harm from smoking (Ray, 2009). Later, this trend spread across India and the hookah pipe was used by men and women from all social classes. For some time, the practice was adopted by British visitors staying in India for business (Ray, 2009). From India, the hookah trend spread to Persia, Turkey, North Africa, Saudi Arabia, China, and the Philippines in the early 17th century. Following a period of decline, the fashion was revived in the 1990s in parts of West Asia, Northern Africa, India, Indonesia, Europe, Russia, and North America (Kulak et al., 2018). By the mid 2000's, hookah pipe use was an emergent global public health concern (Akl et al., 2015). Today in 2020, it is a major health concern and interventions to reduce hookah pipe use are needed (Bashirian et al., 2020).

Even though the shapes and sizes varied over the years and in different parts of the world, most hookah pipes have three parts – a bowl, a pipe, and a hose. Shihadeh (2003) explains that flavoured tobacco is filled in a concavity in the head of the instrument (pipe), the tobacco is sealed with foil and a piece of lit charcoal is placed on top of the foil. Tiny holes are poked on the foil prior to placing the charcoal on it. Hookah pipe users inhale through a mouthpiece (hose); the user may decide if he or she wants to use a filter for hygienic reasons (which he or she can place in the mouthpiece when it is his or her turn to smoke) or if it will be shared without a filter. When hookah pipe users inhale through the mouthpiece, air is drawn over the charcoal and it becomes heated. Smoke is produced as it passes through the tobacco on its way through the water in the bowl and to the user. The hookah pipe is often smoked in groups, so the hose is passed on from person to person until the charcoal is used up. Another charcoal can be placed on the foil when the first charcoal is finished (burnt

away). Sometimes, the water is replaced by alcohol and cannabis is mixed with the tobacco in the head. According to Folan and Massucci (2015), hookah pipe smokers may inhale a similar amount of smoke during one session as a person who would smoke 100 or more cigarettes, yet it remains a common and favourable practice.

2.4 Prevalence

2.4.1 Global Trends

Eshah and Froelicher (2017) report that 71% of current hookah pipe users started as adolescents. Moreno (2015) found 18% of high school seniors reported using the hookah pipe in the last year. In the Middle East, 6%–34% of adolescents use the hookah pipe; 5%–17% in the United States; and 39.6% in a British sample of adolescents (Maziak et al., 2015). A systematic review conducted by Jawad et al., (2018) looked at the prevalence and trends of hookah pipe use globally. They included 129 studies reporting 355 estimates for 68 countries. The countries under review were categorised according to WHO regions (Africa, Americas, Eastern Mediterranean, Europe, South East Asia, Western Pacific). The study found that prevalence estimates among youth were about equal between Eastern Mediterranean and European regions. Additionally, they found that past 30-day use was highest among Lebanese youth, ever use was highest among Lebanese youth, regular or occasional use was highest among Iranian university students, and daily use was highest among Egyptian youth. All regions described an increase in use over time. However, Turkey (2.3% in 2008 to 0.8% in 2010) and Iraq (6.3% in 2008 and 4.8% in 2012) both witnessed decreased hookah pipe use, perhaps owing to legislation and bans in these countries (Jawad et al., 2018).

2.4.2 South African Trends

There is limited research in South Africa regarding the prevalence of hookah pipe smoking with studies mostly focusing on the Gauteng and Western Cape Provinces. This is not surprising since Jawad et al., (2018) found that only 1.4% of studies included in the

abovementioned global review were from Africa. Combrink et al., (2010) collected information from Grade 10 students attending a secondary school in an impoverished area in central Johannesburg. Of these students (aged 14 to 20 years), 60% indicated that they had used or were using the hookah pipe, and 33% reported using it daily. Most young people in this study preferred to smoke the hookah pipe at parties, with friends, or at home. They perceived smoking the hookah pipe as safer than smoking cigarettes (Combrink et al., 2010). In the Western Cape, experimentation with the hookah pipe is common amongst university students, with approximately 60% of students having tried it. Furthermore, van der Merwe et al., (2013) and Daniels and Roman (2013) found that 18% and 40%, respectively, of their sample were current hookah pipe users. Kruger and colleagues (2016) found that 63% of Western Cape university students experimented with the hookah pipe. In the past 30 days, 9.9% of the students smoked the hookah pipe. Senkubuge and colleagues (2011) found that 18.6% of their university student population were current hookah pipe users. Hookah pipe use was associated with having an alcohol drinking-problem, currently smoking cigarettes, and reporting exposure to smoking in places other than home. It was revealed that most current hookah pipe smokers began smoking in high school (van der Merwe et al., 2013). This means that adolescent hookah pipe use is a concern and it should be curbed at this stage. Legislation could be one way of curbing hookah pipe use.

2.5 Legislation

2.5.1 International

Currently, there are many tobacco control policies such as the WHO framework Convention on Tobacco Control (WHO FCTC) but the policies are mainly focused on cigarettes (Peer, 2018). While many of these policies extend to other tobacco products, there is still an increase in hookah pipe use. The hookah pipe is more complex than cigarettes because it has unique features that other tobacco products do not have, such as the large

apparatus, charcoal briquettes, tobacco flavours, perceived harmlessness, and social attraction. In order to regulate this practice, policy needs to make special reference to hookah pipe use and current laws need to be strengthened to address hookah pipe use (Jawad et al., 2015). Jawad et al., (2015) conducted a global analysis of hookah pipe smoking legislation and policy based on Google alerts and the Tobacco Control Laws website. Most policies made reference to hookah pipe generically, which means that the hookah pipe was viewed as entirely on par with cigarettes or other tobacco products; therefore, the hookah pipe was referred to as a tobacco product, and/or smoking, or no reference was made about the hookah pipe at all. Mauritius, on the other hand, had a generic policy restricting tobacco but they made specific reference to prohibiting hookah pipe tobacco. Hookah pipe specific laws were only found in six countries (Costa Rica, Israel, Turkey, Ukraine, Lebanon, and Russia). However, there was no marked difference between the hookah pipe specific legislation and countries where hookah pipe smoking was regarded generically. Costa Rica, Israel, Turkey and Ukraine made reference to smoke free law; Israel, Lebanon and Turkey made reference to health warnings; and Turkey and Russia made reference to advertising, sponsorship, and promotion. The smoke free law included the prohibition of smoking in public, private, and indoor spaces. Ukraine emphasised that smoking the hookah pipe is prohibited. In terms of health warnings, tobacco cannot be marketed unless a warning is printed in letters and the list of health warnings concerning the harmful and fatal effects must be clearly indicated. In Turkey, health warnings were determined by the Board and must be placed on hookah pipe vases. In Turkey, no type of advertisement, introduction, campaign, or promotion that encourages or promotes the consumption of tobacco products could be advertised, whereas in Russia, strict guidelines have been identified when advertising.

Jawad et al., (2018) identified the value of legislation pertaining to hookah pipe use. This is especially true for Turkey where the laws are stricter and more entrenched. Turkey is one of the only countries that has seen a decline in hookah pipe use. The decrease in trends in

Turkey could be attributed to legislation and bans in the country whereby the use of all kinds of tobacco products was banned in all enclosed public places, including hookah pipe cafes. The law also states that any tobacco product, hookah pipe, and cigarettes that do not contain tobacco but are used in a way to imitate a tobacco product, are considered a tobacco product. In addition, tobacco products cannot be sold to minors and health warning labels must be placed on the hookah pipe bowls used for consuming water pipe tobacco products, covering at least 65% of the principal display. Hookah pipe and other tobacco products that are smoked in and around the workplace must have a door-to-door distance of at least 100 m from formal education institutions, such as schools and tutor centres (Jawad et al., 2018).

Presently, there is cognisance in some parts of the world to specifically include hookah pipe use in policy. However, there are gaps in legislation and implementation of the legislation. These gaps could compromise existing tobacco control policy frameworks. Therefore, there is a need to reinforce current laws by referencing hookah pipe products, its accessories, and having specific regulations related to hookah pipe smoking, particularly at bars and restaurants where the hookah pipe is offered on the menu (Jawad et al., 2015).

2.5.2 South Africa

South African legislation does not have special conditions or regulations about the hookah pipe. When defining tobacco products, the hookah pipe is included as a type of tobacco product. The Tobacco Products Control Act 83 of 1993 as amended by General Law Fifth Amendment Act 157 of 1993, Tobacco Products Control Amendment Act 12 of 1999, Tobacco Products Control Amendment Act 23 of 2007, and Tobacco Products Control Amendment Act 63 of 2008 incorporates six legislative requirements to control tobacco in South Africa:

- **Smoking in public spaces:** No person may smoke any tobacco product in a public place, including a place where there is no window, no ventilation inlet, or doorway to or entrance

into a public place. A person may not smoke in a motor vehicle when a child under the age of 12 years is present in that vehicle. The Minister may permit smoking in a prescribed portion of a public place, subject to prescribed conditions, such as the designated smoking area does not occupy more than 25% of the total floor, there is a solid partition between smoking and non-smoking areas, the smoking area is well ventilated, and the smoke from the area is exhausted to the outside. No person may smoke any tobacco product in a private dwelling if that private dwelling is used for any tutoring, schooling, or commercial childcare activity.

- **Advertising, sponsorship, promotion, distribution, display and information required in respect of packaging and labelling of tobacco products:** No person shall promote or advertise, or cause another person to promote or advertise, a tobacco product through any direct or indirect means, including through sponsorship of any organisation, service, event, project, bursary, scholarship, physical establishment, programme, or any other method. Only factual information can be presented. Packaging cannot be misleading or deceptive. A retailer shall display a notice in his or her place of business that contains the prescribed information regarding any tobacco product available at his or her place of business. No person will be able to sell tobacco products if these notices are not displayed. The displays cannot be altered.
- **Standards for manufacturing, importing, and exporting tobacco products:** Every importer and manufacturer of a tobacco product shall provide information about the product and its emissions to the Minister and the public in the prescribed manner and within the prescribed time. Export cannot occur unless the product meets the product and testing standards of the country of final destination.
- **Prohibitions in respect of tobacco products:** No person under the age of 18 years may buy or sell tobacco products. No one may supply or sell any confectionary or toy that

resembles or is intended to represent any tobacco product. Tobacco products may not be sold in any health establishment, including a pharmacy and/or any place where a person under the age of 18 years receives training or education. No one besides tobacco manufacturers or importers, employees, shareholders and its trade partners shall sell, offer to sell, supply, distribute or buy any tobacco product through the postal services, the Internet, or any other electronic media. Furthermore, no manufacturer, distributor, importer or retailer of a tobacco product, or any person or representative acting on behalf of a manufacturer, importer, retailer or distributor, shall at a reduced price or for free, other than a normal trade discount, distribute any tobacco product or supply any tobacco product to any person for subsequent distribution.

- **Restrictions on use of vending machines:** No person shall place a vending machine containing tobacco products in any outdoor or indoor location, other than in the specified public place which has been declared by the Minister. The vending machine may not be used for other products besides the tobacco products. The relevant notices must be displayed in the prescribed manner on the vending machine regarding any tobacco product available for sale in that vending machine. The person responsible or in control of the premises where the vending machine is kept has to ensure that no person under the age of 18 years makes use of the vending machine.
- **Regulations:** The Minister may make regulations regarding the signs and information that must be displayed at points of sale and on vending machines. This includes the size and format of the signs, health warnings that must appear on the signs, legal age at which tobacco products may be purchased, and the location of the signs; information that must be displayed on a package containing a tobacco product and on an enclosed leaflet, picture or pictogram. The following information must be visible: information about the product and its emissions, health hazards and health effects arising from the use of the product or from its emissions, other health-related messages, such as advice on how to stop smoking,

information that may not appear on packages and the descriptors, package design characteristics, graphics or terms considered to be false, misleading, deceptive, or likely to create any erroneous impression. Furthermore, the standards that a tobacco product must comply with, includes the amount of substances that may be contained in the product or its emissions, substances that may or may not be added to the product, product design, and composition.

Persons who fail to comply with this legislation should be convicted and expected to either pay a fine or face imprisonment.

In 2018, The South African Minister of Health proposed five amendments to the existing Tobacco Products Control Act of 1993. These include (1) a zero tolerance policy on indoor smoking in public places, (2) a ban on outdoor smoking in public spaces, (3) when smoking outside, smokers must be at least 10 metres away from public entrances, (4) the removal of all signage on cigarette packaging aside from the brand name and warning stickers, and (5) cigarettes may no longer be publically displayed by retailers. These amendments have been submitted to the ministerial cabinet, but it has not been approved yet.

While South African legislation is on par with international standards and has satisfactory regulations for tobacco products, especially cigarettes, a lot of consideration needs to occur for hookah pipe use. While not smoking in a vehicle with children 12 years of age or younger and regulating non-use in a private dwelling if it is used for any schooling, tutoring, or commercial childcare activity is progressive, legislation does not explicitly condemn hookah pipe use in homes where children reside (not commercial activities), or their recreational spaces, such as the park. Reference is only made to public spaces, such as restaurants and bars. Also, no consequences or regulations have been considered for adolescent use of any tobacco product, even though adolescent use is a common occurrence in South Africa (Desai et al., 2019).

2.6 Knowledge, Attitude and Perceptions of Hookah Pipe Use

Despite legislation, the hookah pipe is used globally by people from all ages and races (WHO, 2015), but knowledge, attitudes, and perceptions of hookah use differ. Holtzman and colleagues (2017) found that college respondents in the United States viewed hookah pipe use as less addictive, less harmful, and as containing less nicotine than cigarettes. Adolescents, on the other hand, believed that hookah pipe smoking is more socially acceptable in society than cigarette smoking. This allowed girls to feel more comfortable smoking hookah pipe compared to cigarettes (Anjum et al., 2008). Also, occasional users perceived the hookah pipe as less harmful than cigarette use (Cornacchione et al., 2016). These findings were echoed in Hammal et al.'s (2008) study conducted in Syria, although frequent users reported feeling addicted in a similar way to cigarette smokers. These findings were corroborated by South African respondents who also perceived hookah pipe use as less addictive than other substances and are convinced that the health risks are being exaggerated (Roman & Daniels, 2013).

Van der Merwe et al., (2013) found that only 31% of South African participants had prior information regarding the dangers and health effects of hookah pipe smoking with 60% obtaining knowledge from printed and audio-visual media. Interestingly, 91% were to an extent aware of the harmful effects of smoking the hookah pipe, although the majority adopted a permissive attitude because it is considered socially acceptable. Also, respondents generally had an indifferent attitude about secondhand smoke. Respondents (hookah users and non-users) reported being less bothered by hookah smoke compared with cigarette smoke and they did not consider being exposed to secondhand hookah smoke a problem, especially in a close friend or family setting (Holtzman et al., 2017). Essentially, the research shows that young people do not view hookah pipe use as a major health or social concern.

2.7 Negative Effects of Hookah Pipe Smoking

Many hookah pipe users are oblivious to the negative effects of hookah pipe use or disregard it (Roskin & Aveyard, 2009). Even though there have been earlier beliefs by royal physicians about using the hookah pipe to reduce the potential harm from smoking, global and South African literature proves otherwise (Ray, 2009; Reddy et al., 2015). Maziak (2013) highlights that hookah pipe smoking takes place over a longer period of time compared to cigarette smoking. Hookah smoking sessions typically last 45–60 minutes and involves larger volumes of smoke compared to cigarette smoking. Quite similar to tobacco smoking, hookah smoking poses several risks to one's health, health systems, environment, and the economy.

2.7.1 Health Effects of Hookah Pipe Smoking

Albers et al., (2015) identify three components of the hookah pipe that are bad for one's health:

- a) **Charcoal:** Charcoal is burned in the hookah pipe to heat the tobacco and create the smoke because the fruit syrup or sugar makes the tobacco damp. The inhaled smoke has been found to contain high concentrations of carbon monoxide (CO), nicotine, and other heavy metals (such as mercury and lead), all of which have the potential to cause adverse health effects, such as respiratory diseases and heart conditions.
- b) **Tobacco:** Hookah tobacco and smoke contain several toxic agents known to cause lung, bladder, and oral cancers.
- c) **Mouthpiece:** Infections may be passed to other smokers by sharing the mouthpiece of the hookah.

However, these are not the only health effects of the hookah pipe. The hookah pipe has several short-term effects, long-term effects, and health effects as a result of secondhand smoke. Al- Al-Kubati and colleagues (2006) and van der Merwe et al., (2013) identify the following as short-term health effects which arise from hookah pipe smoking: shortness of

breath, nausea, headaches, light headedness, increased respiratory rate, dehydration, carbon monoxide intoxication, decreased exercise capacity, coughing, loss of taste, increased heart rate and systolic (a measure of blood generated by the heart's contraction), and diastolic blood pressure (a measure of blood pressure between contractions of the heart).

El-Zaatari and colleagues (2015) reviewed the long-term health effects of hookah smoking and found the following:

- a) **Long-term cardiovascular effects:** Hookah pipe users have increased risk of heart disease compared to never users and it was found that hookah pipe smoking was associated with the extent of coronary artery disease. Hookah pipe smokers experienced significantly higher rates of recurrent ischaemia (restriction in blood supply to tissues, causing a shortage of oxygen that is needed for cellular metabolism). The review found a weak association between exclusive long-term hookah pipe smoking and increased blood pressure, and no association between exclusive hookah pipe smoking and hypertension in healthy young adults, primarily university students. This could be attributed to the fact that respondents reported only smoking one to two times per week.
- b) **Effects on the respiratory system:** Chronically, CO levels may be elevated and can become permanently altered, leading to chronic obstructive pulmonary disease (COPD). Chronic bronchitis, emphysema, and exacerbation of asthma are other pulmonary manifestations of hookah pipe smoking.
- c) **Carbon Monoxide (CO) Toxicity:** Hookah pipe smoking leads to a marked CO inhalation and increased carboxyhaemoglobin (COHb) or exhaled CO when compared to cigarette smokers and non-smokers. COHb compromises the transportation of oxygen to organs such as the brain, and can cause dizziness, headache, syncope, and nausea. The increase in exhaled CO levels is most likely related to the charcoal.
- d) **COPD, chronic bronchitis, emphysema and asthma:** An association was found between COPD and smoking the hookah pipe as well as emphysema and smoking the

hookah pipe. Symptoms of chronic bronchitis is more severe in hookah pipe smokers compared to non-smokers. Chronic cough but not chronic sputum production was more prevalent in individuals with occupational exposure to hookah pipe smoke.

- e) **Lung Cancer:** An association between lung cancer and smoking the hookah pipe was found in several studies but evidence linking hookah pipe smoking and lung cancer is limited and more robust studies are needed to determine this relationship.
- f) **Oesophageal, gastric and bladder cancer:** Studies supporting associations between hookah pipe use and oesophageal, gastric, and bladder cancer exist, but robust studies are needed to determine this relationship.
- g) **Obstetrical and perinatal outcomes:** Hookah pipe smoking has been associated with obstetric and perinatal complications, including low birthweight, infant mortality, and pulmonary complications at birth but the studies where data was obtained was methodically limited and have not been replicated. Therefore, more robust studies are needed to determine this association.
- h) **Periodontal and oral disease:** Periodontal disease, dry socket after dental surgery, and vertical periodontal bone defects was associated with heavy hookah pipe smokers. However, adjustment for confounders was either absent or incomplete in most cases. Thus, more robust studies are still needed. Hookah pipe smoking was associated with a greater referral rate for oral lesions suspicious for cancer, but weak associations were found. Therefore, the association of hookah pipe smoking and oral lesions remains inconclusive.
- i) **Infectious disease:** A cluster of tuberculosis cases was reported among individuals who shared a hookah pipe mixed with cannabis. The social nature of hookah also puts users at risk for other infectious diseases like tuberculosis, hepatitis, and meningitis. However, it was difficult to separate the effect of close contact from that of hookah pipe sharing, therefore further investigation is needed.

j) **Other:** Single studies report effects on larynx and voice, asthma, osteoporosis, mental health diagnoses, greater BMI and risk for obesity, low back pain, increased risk of gastroesophageal reflux and overall health-related quality, but these associations need further confirmation.

In addition to the aforementioned health consequences, in 2020 the world faced an unprecedented global pandemic. On 11 March 2020, the WHO declared the coronavirus (COVID-19) outbreak a global pandemic (WHO, 2020a). At the time of writing, the number of confirmed cases and deaths in South Africa are increasing daily, as they are worldwide (WHO, 2020b). South Africa is currently under lockdown. Coronaviruses (CoV) are a large family of viruses that cause illness ranging from the common cold to more severe diseases and even death. The virus is novel because it has not been previously identified in humans. However, since people have now contracted the virus, it can be spread from person to person, and is primarily spread through close contact with another individual, in particular, through sneezing and coughing (WHO, 2020a). Although, since the hookah pipe requires the sharing of mouthpieces, it could be a potential risk as the virus could be transmitted through respiratory droplets. Also, since hookah pipe smoking is usually performed in a group, being in close proximity of many people increases the risk because a person could be a carrier and asymptomatic. Smoking the hookah pipe increases the likelihood of respiratory diseases (El-Zaatari et al., 2015), smoking the hookah pipe could exacerbate the experience of the illness if one is diagnosed. In addition, since the virus is novel, experts are learning about it in real time, so conclusive evidence does not exist yet about how risky smoking the hookah pipe can be for the contraction of the virus or the health consequences.

Health effects as a result of secondhand hookah pipe smoke poses a serious risk for non-smokers, particularly because the smoke contains not only tobacco but also other substances from the heat source, such as charcoal, and other heavy metal compounds (Chaouachi, 2009). Acrolein is a highly ciliotoxic agent, a toxic respiratory irritant, a

cardiotoxicant, and a possible carcinogen present in hookah smoke (Kassem et al., 2018). Due to these toxins, secondhand hookah smoke increases the risk of heart disease, sudden infant death syndrome, lung cancer, respiratory problems, ear infections, and asthma attacks (Noonan, 2010). No amount of secondhand smoke is safe since hookah pipe smokers and secondhand smokers are at risks for the same kinds of effects (Martinasek et al., 2011). Furthermore, Nayani et al., (2018) found that environmental tobacco smoke can directly and indirectly cause dental caries in children. The direct exposure of environmental tobacco can affect tooth surface, whereas indirect affect may cause enamel hypoplasia of a developing tooth or caries resulting from salivary gland impairment. Therefore, reduction of second-hand smoking is imperative for not only improving the oral health of children but for the prevention of other chronic illnesses as well (Nayani et al., 2018).

Whilst some health effects may be inconclusive, they are definitely apparent. There is overwhelming unanimity amongst researchers that hookah pipe use is not only an individual health concern, but indeed also a public health concern.

2.7.2 The Effect of Hookah Pipe Smoking on Health Systems

Since hookah pipe smoking is a public health concern, it has a natural impact on health systems, particularly in impoverished areas in South Africa where resources are already stretched (Reddy et al., 2015). However, literature appears limited in terms of determining how hookah pipe specifically affects health care systems since great emphasis is placed on the environment and health effects. Maciosek et al., (2017) claim that the effects on the health care system would be quite similar to that of tobacco smoking, which is to treat short-term, long-term, and secondhand smoke related health concerns. Noonan and Kulbok (2009) have cautioned healthcare providers to familiarise themselves with the implications of hookah pipe smoking and its effects so that they can educate their patients about the health risks inherent in these products to help prevent the long-lasting problem of nicotine addiction.

2.7.3 Environmental Effects of Hookah Pipe Smoking

Many people view tobacco smoke as harming the environment but the growing, production, marketing and consumption are all devastating for the environment. The cultivation of tobacco causes deforestation and over-utilises harmful chemicals. The waste from production is mostly toxic so the disposal of packaging and foil filled with burnt tobacco pollute the fragile ecosystems (Drope & Schluger, 2018). Whilst tobacco products including hookah smoking negatively affects the environment and ecosystems, it also has an impact on homes, bars, and restaurants where the hookah pipe is smoked (Gurung et al., 2016). According to Weitzman et al., (2016), hookah smokers generally smoke at their homes or their friend's homes. As a result, hookah smoke impairs the air quality in the home. Weitzman et al., (2016) found that the rooms where the hookah pipe was smoked had the highest concentrations of all pollutants. CO levels were found to be significantly higher in the hookah smoking rooms compared to cigarette smoking rooms. Interestingly, the CO levels in the rooms adjacent to where the hookah pipe was smoked were 2.5 to 4 times greater than the smoking and non-smoking rooms of the cigarette homes (Weitzman et al., 2016).

Besides smoking at home, people may choose to smoke at a bar or restaurant. Gurung et al., (2016) studied the concentrations of several environmental tobacco smoke pollutants such as CO and particulate matter with a diameter of less than 2.5 microns (PM_{2.5}) by using sensors inside and outside places where the hookah pipe was typically smoked. It was found that smoking the hookah pipe increases the concentrations of CO and PM_{2.5} inside premises where the hookah pipe is smoked. This result is analogous with the result obtained by Weitzman et al., (2016) who obtained similar findings in rooms in residential homes where hookah was smoked. Smoking inside of rooms or restaurants does not only affect smokers but it also causes adverse health effects in employees working at these establishments and people living in these homes because of the concentrations of indoor air pollutants and secondhand

smoke which has adverse health effects. The effects may be greater and reach a local community where the home, bar, or restaurant is located because the indoor air leaks outdoors and may cause a public health concern since it may affect local communities (Nayani et al., 2018).

2.7.4 Economic Effects of Hookah Pipe Smoking

The economic impact of smoking tobacco in any form is impacted by active and passive smoking. The economic impact is often felt by families, taxpayers, private individuals, and employers (Ekpu & Brown, 2015). Reddy et al (2015) highlights that households in South Africa (the bottom two quartiles) systematically allocate smaller budget shares towards some food categories than non-smoking households. Economic costs of smoking may be (a) *direct*, such as health effects, addiction, resources by government and organisations to minimise the prevalence of hookah pipe use, health care expenditure, or missing school or classes because of the desire to smoke the hookah pipe, or ill health; (b) *indirect*, for example, cost to society and people exposed to secondhand smoke, cleaning up the environment and cost to employers due to loss of productivity; and (c) *intangible*, such as the burden of pain and suffering caused by smoking-induced illness, morbidity, and mortality (Ekpu & Brown, 2015). Smoking may also lead to premature death. This negatively impacts the economy since the deceased will no longer pay tax (London, 2001).

Evidently, it is beneficial to reduce the prevalence of hookah pipe use. Benefits include but are not limited to: improved health and reduction of non-communicable diseases, improved economy, and development of countries through productive citizens (Lopez et al., 2017). Lopez et al., (2017) describes a need for intervention and legislation to reduce hookah pipe use for improved public health. This chapter will not discuss existing interventions as this is dealt with in Chapter 5.

2.7.5 Gateway and Addiction

In addition to health, environmental, and economic effects of hookah smoking, the hookah pipe has proven to be a gateway to other substances, such as cigarettes, cannabis, and alcohol (Nyarko & Masson, 2019). Since the tobacco used in hookah pipes contains the addictive substance *nicotine*, the transition to cigarettes is not uncommon. In many cases, hookah addiction may be stronger than cigarette addiction even with infrequent use. Similar to cigarette smoking, hookah pipe users experience withdrawal symptoms, cravings, and relapse (Siddiqi, 2018). This is a result of duration and frequency of use, chemical properties of the smoke, volume of smoke inhaled, and type of tobacco (Blachman-Braun et al., 2014). Also, the hookah pipe is a stationary mechanism; it is a time-consuming practice and may not always be readily accessible, whereas substances such as cigarettes, and in some cases, cannabis, become more feasible to obtain for immediate gratification or to satisfy smoking urges (Jaber et al., 2015). Therefore, the relation between access and dependence is likely to be a major predictor of the transition from hookah pipe to cigarette smoking (Jaber et al., 2015).

As with drinking alcohol, many young people perceive hookah pipe smoking as a form of socialisation and relaxation. In fact, the two are often consumed concurrently due to the availability of alcohol at hookah lounges/bars or at parties (Soule et al., 2015). For some people, alcohol enhances the hookah smoking experience and may play a role in hookah smoking initiation or alcohol initiation, depending on what the adolescent is using already (Soule et al., 2015). The use of alcohol may contribute to the increased urge to smoke, maintenance of hookah pipe smoking through enhanced smoking experiences, and significant exposure to addictive nicotine (Leavens et al., 2020). Thus, adolescents addicted to the hookah pipe may also be at risk for alcohol addiction (Jaber et al., 2015).

According to Berg and colleagues (2018), tobacco and cannabis use have a complementary and synergistic relationship, wherein the effects of one may reinforce and/or enhance the effects of the other, potentially through psychological and/or physiological mechanisms. Cannabis and alcohol are commonly used with the hookah pipe, although the use of cannabis is more common than the use of alcohol in the hookah pipe. Using the hookah pipe increases the risk of initiating and allows for continuation of use of cannabis (Sterling & Mermelstein, 2011). In their study, Audrain-McGovern and colleagues (2018) found that 14-year-old adolescents who use the hookah pipe are 3.6 to 4 times more likely to use cannabis two years later. Moreover, cannabis users have higher prevalence rates of tobacco use compared to non-users (Schauer et al., 2015). Therefore, adolescents are at risk for cannabis addiction too.

2.8 Positive Perceptions of Hookah Pipe Smoking

Despite the negative effects of hookah pipe smoking, South African adolescents continue to smoke the hookah pipe. They tend to focus on the collateral gains, such as social connectedness, relaxation, and experiencing the novelty (Daniels & Roman, 2013). Leavens et al., (2020) identified hookah pipe smoking as fun and a coping mechanism to life's stressors, since adolescents indicate that they smoke for recreation and relaxation purposes. Hookah pipe users use the hookah pipe for entertainment, taste of flavours, escape, relaxation, part of cultural heritage, and leisure (Daniels & Roman, 2013). A further investigation into determinants of adolescent hookah pipe use will be discussed in Chapter 4. To continue with the idea that there are positive effects of smoking the hookah pipe (if there were none, people would not use it), self-determination theory (SDT) – a motivation theory – asserts that people engage in or are motivated towards certain behaviours because they are in pursuit of satisfaction of their BPN (Deci & Ryan, 2000).

2.9 Self-Determination Theory (SDT)

2.9.1 Overview of SDT

Even though formation of SDT began in the 1970's, it was Edward L. Deci and Richard M. Ryan (1985) who introduced the first comprehensive SDT work in the mid-1980's. In a nutshell, SDT is a theory of human motivation. It is aimed at understanding what motivates human beings to behave the way they do, in this case, smoke the hookah pipe. Initially, SDT was focused on intrinsic motivation as a determinant of behaviour, but more recently, SDT is focused on the influence of intrinsic motivation, extrinsic motivation, and the social environment on human behaviour in the pursuit of goals (Deci & Ryan, 1985; Esau, 2016).

SDT asserts that human beings are inclined towards self-motivation and self enhancement in an attempt to satisfy their BPN (autonomy, competence, and relatedness). SDT assumes that “all individuals have natural, innate and constructive tendencies to develop an ever more elaborated and unified sense of self” (Deci & Ryan, 2002:5). Deci and Ryan (2002) also assert that healthy development involves the complementary functioning of inner organisation, holistic self-regulation, and integration of oneself with others. These assumptions are based on a set of six mini theories which form the basis of SDT (Deci & Ryan, 1985; 2000). The six mini theories are described in Table 2.1

Table 2.1: The Six Mini Theories That Form the Basis of SDT

Theory	Description
Cognitive Evaluation Theory (CET):	CET is concerned with the effects of social contexts, rewards, ego involvements, and interpersonal interaction on intrinsic motivation. According to CET, competence and autonomy supports in fostering intrinsic motivation.
Organismic Integration Theory (OIT):	OIT focuses on the process of internalisation of various extrinsic motives. OIT is concerned with the social contexts that enhance or hinder internalisation. Therefore, integration and internalisation are facilitated by contextual supports for autonomy, competence, and relatedness. This means that the likelihood of human beings adopting, partially adopting, or resisting a behaviour or belief system is dependent on whether they chose it, can do well in it, and connect with those who convey it. Therefore, OIT highlights that supports for autonomy and relatedness are critical to internalisation.
Causality Orientations Theory (COT):	COT emphasises individual differences, particularly how people adjust to different aspects of the environment in regulating their behaviour. There are three types of causality orientations emphasised by COT, namely: (a) the autonomy orientation – persons act out of interest in and valuing of what is occurring, (b) the control orientation – the focus is on rewards, gains, and approval, and (c) impersonal or amotivated orientation – characterised by anxiety concerning competence.
BPN Theory (BPNT):	The concept of BPN is connected directly with psychological growth and development, since the impact of any event or behaviour is largely a function of its relations with need satisfaction. Therefore, contexts that support versus thwart these needs should invariably impact wellness.
Goal Contents Theory (GCT):	Goals, such as personal growth, intimate relationships, or contributing to one's community, are considered conducive to need satisfaction, and therefore facilitate health and wellness. Whereas extrinsic goals such as appearance, financial success, and fame/popularity are less conducive to need satisfaction, and therefore facilitate lower wellness and greater ill-being.
Relationships Motivation Theory (RMT):	RMT is concerned with close relationships such as best friends or romantic partners as well as other relationships. RMT posits that relationships are essential for the well-being and adjustment of human beings. However, the relatedness need is mostly satisfied in high-quality relationships, but the autonomy need, and to a lesser degree, the competence need, is also satisfied. High quality relationships refer to relationships where each partner supports the autonomy, competence, and relatedness needs of the other.

These six mini theories constitute SDT – an organismic dialectic model. This means that human beings actively move towards psychological growth and development by attempting to satisfy their BPN. However, they require ongoing social nutrients and support which is received through the social context (such as family, school, and community context). The social context can either thwart or support the natural tendencies toward psychological growth and active engagement or it can catalyse a lack of integration, defense and fulfillment of need-substitutes. The dialectic between the active organism (human) and the social context is the basis for SDT's predictions about behaviour, experience, and development. Within SDT, the nutrients for healthy development and functioning are specified using the concept of *BPN* (Deci & Ryan, 1985; 2000).

2.9.2 Basic Psychological Needs

In order to understand human motivation, SDT posits that a consideration of innate psychological needs is imperative (Deci & Ryan, 2000). SDT argues that three BPN are essential. These three needs are autonomy, competence, and relatedness, and they guide people towards vital, competent, and socially integrated behaviours. The three BPN are also essential for ongoing psychological growth, well-being, and integrity. The needs are universal and must be satisfied in all cultures so that people can be optimally healthy (Ryan, Huta & Deci, 2008).

Considering basic psychological needs is an important part of addressing a public health concern such as adolescent hookah pipe use because it provides an understanding of the motivators of the behaviour. SDT argues that people are motivated toward certain behaviours in an attempt to satisfy their basic psychological needs. Considering adolescents desire to make their own choices and experiment in new behaviours, it may be that opting to smoke the hookah contributes to the satisfaction of their need for autonomy. Hookah pipe smoking is a social activity; this means adolescents spend time smoking with their friends. Having friends, belonging to a peer group and engaging in activities together is imperative for adolescents. For this reason, smoking the hookah pipe may contribute to satisfying their need for relatedness. Lastly, adolescents want to experience a sense of competence. Affirmation for inhaling a large amount of smoking, making shapes with the smoke and preparing a hookah pipe with the correct volumes of tobacco, water and coals are commended. Naturally, this type of approval can lead to feeling competent.

Undoubtedly, individual differences and social contexts support satisfaction or frustration of these BPN. However, constant deprivation of any need is to the detriment of an individual's health and well-being, as it leads to BPN being frustrated (Deci & Ryan, 2000). When needs are frustrated, it is more likely that compensatory behaviours or substitute

fulfilments will develop (Kader & Roman, 2016). Unfortunately, these compensatory behaviours or substitute fulfilments do not actually satisfy the frustrated BPN but provide some collateral satisfaction (Deci & Ryan, 2000). For example, if people's need for relatedness is substantially frustrated when they are young, they might compensate by deriving a sense of connectedness and security by joining a gang or they may seek to gain a sense of worth by attaining wealth and fame. Alternatively, they may smoke the hookah pipe with a peer group.

SDT argues that all three needs are essential and that if any are thwarted there will be distinct functional costs because BPN are universal aspects of functioning (Ryan & Deci, 2000). In other words, needs satisfaction will result in positive psychological consequences and needs frustration will result in negative psychological consequences (Deci & Ryan, 2000). The next section contextualises the three BPN of adolescents.

2.9.2.1 Autonomy

Deci and Ryan (2000) explain *autonomy* as the need that regulates one's behaviour and allows the individual to feel as though he or she is not being controlled by others or the external environment. Essentially, autonomous people are able to think, decide, and act freely. When an individual's autonomy is supported, they have a sense of empowerment and feel less threatened. Within an autonomy supportive environment, there is usually a sense of nurturance and care. This in turn enhances one's relatedness satisfaction. These need satisfactions create a willingness to learn, grow, and experiment (Ryan & Deci, 2017). According to Deci and Ryan (2000), when people are rewarded, surveilled, evaluated, or threatened, they tend to feel controlled and pressured. This diminishes autonomy satisfaction. When people are offered choice, they tend to experience greater autonomy satisfaction.

For adolescents, Bidjerano and Newman (2010) highlight that autonomy is demonstrated by their ability and desire to assert themselves in interacting and

communicating with parents and other authority figures. For adolescents, autonomy starts out by their inclination to independently perform actions, such as engaging in activities of their own choosing, making decisions on how they would like to spend their time, making choices regarding clothing, and expressing their own independent thinking (Shih, 2008). The ability to make these changes creates opportunities for self-experimentation and self-expression as well as practice in important qualities, such as leadership, initiative and creativity which is essential for healthy development (Bidjerano & Newman, 2010).

Becoming an autonomous individual is an accomplishment as it means a capacity for independence, less reliance on parents, and self-regulation. Autonomy supportive parenting contributes to include increased sense of self-esteem, enhanced academic competence, fewer signs of depression, and less antisocial behaviour. In contrast, excessive and unrestricted behavioural autonomy has been associated with externalised problems such as truancy and substance use (Shih, 2008). However, it is essential for parents to strike a balance by providing adolescents with direction when choosing activities and making decisions, but parents must allow opportunities for individuals to act in accordance with their own inner interests and desires for self-direction and independent decision making (Bidjerano & Newman, 2010).

2.9.2.2 Competence

Deci and Ryan (2000) describe *competence* as the need to feel a sense of mastery in physical and social worlds when one engages in developmentally appropriate experiences and challenges as well as expresses one's capacity. When people experience a sense of competence, it leads them to seek challenges that are optimal for their capabilities. They work towards enhancing and maintaining capacities and skills through activities that would lead to satisfaction of the need for competence (Ryan & Deci, 2017). Deci and Ryan (2002) assert that competence is not an attained ability or skill; instead, it is a feeling of competence and

effectiveness when engaging or completing an action. The satisfaction of competence is important because it contributes to long-term psychological health.

Adolescents need to have a perception that they possess adequate ability in a developmentally appropriate task in order for them to develop optimally and become self-determined (Darnier, 2009). Competence is necessary for adolescents because it encourages effort, enjoyment, persistence, prolonged engagement with a specific activity or task, and satisfaction. Having a sense of competence enhances the self-confidence of adolescents. Adolescents thrive in an environment that emphasises self-improvement, personal challenge, and positive and negative constructive feedback (even after failure). However, it is necessary for the adolescent to understand and believe that this feedback is geared towards their improvement (Hill et al., 2015). If this is the belief, adolescents will be more committed and feel more competent; if this is not the belief and understanding, then they feel a sense of inadequacy. Kader (2015) asserts that adolescent competence is centred around acquiring knowledge, learning to take pride in their work, and acquiring an attitude to do well in their tasks. There is also a positive identification with others, such as peers, parents, and siblings, who tend to do the desired things well.

2.9.2.3 Relatedness

Deci and Ryan (2000) explain relatedness as the need to experience a sense of belonging, intimacy, and security with others. Relatedness is about seeking positive attachments as well as developing and maintaining close personal relationships, such as romantic partners, close friends, and belonging to groups (Niemiec & Ryan, 2009). According to Deci and Ryan (2002), relatedness refers to feeling connected to others and caring for and being cared for by others. Relatedness involves being accepted by others and accepting others. Relatedness is much more than a formal status such as being with a spouse or a group member, or attaining a certain outcome (for example, sex); for a sense of relatedness to be

experienced, one needs to feel as though one is in relation to others. Relatedness is concerned with the psychological sense of being with others in a safe and secure communion. According to Kader and Roman (2016), relatedness includes sharing and internalising group needs and values. Relatedness allows one to cohere with one's group (family, friends, and community).

It is important for adolescents to feel that they belong. Socialising with peers is of cardinal importance in this developmental stage. They need to feel a sense of inclusiveness and a sense of belonging (Hill et al., 2015). Adolescents require social support from their peers and adults. They look for contact with family members, teachers, sporting peers, coaches as well as friends at school or in the community. This can be at social events or through social media (Hill et al., 2015). Within these relationships, adolescents experience levels of trust and they learn how to manage conflict.

It is important for adolescents to socialise and build personal connections. These connections foster the development of a group identity and increase feelings of relatedness (Hill et al., 2015). For the need of relatedness to be satisfied, Ryan and colleagues (2008) assert that they must feel loved and cared for by others, which must be returned and reciprocated. Having a sense of belonging allows adolescents to share knowledge, skills, and feelings to the individual, which promotes cohesive social organisation; without it, they will experience feelings of alienation, loneliness, and social isolation (Kader, 2015).

For these needs to be met, adolescents must be motivated to pursue behaviours that will allow for satisfaction of these needs.

2.9.3 Motivation in SDT

SDT is based on the premise that people are by nature self-motivated, active, interested and curious beings with a desire to succeed as it is rewarding and satisfying. However, it is necessary to highlight that people can be passive and disaffected or alienated and mechanised (Deci & Ryan, 2008). Usually, motivation was considered a unitary concept

that focused primarily on the amount of motivation people had in order to engage in certain behaviours and tasks. In SDT, there are three categories of motivation, but they reside along a continuum with intrinsic motivation at one end, extrinsic motivation in the middle, and amotivation at the other end (Agawa & Takeuchi, 2016). *Intrinsic motivation* – also referred to as *autonomous motivation* – involves behaving with a full sense of volition and choice; *extrinsic motivation* – also referred to as *controlled motivation* – involves behaving with the experience of pressure and demand toward specific outcomes; and *amotivation* – acting with a lack of motivation (Agawa & Takeuchi, 2016). Furthermore, Deci and Ryan (2008) proposed four regulations within extrinsic motivation which are dependent on the degree of internalisation involved in the action. The concept of *internalisation* describes how one's motivation for behaviour can range from amotivation (or unwillingness), to passive compliance, to active personal commitment (Deci & Ryan, 2000). The four regulations are *integrated, identified, introjected, and external regulations*. Integrated regulation is the most self-determined form of regulation, whereas external regulation is the least autonomous. This view was posed because it was believed that the type or quality of motivation one has is more important than the amount of motivation one has as it would be a better indicator for predicting psychological health and well-being, creative problem solving, conceptual learning, and effective performance (Deci & Ryan, 2008). Table 2.2 describes the concept of *motivation* in SDT.

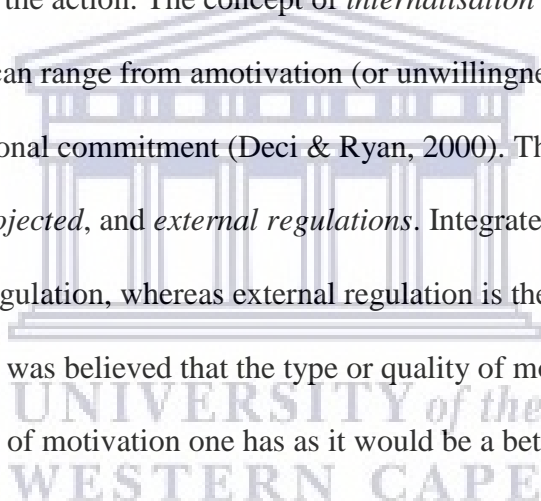


Table 2.2: Self-Determination Continuum


Quality of behaviour	Non-Self-Determined					Self-Determined
Categories of Motivation	Amotivation	Extrinsic Motivation				Intrinsic Motivation
Types of Regulation	Non-Regulated	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
	Absence of intentional regulation	Contingencies of reward and punishment	Self-worth contingent of performance; ego involvement	Importance of goals, values and regulation	Coherence among goals, values and regulations	Interest and enjoyment of task
	Absence of intentional regulation	Controlled Motivation	Moderately controlled motivation	Moderately autonomous motivation	Autonomous Motivation	Inherently autonomous motivation
Perceived locus of causality	Impersonal	External	Somewhat External	Somewhat Internal	Internal	Internal

Table 2.2 describes the SDT continuum showing that amotivation completely lacks self-determination, the types of extrinsic motivation that vary in their degree of self-determination, and intrinsic motivation, which is undeniably self-determined. The Table also demonstrates the nature of the regulation for each and its placement along the continuum, depicting the degree to which each represents autonomous motivation.

Basically, when one thinks of motivation, one considers what moves people to think, act, and develop in a certain way. The topic of motivation is interested in the processes, conditions, and environments that facilitate performance, healthy developments, persistence, and vitality in our human actions (Deci & Ryan, 2008). The next section discusses the three categories of motivation that drives people to engage in certain behaviours.

2.9.3.1 Intrinsic Motivation

Gagné and Deci (2005) describe *intrinsic motivation* as people choosing to engage in a particular behaviour or activity because they find it interesting and they derive spontaneous satisfaction from the behaviour or activity. This is considered the best form of motivation and the motivation that would most likely yield more positive outcomes because people who are intrinsically motivated are engaging in an act out of their own volition (e.g., I choose to stop

smoking), they are persistent (I will not smoke even if my friends tempt me), and they are devoted (I will not smoke even if my friends ridicule me) to the activity or behaviour.

In contrast, being controlled involves acting with a sense of pressure and people tend to engage in certain behaviours to receive a form of reward or avoid a form of punishment (I have to stop smoking otherwise my parents will take away my privileges) (Deci & Ryan, 2008). Vansteenkiste and colleagues (2014) assert that the contexts, such as homes, classrooms, or peer groups, either enhance or hinder people's intrinsic motivation. For example, if the context feels controlled and pressurising, it will undermine intrinsic motivation, whereas if the context feels informational and supportive, it will enhance intrinsic motivation. Intrinsic motivation is a key element for self-determined behaviour (Deci & Ryan, 2000).

Typically, when people engage in intrinsically motivated behaviour, Deci and Ryan (1985) highlight that people experience positive feelings as a result of the activity. Also, intrinsically motivated people display curiosity, work to master optimal challenges, explore novel stimuli, and they are interested in the activity. In contrast, deadlines, punishment and surveillance decreases intrinsic motivation. When people are intrinsically motivated, they feel a sense of autonomy as their basic need for autonomy is satisfied. When people receive positive feedback about their performance it can in some cases enhance one's sense of intrinsic motivation because it directly conveys positive competence information, thus satisfying the need for competence without being experienced as controlling. On the other hand, negative feedback undermines intrinsic motivation by thwarting people's need for competence, but constructive feedback can be helpful. Negative feedback may leave people amotivated. Feedback is different to tangible rewards as tangible rewards enhances one's sense of extrinsic motivation because it gears people towards a specific action (Deci & Ryan, 2008).

2.9.3.2 *Extrinsic Motivation*

While intrinsic motivation is focused on acting out of one's own volition and engaging in activities that are fun and interesting, *extrinsic motivation* is fundamentally contingent upon the attainment of an outcome that is separable from the action itself (Legault, 2016).

Therefore, extrinsic behaviour is instrumental in nature and performed to get a desired outcome. For example, an adolescent may stop smoking hookah pipe at home if the parent increases her allowance. Extrinsic motivation is multidimensional and varies from completely external (e.g., stop smoking the hookah pipe to get a greater allowance) to completely internal (e.g., stop smoking the hookah pipe because it is a health hazard). Internalisation refers to the process through which an individual ultimately and freely adopts behaviours, values, and attitudes, and no longer require the presence of an external contingency (Esau, 2016). For internalisation to occur, BPN must be met because if needs are thwarted, people will be less effective at internalising and integrating regulations. According to Ryan and Deci (2000), the more internalised the extrinsic motivation, the more autonomous the person will be when enacting the behaviours (Ryan & Deci, 2000). Deci and Ryan (1985) identify four subtypes of extrinsic motivation that fall on the continuum of internalisation. The four subtypes of extrinsic motivation are (1) external regulation, (2) introjection, (3) identification, and (4) integration.

External Regulation is the least autonomous type of extrinsic motivation. External regulation is characterised by behaviours that are controlled by external pressure, such as received rewards, or avoiding punishments imposed by others. For example, stop smoking the hookah pipe because parents will ground the adolescent or smoking the hookah pipe because friends are allowing the adolescent to spend time in their company (Gravel et al., 2016). In the case of uninteresting activities, Gravel et al., (2016) maintain that people require a reward or

punishment to motivate them. Essentially, the underlying reasons for behaviour are to (a) receive or avoid a consequence, or (b) fulfil an external requirement (compliance).

Introjection refers to a regulation that has been taken in by a person but not accepted as his or her own; hence Gagné and Deci (2005) consider introjection as controlling. For example, engaging in a behaviour because it would enhance one's self-worth or it would avoid shame, anxiety, or guilt. These behaviours are not considered autonomous (Legault, 2016). Gagné and Deci (2005) consider introjected regulation as interesting because the regulation is within the person but is a relatively controlled form of internalised extrinsic motivation (I cannot smoke the hookah pipe because I will be considered a bad person); so it is not necessarily a self-selected goal, it is more focused on morality and societal norms (external contingency). The underlying reasons for behaviour are related to (a) feelings of internal pressure, (b) avoiding guilt, or (c) boosting ego (Legault, 2016). Introjection is considered the effective type of internalisation.

Identification is experienced as autonomous but to a lesser extent compared to integration because identified regulation is perceived as significant to the person, but it is not integrated to one's identity and values. Engaging in regular recreation activities because they are a normal and healthy part of life is an example of an identified social motive (Legault, 2016). Gagné and Deci (2005) highlight that with identified regulation, people tend to feel greater volition and freedom because it is more congruent with their personal goals and identities. Essentially, identification involves people accepting the importance of the behaviour for themselves and thus accepting it as their own; they identify with the value of the activity and willingly accept responsibility for regulating the behaviour. In this way, they do not feel controlled or pressured to do the behaviour, they have a greater sense of autonomy (Deci & Ryan, 2008). The underlying reasons for behaviour are related to the (a) personal valuing of a behaviour, or (b) considering the behaviour important for oneself (Legault, 2016)

Integration is the most autonomous form of extrinsic motivation because the behaviour is fully endorsed by the self and it is without a doubt integrated to other aspects of the self. For example, not smoking the hookah pipe because one believes that smoking is not an integral and meaningful part of one's identity (Legault, 2016). With integrated regulation, there is a clear sense that behaviour emanates from one's sense of self and is thus self-determined. Behaviours that occur as a result of integration regulation are central to one's identity. Integrated regulation is considered the most developmentally advanced form of extrinsic motivation (Gagné & Deci, 2005). Integration shares characteristics with intrinsic motivation because they provide a sense of volition, but it differs because the motivation is characterised not by the person being interested in the activity but rather by the activity being instrumentally important for personal goals (Deci & Ryan, 2008). The underlying reasons for behaviour are related to (a) expression of self and identity, and (b) congruence with self and other values (Legault, 2016).

Subtypes of extrinsic motivation are not a stage theory of internalisation, rather it is illustrating the extent to which people have integrated the regulation of a behaviour. Therefore, people can at any time under optimal conditions fully integrate a new regulation, or they can integrate an existing regulation that had been only partially internalised (Gagné & Deci, 2005).

2.9.3.3 Amotivation

Since motivation exists on a continuum, *amotivation* is considered the least self-determined regulation (Gravel et al., 2016). Gagné and Deci (2005) describe amotivation as acting with a lack of or even absence of motivation and intention. Gravel et al., (2016) argue that amotivation could be attributed to a sense of either lack of control or efficacy over the behaviour. Amotivation is highly distinct from intrinsic and extrinsic motivation since both intrinsic and extrinsic motivation involve some degree of intention. Gagné and Deci (2005) as

well as Kader and Roman (2016) postulate that amotivation results from not feeling autonomous in the decision to act, not feeling competent enough to act, or not believing that it will yield the desired outcome. Garn and colleagues (2010) hypothesise that amotivation can arise from environments that are too controlling, resulting in complete resistance or withdrawal. For example, if a parent does not allow a child any form of freedom, the child may become rebellious and withdraw from the expectations of this environment. Therefore, the child may experience a sense of apathy and may feel “whether I smoke the hookah pipe or not, it does not matter”. Amotivation usually occurs in environments that are unsettling and where needs are frustrated (Kader & Roman, 2016).

2.9.4 The Role of the Environment in SDT

Despite people constantly attempting to satisfy the essential needs of autonomy, competence, and relatedness; if the social context does not provide a suitable path that would allow satisfaction of these essential needs, or if people need to remain in contexts or situations that constantly block need satisfaction, it is likely that there would be negative psychological costs and accommodations would develop (Gagné & Deci, 2005). Simply put, different forms of pathology reside primarily in the frustration of BPN, so when needs are frustrated, people can be led to develop compensatory behaviours or need substitute which can have a negative consequence and, as a result, continue to interfere with attaining the satisfaction they really need, such as hookah use (Kader & Roman, 2016). Ryan and Deci (2017) therefore discuss the impact of the social environment on need satisfaction, need frustration, and motivation.

Proximal social contexts, such as peer groups, families, schools, and teams (sport, religious, cultural, etc.), influence individual’s motivation, development, and wellness because individuals have direct interpersonal contact with the people within these contexts. The proximal social context has an impact on behaviour, motivation, experiences and BPN being satisfied or frustrated. Proximal social contexts are embedded within a broader social

system which influence behaviour and need satisfaction. Ryan and Deci (2017) refer to this as the pervasive and distal contexts which include cultural, religious, political, and economic systems in which the proximal social contexts are constructed. Hence, these environments also affect needs satisfaction and needs frustration. The effect of the pervasive and distal factors may be direct or indirect; the effect of the proximal factors is direct.

Pervasive contexts play an enormous role in needs satisfaction and needs frustration because they influence the proximal social contexts in terms of guiding the values, rewards, and pressures. If hookah pipe use is considered taboo in the religious and cultural contexts, families that are strongly influenced by culture and religion will also consider hookah pipe smoking taboo. Naturally, this message will be conveyed to the adolescents in the family, impacting on their ability to freely smoke the hookah pipe (Ryan & Deci, 2017). Similarly, if smoking the hookah pipe is considered a less expensive activity that allows one to socialise, it may be encouraged by peer groups; or if government bans the selling of hookah pipes, coals, and tobacco to minors (people under the age of 18), these products will be less easily accessible and could affect the frequency of use, or some may not even smoke as they would consider the act against the law. Therefore, pervasive contexts can directly affect people's behaviours and need satisfaction by either blocking it or regulating it (Gagné & Deci, 2005).

SDT posits that motivation and BPN are important for well-being and optimal development. It also helps in understanding why people engage in certain behaviours, such as smoking the hookah pipe. Understanding why people engage in behaviours is important when developing an intervention because it allows developers to address the needs and goals that adolescents have. The intervention can strive to meet the goals by creating a context that promotes satisfaction of BPN without using the hookah pipe. For these reasons, SDT is a well-suited theoretical contribution for this study. However, in order to understand adolescents' needs and behaviours, it is important to consider their developmental stage. Adolescents are in a critical phase of development where they find themselves in a period of

transition between childhood and adulthood characterised by physical, emotional, and social changes (Wood et al., 2018).

2.10 Developmental Perspective

2.10.1 The Phase of Adolescence

Adolescence is an overwhelming period in one's life where one prepares for adulthood. During adolescence, there is an intense period of physical, social, and psychological development (Sugar, 2014). Adolescence is characterised by conflicts with parents and other authority figures, moodiness, experimentation, and high-risk behaviour. Adolescents experience drastic growth spurts during puberty. They also experience significant changes in their ability to assess and comprehend complex situations and information and in their desire to become independent unique individuals (Sugar, 2014).

The physical maturation coupled with the psychosocial development influences adolescents' ability to think, relate, and act as a competent adult. However, adolescents constantly have conflicting thoughts and emotions. On the one hand, they are joyful, fun, seek security from family, desire a sense of belonging, closeness, and support, but, on the other hand, have a sense of loneliness, anger, embarrassment, they want to be unique, they push back on boundaries, and want unquestioned support. Most of all, adolescents wish to belong but still have their own identity by having a sense of uniqueness (Case-Smith & Clifford O'Brien, 2014).

Adolescence is a period of learning, experimenting, and experiencing. This is critical to the process of gaining independence later in life. As adolescents develop, they establish norms and lifestyles congruent with the values and culture of their peers, their families, and their communities. In addition, they begin forming their identity, including their gender, personal, moral, and occupational identity (Case-Smith & Clifford O'Brien, 2014).

2.10.1.1 Physical Development

Adolescence is characterised by the biological and physiological changes of puberty, drastic increases in height and weight as well as body proportion. The growth and sex related hormones initiate a period of rapid growth which varies in intensity, onset, and duration (Case-Smith & Clifford O'Brien, 2014). In this phase, secondary sex characteristics start developing. This differs for boys and girls. Boys who mature early tend to be self-controlled, efficient, and level-headed; they have a better body image, higher self-esteem, and do well in sport compared to boys who mature later. Boys who develop earlier tend to be exposed to substances and sex prematurely. Boys who tend to mature later tend to be seen as less attractive, less well balanced, tense, anxious, childish, and have poorer academic performance compared to boys that mature earlier.

Generally, boys who develop later tend to have feelings of guilt, inferiority, depression, and a sense of rejection. They have a greater need for encouragement, sympathy, and understanding from other boys (Louw & Louw, 2014). The converse is true for girls, as they appear to have a more positive body image, greater academic performance, and are considered attractive (Louw & Louw, 2014). Girls who mature earlier tend to be attractive to older boys, but they are not yet emotionally mature to deal with such intimate relationships. They also tend not to fit in as well with their peers or are too immature to fit in with an older peer group, leading to a sense of social isolation. Generally, adolescents find security and social confidence in fitting in with the “norm” for physical development and perceived competencies in relation to their peers (Case-Smith & Clifford O'Brien, 2014). Louw and Louw (2014) assert that adolescents are aware of their physical changes, but an important developmental task during adolescence is to accept their changed appearance. This is not easy because these physical changes result in clumsiness and embarrassment. Some girls and boys reach puberty early and others reach puberty later than the average expected age or in relation

to their peer group. It is a period where they need acceptance and affirmation. Being accepted into a peer group makes provision for this. Being a part of this group may mean that adolescents need to smoke the hookah pipe in order to be and feel accepted.

2.10.1.2 Cognitive Development

Cognitive development is the development of knowledge and interpretation. It includes the development of advanced levels of reasoning, logic, thinking, and rationalising (Moshman, 2011). In order to understand the cognitive development of adolescents, Jean Piaget's theory of cognitive development will be discussed. Jean Piaget was an influential and leading figure in the fields of cognitive theory and developmental psychology (Louw & Louw, 2014). He believed that knowledge is based on individuals' experiences which is influenced by their emotional, biological, and mental stage of development (Bates, 2015). Piaget holds that maturation coupled with experience drives cognitive development, therefore human beings construct knowledge and do not simply receive it (Bergin & Bergin, 2015).

Jean Piaget's Theory of Cognitive Development

According to Piaget's theory, children actively construct knowledge rather than passively copying what they perceive. Children construct knowledge by assimilating new information into existing mental structures or accommodate those mental structures to fit new information (Bergin & Bergin, 2015). Bates (2015) highlights that this is achieved through four stages of cognitive development. The stages are described in Table 2.3.

Table 2.3: Piaget's Stages of Cognitive Development

Stage	Description
Sensorimotor stage	The approximate age for the sensorimotor stage is age 0 – 2. During this stage learning takes place through touching and feeling.
Pre-operational Stage	The approximate age for the pre-operational stage is age 2-6. This is the stage where the ability to arrange objects logically starts to develop.
Concrete operational stage	The approximate age for the concrete operational stage is age 7-11. During the stage the ability to think logically about objects and events starts to become more structured.
Formal operational stage	The approximate age for the formal operational stage is age 12 and older. During this stage, abstract thinking and verbal reasoning starts to develop. It is during this stage where adolescents can decide whether or not they want to smoke the hookah pipe. They are also able to set goals and pursue behaviours that will lead to the satisfaction of their needs.

This chapter focuses on the *formal operational stage*, as it is the most appropriate stage for adolescents.

Formal Operational Stage

Within the formal operations stage, adolescents tend to think logically, in an organised manner, more consistently, and in terms of cause and effect (White et al., 2010). They can also use deductive (logical analysis) and inductive reasoning (logical inferences) to analyse problems and reach conclusions (Matsumoto, 2009). Additionally, they are able to think abstractly. In other words, they are able to engage concepts that are beyond their sensation. Therefore, adolescents can manipulate and talk about concepts such as love, God, and the future in tangible ways and think more deeply, hypothetically, understand that there are two sides to an argument, comprehend metaphors, and understand wit and sarcasm (Milevsky, 2015).

The advance in cognition during this stage influences much of their later lives. The ability to consider other people's perspectives is an important developmental milestone because in order for adolescents to have successful social interactions in future, they would need to understand people and they must be able to interact appropriately (Milevsky, 2015). This process is instrumental in their experience of relatedness.

Adolescents view themselves as exceptional, unique, and special (White et al., 2010). However, the newly acquired skills help them in their social situations as these skills allow them to think of themselves in relation to others; these skills also help them think about social situations, social relationships, and others in general. Social cognition is important as adolescents centre their lives around themselves, their peers, and their friends. This means that adolescents are able to understand the thoughts, behaviours, and emotions of others. This is a skill that children in former stages do not have (Milevsky, 2015). Thus, they are perceptive of the interests and status of their peer group. They are then able to decide if their

values align with their peer groups. This is how their needs can be satisfied and their decision to smoke the hookah pipe is influenced.

In addition, adolescents value the ability to make autonomous decisions. This is a critical part of transitioning into adulthood. Although beginning in adolescence in the formal operational stage, this process continues into late adolescence. Therefore, older adolescents are better able to evaluate information, anticipate consequences of actions, make more thoughtful decisions, and have improved problem-solving skills (Milevsky, 2015).

Louw and Louw (2014) highlight six conceptual skills that emerge during this stage, namely, adolescents are able to:

- 1) Mentally manipulate more than two categories of variables and understand the relationship between them; for example, hookah pipe use and the effect on their social status.
- 2) Understand change that comes with time. For example, they may believe that in time they will stop smoking the hookah pipe.
- 3) Hypothesise a logical sequence of events. For example, friends spend time together, they are bored, they decide to smoke the hookah pipe, and they should not inform their parents or older siblings.
- 4) Anticipate the consequences of their actions. For example, smoking the hookah pipe might make their parents or teachers angry, or the family members may not be angry because they also smoke, so they condone the behaviour.
- 5) Detect the logical consistency or inconsistency in a set of statements. For example, adolescents are able to identify when someone is lying or making threats.
- 6) Think in relativistic ways about themselves, other individuals, and their world. For example, they may compare themselves with their family members, peers, and friends.

The abovementioned skills are important for cognitive development because each one has implications for how adolescents approach interpersonal relationships, formulate personal

plans and their ability to analyse scientific and mathematical information. Essentially, at the formal operations stage, the school, home and community contexts play an important role in the cognitive development of adolescents as this is where the skills are tested and either reinforced or not reinforced (Louw & Louw, 2014).

2.10.1.3 Personality Development

Personality is formed primarily by biological and environmental factors. Biological factors refer to genes, brain structure, and physiological mechanisms. Environmental factors comprise external influences such as social roles, cultural norms, life events, and people in the milieu of an individual. Together, the biological and environmental factors contribute to the development of one's personality (Zimmermann & Neyer, 2013). Personality includes the individual differences in feelings, thoughts, and behaviours that are relatively stable across time and situations. Personality may change across one's lifespan, but it remains the motivational core of human behaviour and the self-regulating system designed to maximise adaptation to life's challenges (Mroczek et al., 2006). One's personality also has a determining role in the choice to smoke and the satisfaction or frustration of needs. Erik Erikson was of the view that personality development occurs across the entire lifespan.

Erik Erikson's Theory on Human Development

Erik Erikson argues that healthy personality is conceived as an epigenetic process where each item of personality is related to all the others. Therefore, proper development needs to occur at the intended time of each psychosocial stage (Erikson, 1950). In other words, healthy development occurs in sequential stages (Meyer et al., 2008). These sequential stages each have a key developmental task that needs to be mastered in order to progress to the next psychosocial stage, otherwise it would have a negative effect on one's mental health and development. In Table 2.4, Kader (2015) highlights the period of life each psychosocial

stage should occur, the psychosocial stage, and the key developmental task for that particular stage.

Table 2.4: Erikson's Stages of Psychosocial Development

Period of life (Age)	Psychosocial Stage	Key Developmental Task
0-1 years old	Trust vs. Mistrust	Hope
1-3 years old	Autonomy vs. Shame and Doubt	Will Power
3-6 years old	Initiative vs. Guilt	Purpose
6-12 years old	Industry vs. Inferiority	Competence
12-19 years old	Identity vs. Role Confusion	Reliability/fidelity
20-35 years old	Intimacy vs. Isolation	Love
35-60 years old	Generativity vs. Stagnation	Care
60+ years old	Integrity vs. Despair	Wisdom

In order to master the developmental tasks, the ego, which is the planning and executive element of a person's functioning, must make choices about its future development (Erikson, 1968). In other words, expectations, needs, opportunities and possibilities arise in each psychosocial stage; these expectations, needs, opportunities and possibilities demand a choice between two opposing development possibilities, for example, identity vs. role confusion (Meyer et al., 2008). In order to master a phase, a healthy balance between the two possibilities must be achieved without excluding or compromising one of the possibilities. The ability to strike an effective balance is referred to as ego strength. When the development is progressing successfully, the ego acquires characteristics, such as hope, will power, trustworthiness, and the ability to care and love (Erikson, 1982).

This chapter will elaborate on identity vs. role confusion as this is the stage where adolescents find themselves considering their ages.

Identity vs. Role Confusion

Adolescents are within the psychosocial stage of *identity vs. role confusion*. They need to master the developmental task of reliability by achieving a consistent sense of identity through exploration of different roles vs. confusion from overwhelming opportunities and failure to develop an integrated self-image (Butler & McManus, 2014). Erikson (1968) claims that the adolescent tries to develop a school, occupational, and sexual identity in this stage.

Koutoukidis and colleagues (2016) explain identity as an individual's concept of who they are and where they are going in life. Therefore, adolescents are driven by "who am I; what can I be and where am I going?" (Azevedo, 2012). In order to answer these important questions, adolescents must formulate standards of conduct and know what they value and consider worth doing. This awareness provides adolescents with an opportunity to fulfil their sense of self-worth and importance which contributes to a positive and stable identity.

Whilst adolescents are forming their identity, they must develop their own ethical system which is based on their personal values. It is important for adolescents to be aware of their parents' and peers' worldviews, but it is imperative that they develop their own (Laser & Nicotera, 2011). Adolescents' main motivation is their social relationships. Therefore, comments from parents and peers reflect appraisals of the individual that some adolescents may incorporate as part of their identity and feelings about themselves. In addition, their significant relationships (peers and role models) help shape their personality and play an important role in mastering this developmental task (Azevedo, 2012). Nonetheless, adolescents are in a process of developing their own ideals, values, and worldview, which may differ from their peers, parents, and other important figures; hence, it is natural for conflict to arise and adolescents to be viewed as rebellious (Koutoukidis et al., 2016).

Adolescence is a time when experimenting is developmentally appropriate, except when it seriously threatens the youth's health or life (Laser & Nicotera, 2011). When a positive identity is formed and considered fairly stable and consistent, the stage has been mastered (Koutoukidis et al., 2016). Laser and Nicotera (2011) emphasise the importance of this stage as it allows for identity and personality to develop in terms of self-concept (the set of beliefs about oneself, including roles, goals, interests, and values) and self-esteem (evaluating how one feels about one's self-concept). The formation of adolescents' identity coupled with influences of significant relationships are important when deciding to experiment with the hookah pipe.

2.10.1.4 Emotional Development

Emotional development during adolescence means “establishing a realistic and coherent sense of identity in the context of relating to others and learning to cope with stress and manage emotions” (APA, 2002, p. 15). According to Yates (2011), adolescents have increased awareness of complex emotional cycles, for example, feeling guilty, angry, ashamed, and frightened, especially when they are engaging in a behaviour, such as hookah pipe smoking that may be perceived negatively by family members. Adolescents’ ability to regulate their emotions is based on their moral beliefs and the impressions they will make. Adolescents tend to feel their emotions strongly and intensely. Sometimes, adolescents can communicate their feelings appropriately, other times an event can trigger an extreme emotional response. Adolescents are not aware of a full range of emotions, so they struggle to express their emotions effectively. As a result, they may engage in behaviours that may be difficult to understand (Laser & Nicotera, 2011).

Generally, if children are raised in a nurturing and secure environment, they tend to be able to control their emotional expression better. However, in adolescence, the process becomes complex because adolescents experience the freedom to escape the context of the family and explore new contexts where rules about emotional expression is less dictated (Wilson & Wilson, 2014). Generally, the context where emotional freedom is experienced is within the peer group. Often there is internal and external conflict about the adolescent trying to escape the family context and conforming to the peer group (Wilson & Wilson, 2014).

2.1.10.5 Social Development

During adolescence, adolescents seek peer affiliations to counter the instability of the rapid developmental changes they experience. Within this peer group, there is struggle for mastery to take place as there is a strong need for identity and to affirm self-image. There is a sense of need to adhere to the behavioural standards set by the peer group; in addition,

acceptance into the latter is of utmost importance for the adolescent. Adolescents have a massive fear of rejection and a strong desire to belong and feel accepted. Typically, adolescent relationships are characterised by giving and sharing. The peer group also provides the adolescent with the opportunity to test new ideas and share similar feelings, interests, attitudes, and experiences (Gilmore & Meersand, 2014). Also, within their social sphere, adolescents explore their ability to attract the opposite sex (or same sex) romantically (Koutoukidis et al., 2016). Since smoking the hookah pipe is a social phenomenon, it serves as a meaningful activity for adolescents as it allows adolescents to experiment, bond, belong, and potentially meet new friends or attract the opposite sex.

On the other hand, Koutoukidis et al., (2016) claim that relationships with parents become strained as there are many conflicts pertaining to freedom, independence, and control. Adolescents tend to have emotional and physical detachment from parents. However, they also experience a sense of fear related to the consequences associated with independence and autonomy. During this stage, parents and adolescents need to learn and adjust to new roles. In terms of siblings, Koutoukidis et al., (2016) highlight that younger siblings seldom understand their adolescent sibling's need for privacy and spending so much time with peers. However, adolescents enjoy guiding and interacting younger siblings when it is convenient for them and they can experience a sense of control. This is also how younger siblings are influenced by the behaviours of older siblings. Social relationships that develop outside the family help adolescents identify and define their role in society (Sugar, 2014).

2.1.10.6 Moral Development

Morality refers to a set of principles that enables individuals to differentiate between right and wrong in order to direct their behaviour. Moral development is the process by which children learn the principles that enable them to judge behaviour in a particular society. The ability to differentiate between right and wrong is the most important developmental task

being mastered in moral development. (Louw & Louw, 2014). Hence, moral education focuses on maintaining social order while giving the individual the opportunity to function optimally within his or her culture (Louw & Louw, 2014). Different theories exist about moral development. However, Lawrence Kohlberg is renowned for his contribution towards the understanding of moral development, therefore his views on adolescent moral development will be discussed.

Lawrence Kohlberg's View of Moral Development

Kohlberg viewed moral development as a complex process involving the acceptance of the values and rules of society in a way that shapes behaviour. Kohlberg identified five ego strengths that are essential for moral conduct and development. The five ego strengths are: (1) intelligence; (2) tendency to anticipate future events and choose the greater remote outcome over the lesser immediate outcome; (3) capacity to maintain stable, focused attention; (4) capacity to control unsocialised fantasies; and (5) self-esteem or satisfaction with the self and the environment (Austrian, 2013). Kohlberg argues that knowing what behaviours are right and wrong is important but understanding and appreciating why behaviours should or should not be exhibited is even more important. In order to understand the reasoning behind the moral judgements, Kohlberg classified the responses into a series of levels and stages (James et al., 2014). These levels and stages are illustrated in Table 2.5 below, along with the typical age each level is experienced.

Table 2.5: Kohlberg's Levels and Stages of Moral Reasoning

Stage	Description
Level I: Pre- Conventional (age 4-10)	
<i>Stage 1:</i> Punishment and obedience orientation	The child decides what is right based on whether the action will be rewarded or punished. The child does not consider the interests of others. The child obeys because adults have greater power. Children cannot reason as mature members of society. They have no real understanding of right and wrong.
<i>Stage 2:</i> Individualism, instrumental purpose and exchange	The child follows rules when it serves his or her own needs and interests. The child is aware that others have interests too and they may conflict with his or hers. They view morality as external to themselves and their behaviour reflects what others tell them to do. They are generally selfish and egocentric. However, there is an indication of thought involving exchange and reciprocity as children become aware that other people have opinions.
Level II: Conventional (age 10-13)	
<i>Stage 3:</i> Mutual interpersonal expectations, relationships and interpersonal conformity	The child is concerned with living up to others' expectations. Being good is important and it means having good intentions, being concerned about others, and being loyal and trustworthy. The child conforms to rules to please others. The child still has external locus of control but begins to have a concern for social order.
<i>Stage 4:</i> Social system and conscience	The child defines what is right in terms of duties that he or she has agreed to carry out and abides by laws, except in extreme cases. Moral actions are those that the larger society determined are right. The child has an increased awareness of other people's feelings and moral judgement develops. The child feels guilty if his or her behaviour is not approved.
Level III: Post- Conventional (age 13-16)	
<i>Stage 5:</i> Social contract or utility and individual rights	Values and rules are seen as relative to a particular group and may change. Rules should be followed for the welfare and protection of all people's rights and what is best for the largest number of people. Some values, such as life and liberty, are recognised as non-relative and must be upheld regardless of socially agreed upon laws. Abstract thinking abilities develop. There is internal locus of control. Adolescents conform to the rules of society.
<i>Stage 6:</i> Universal ethical principles.	A person develops and follows his or her own self-chosen ethical principles, which are part of an integrated and carefully thought out system of values. If social laws violate these principles, the person's actions will be consistent with his/her ethical principles. Conformity is based on universal principles of justice and occurs to avoid self-condemnation.

Adapted from James et al., (2014); Louw & Louw (2014); and Austrian (2013)

Morality serves as a guide for adolescents' behaviour as it assists them in practicing socially and morally responsible behaviour. Adolescents are focused on questioning the rules and norms and determining what they deem right and wrong. This is often influenced by peers, family, and society (Koutoukidis et al., 2016). However, adolescents develop a moral self-concept based on their everyday experience and they need to make decisions to regulate their behaviour when faced with new challenges and social influences. In their process of moral development, adolescents have to question existing values, decide which values are acceptable, and incorporate them into their own value system (Louw & Louw, 2014). Often this assists in the decision to smoke the hookah pipe or not and pursue behaviours towards the satisfaction of BPN. A key developmental task for adolescents is to develop a personal value

system. Adolescence is a crucial period of moral development because it helps the individual develop their abstract thinking skills and allows them to integrate their own moral principles and values in their social realm. Moral experiences and expertise gained in adolescence forms the foundation of mature moral character, identity, and action (Louw & Louw, 2014).

In order to develop an effective intervention, one has to consider the developmental experiences of adolescents as it provides a thorough understanding of why individuals behave the way they do and why they are so curious and impressionable. The intervention thus would factor and accommodate the developmental experiences as well as create an environment where BPN can be satisfied. SDT highlights the valuable role individual influences and other contexts such as the family and social milieu have on need satisfaction and motivation, which is equally important to consider when developing an intervention. Hence, the focus on physical, cognitive, personality, emotional, and social development of adolescents. Much attention has focused on the adolescent, but as SDT and the developmental perspective has highlighted, the family context and the role of family members is crucial in adolescents' lives and influences their choice to smoke the hookah pipe or not.

2.10.2 Role of Family in Adolescent Hookah Pipe Use

Families play an important role in the development of adolescents, either hindering or promoting their development especially in the South Africa context where family is regarded as the bedrock of society (Kader & Roman, 2018). Hookah pipe smoking is commonly done in social groups in the family home or at a friend's home and it is considered acceptable by family members (van Der Merwe et al., 2013). Daniels and Roman (2013) found that the hookah pipe was used in 11% of families, while Jamil and Saridakis (2010) found that 28% smoke the hookah with family members. This is concerning because younger members of the family witness older siblings or parents smoking the hookah pipe, which not only initiates tobacco use, but also encourages hookah pipe smoking (Daniels & Roman, 2013).

However, having a home with a smoke free rule is associated with a lesser likelihood of tobacco use. Therefore, Zhang and colleagues (2015) highlight the concerns surrounding hookah pipe use and emphasise the need for the family to set appropriate rules around smoking anything in the home. Many families find hookah pipe smoking in the home and in their presence acceptable (Casteñeda et al., 2016). In some cases, family members smoke together (Folan & Massuccim, 2015). This is concerning as it sends a message to the younger children in the family that hookah pipe smoking is acceptable. This calls for addressing or including the family in hookah pipe cessation interventions. According to Barnett, Lorenzo and Soule (2016), there is a lack of basic knowledge about hookah tobacco smoking and misconceptions about its danger have led to positive associations of hookah use. The role of family in adolescent hookah pipe use is described in more detail in Chapter 8.

2.11 Conclusion

This chapter has addressed the hazards of hookah pipe smoking as well as legislation regulating tobacco use. It has also taken into account the theoretical orientations that guide the understanding of why hookah pipe smoking is considered attractive to adolescents. Since the family has a defining role in adolescents' choice to smoke or not smoke, the family context has been discussed from a developmental and SDT perspective. In order to develop an effective intervention, one has to consider the developmental stage adolescents find themselves in so that the intervention can be appropriate, relevant, and interesting. Considering the SDT perspective is also important because the aim of the intervention is to satisfy BPN in an attempt to deter adolescents from smoking the hookah pipe. SDT references autonomy, competence, and relatedness. The developmental perspective echoes this by explaining how adolescents are trying to be more independent and less reliant on parents; they are experimenting with behaviours and activities that they enjoy and feel accomplished in as well as finding value in their peer groups and aligning their views and values with that of their peers in order to belong, and feel accepted and affirmed. This is why

these two theories combined with existing literature is appropriate for studying adolescent hookah pipe use in order to intervene. The developmental perspective coupled with SDT provides a deeper understanding of what adolescents require for optimal development and growth whilst considering their developmental needs and challenges.

Attention now shifts to the methodology employed in this study.

2.12 References

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CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was used in this study. A mixed method methodology was employed using an explanatory research design and intervention mapping. The methodology was geared towards achieving the research aim: *To design an intervention to reduce adolescent hookah pipe use and satisfy their BPN*. The study comprised two phases: Phase 1 included (a) systematic reviews, (b) quantitative data, and (c) qualitative data to determine and describe the need for intervention. Phase 2 included a modified Delphi study to guide the design of the intervention. The chapter closes with some concluding remarks.

The methodological aspects of the study are described next.

3.2 Mixed Method Methodology

History in the social, human, and behavioural sciences suggests that mixed method research stems from methodologists and researchers who found merit in both quantitative and qualitative viewpoints to address their research questions (Johnson et al., 2007). The work done by Campbell and Fiske (1959) is one of the first to have considered the use of mixed methods research. They advocated for more than one method to be used as part of a validation process in research. Their argument was that this would ensure that the explanation of variance is the result of the underlying phenomena, not the method (quantitative or qualitative). Today, mixed methods research is considered the third major research approach along with quantitative research and qualitative research (Creswell & Plano Clark, 2011). Mixed methods research is considered inclusive, pluralistic, and complementary (Burke et al., 2004).

According to Clark and Ivankova (2015), mixed methods research involves integrating quantitative and qualitative methods in a single study so that the researcher can be ruthlessly pragmatic when collecting and analysing quantitative and qualitative data to answer a research question. It provides an in-depth and thorough understanding since the researcher is able to link, integrate, and mix two forms of data concurrently by merging them sequentially (Tashakkori & Teddlie, 2010). Greene and Hall (2017, p. 2) explain that the overall reason for mixing methods in the study of human and social science is to better understand “the inherent complexities and contingencies of human phenomena”. Greene and Hall (2017, p. 2) assert that a better understanding is attained by using a “plurality of our ways of seeing, interpreting, and knowing”, thereby enriching the findings of the study. Simply put, mixed method research synthesises ideas from quantitative and qualitative research in a single study (Johnson et al., 2007) to answer the identified research question(s) and achieve the intended aim of the study (Campbell & Fiske, 1959).

However, as with any methodology, mixed methodology has its strengths and weaknesses. Table 3.1 incorporates the insights from Sechrest and Sidana (1995), Johnson et al., (2007), and Doyle and colleagues (2009) to determine the strengths and weaknesses of the method.

Table 3.1: Strengths and Weaknesses of the Mixed Method Methodology

Strengths	Weaknesses
<ul style="list-style-type: none"> • Enhances our beliefs that the results are valid and not a methodological artifact • Researchers can be more confident about their results - verification • Stimulates thoughts around creative ways to collect data • Uncovers contradictions • The quantitative data can help the qualitative component by identifying a representative sample to address the research question • Qualitative data can assist the quantitative component by guiding the development and conceptualisation of the instrument • Quantitative data can facilitate the assessment of generalisability of the qualitative data and provide a different view on the findings • Qualitative data can provide insight into the quantitative data during analysis • Combined methodologies can initiate new modes of thinking by attending to paradoxes that emerge from the two data sources. • Probe a data set to determine its meaning, for example, words can add meaning to numbers and numbers can add precision to words • Reducing complexity to improve understanding • Pursue “truthfulness” • Instrument fidelity • Can answer complex and broader research questions so findings can be richer • The one method can address the weaknesses of the other method • Stronger evidence for conclusion 	<ul style="list-style-type: none"> • Can be difficult for a single researcher to carry out both quantitative and qualitative methods • Expensive • Time consuming • Gaps in the research methodology as it is an emerging methodology. For example, how quantitative data can be qualitatively analysed; paradigm mixing; and interpretation of conflicting results. • Researcher must be knowledgeable about using quantitative and qualitative methods • Researcher must be knowledgeable about using multiple methods and how to mix appropriately • Criticisms focus on the incompatibility thesis – They cannot be mixed because they have different ontological and epistemological origins • It is not enough to make a methodological choice purely on “what works” because it brings to the fore the question, what works for whom and to what end?

Mixed method studies are used when one approach is not sufficient to answer the research questions and achieve the intended aim of the study (Ivankova et al., 2006). For this reason, the current study employed a mixed methodology, as one approach would not be sufficient to answer all the research questions. To gain a better understanding of how the mixed method methodology was applied, understanding paradigms is important to determine the place of mixed method methods methodology in relation to quantitative and qualitative methods.

3.3 Paradigms

Researchers in the behavioural and social sciences are currently in a three methodological or research paradigm world where qualitative, quantitative, and mixed methods research all thrive and co-exist. Johnson et al., (2007) recognise the value of a three-

paradigm world because each approach has its strengths and weaknesses and time and place when they are applicable (which is dependent on the research questions and aims of the study). Research paradigms are the philosophical foundations of research studies. Paradigms determine how the study will be conceptualised and conducted through particular methods and designs. The research paradigm is the worldview or set of principles and beliefs that give rise to a certain research methodology. Paradigms are linked to the generalisations, beliefs, and the values of the researcher (Riazi, 2016).

According to Tashakkori and Teddlie (2010), quantitatively-oriented researchers mainly work within the post-positivist or positivist paradigm. Quantitative researchers are predominantly interested in numerical data and analysis. Qualitative-oriented researchers, on the other hand, mainly work within the constructivist paradigm, and are mostly concerned with narrative data and analysis. The major differences between the quantitative and qualitative paradigms is that quantitative inquiry is objective, whereas qualitative inquiry is subjective. In addition, quantitative findings are deductive, reflected in numbers, generalisable, and context free, whereas qualitative findings are inductive, reflected in deep rich words, and context-bound (Morgan, 2007). For a long time, there have been debates or “paradigm wars” about the legitimacy of the knowledge produced by the opponent. Current literature reveals reconciliation of research paradigms. This is referred to as a pragmatic shift towards the saliency of the research question. This movement has led to mixed methods research (Riazi, 2016).

Researchers that are oriented to mixed method methodologies work primarily within the pragmatist paradigm. They are interested in both numeric and narrative data and their analysis. Mixed methods research is thus considered a midpoint between quantitative and qualitative research because it is focused on integrating and blending quantitative and qualitative elements so that the research question can be addressed (Morgan, 2007).

3.4 The Pragmatic Approach

The primary philosophy of mixed research is the pragmatic approach (Johnson et al., 2007). The pragmatic approach is “neither positivism or interpretive and/ or value free or value laden, but a combination of all to address social real-life issues” (Ihuah & Eaton, 2013, p. 937). The pragmatic approach emphasises that research questions should be dealt with realistically, practically, and sensibly, rather than solely focused on theoretical orientations (Greene & Hall, 2017). The pragmatic approach is best suited to answer the research questions. Subjective or objective meanings can provide facts to a research question and the focus is on practical applications to issues by merging views to assist in interpreting data (Feilzer, 2010).

Pragmatism highlights the importance of the social realm, as well as the physical and natural world, and recognises the influence of human experiences. Even though pragmatism emphasises that the method is chosen after careful consideration of the research question and the research ends determines the research means, pragmatism acknowledges fallibilism (no belief or conclusion can be perfect, rationally justified, or supported in absolute certainty). However, pragmatism views justification, referred to as "warranted assertability" (knowledge is gained as a result of an ongoing process of inquiry, rather than as a result of internal mental activity) as important (Burke et al., 2004).

The pragmatic approach holds the view that current knowledge, truth, and meaning changes over time through living, experiencing, and experimenting; therefore, research findings should be considered “provisional truths”. They propose that “absolute truth” or “final opinion” may be established at the end of history. The pragmatic approach makes provision for cultural and political values. Pragmatic thinking follows a homeostasis process of doubt, belief, new beliefs, inquiry, and new inquiry, where the researcher constantly seeks to build and improve on past research and understanding so that it fits how the world works now (Feilzer, 2010).

The pragmatic approach uses both quantitative and qualitative approaches. The mixture of methods and procedures are determined by the research questions and the consequences of the research since pragmatic researchers believe that the research question is more important than the method or paradigm. Therefore, the research questions dictate the method of the study (Tashakkori & Teddlie, 2010). Although, it must be understood that mixed method research is not an alternative to using a mono-method (quantitative or qualitative), nor is it a superior or inferior method compared to quantitative or qualitative methods (Morgan, 2007). The pragmatic approach is aimed at attempting to fit together the insights of quantitative and qualitative research to determine workable solutions based on shared meanings and joint action (Morgan, 2007).

Pragmatism is considered the “middle ground between philosophical dogmatism and skepticism to find a workable solution”. It is more action oriented (Burke et al., 2004, p. 18). Pragmatism rejects traditional dualism, such as objectivism vs. subjectivism, because it is focused on more sensible and practical versions of philosophical dualisms to determine how well they can work together to solve problems (Burke et al., 2004).

Johnson and Onwuegbuzie (2004) discussed the critique of opponents of the pragmatic approach and identified four challenges: (1) the change demonstrated in pragmatism may be more incremental change instead of structural, fundamental, or evolutionary change in society; (2) the meaning of workable solutions is vague unless explicitly explained by the researcher; (3) pragmatism could be a way of getting around traditional philosophical and ethical debates; (4) it may have a logical failing as a solution to philosophical debates. According to Morgan (2007), pragmatism endorses pluralism and eclecticism, so it welcomes different and even conflicting perspectives and theories. Hence, it is believed that observations, experiments, and experiences have a meaningful purpose in research and can be used in a single study to provide enriched findings (Tashakkori & Teddlie, 2010).

The current study employed the pragmatic approach, using both quantitative and qualitative methods as it is most suited to answer the research question, and ultimately, the overall aim of the study, which is to design an intervention to reduce adolescent hookah pipe use and satisfy their BPN. This approach allowed the researcher to determine factors such as prevalence of hookah use, motivation for hookah use, and BPN of adolescent hookah pipe users (quantitative), and explore reasons, environment, motivation, and the BPN of adolescent hookah pipe users (qualitative) through subjective (interviews) and objective (questionnaires) approaches.

3.5 Research Designs in Mixed Methodology

Vogt and colleagues (2012) describe a research design as “fundamental” and “the master” of a research study. Research designs are the specific procedures involved in the research process (Creswell, 2013). De Vaus (2001, p. 9) states that “the function of a research design is to ensure that the evidence obtained enables the researcher to answer the initial question as unambiguously as possible”. An important principle of choosing a mixed methods design is to identify reasons for combining certain methods because this would subsequently determine which methods will be mixed (Morgan, 2007). Creswell and Plano Clark (2007) note that mixing methods is challenging and therefore requires careful thought and consideration for doing so. Greene and colleagues (1989) identified good rationales for mixing methods, as noted below.

- i. **Triangulation:** To seek collaboration of results from different methods.
- ii. **Complementary:** Seeking clarity or elaboration from another method.
- iii. **Development:** Using the results from one method to inform the other method.
- iv. **Initiation:** Discovering paradoxes that lead to reframing the research question.
- v. **Expansion:** Expanding the breadth and range of inquiry by using different methods for different inquiry components.

Creswell and Plano Clark (2011) claim that the process of mixing quantitative and qualitative components in a study is determined by four factors:

- i. **Level of interaction:** The *level of interaction* refers to the extent which quantitative and qualitative strands are kept independent or interact with each other. An *independent level* of interaction means that the quantitative and qualitative strands are implemented in such a way that they are independent from each other. This means that the data collection and data analysis is kept separate. The researcher only mixes during the discussion and conclusion sections of the study, illustrating how the two strands converge, support, and inform one another. An *interactive level* of interaction means that there is a direct interaction between the quantitative and qualitative strands of the study. Mixing can occur at different points of the study, not only in the discussion and conclusion sections. This study made use of an independent level of interaction.
- ii. **Timing:** The *timing* is focused on when qualitative and quantitative strands will be used. Timing is not only focused on data collection by the entire quantitative and qualitative strands. Creswell (2013) identifies three types of timing: (a) *Concurrent timing* (Implement at the same time); (b) *Sequential timing* (Implement the strands in two distinct phases, with the collection and analysis of one type of data occurring after the collection and analysis of the other type); and (c) *multiphase combination timing* (Implement multiple phases in a research study that includes concurrent and/or sequential timing). This study made use of sequential timing.
- iii. **Weighting:** The weighting is focused on the order and priority or importance of the qualitative and quantitative strands that will be used. Creswell (2013) identifies three weighting options: (a) *equal priority* (both play an equally important role in addressing the research problem); (b) *qualitative priority* (greater emphasis is placed on the qualitative methods and the quantitative methods are used in a secondary role); and (c)

quantitative priority (greater emphasis is placed on the quantitative methods and the qualitative methods are used in a secondary role). This study made use of equal priority.

- iv. **Mixing (point of interface):** *Mixing* refers to the process where the researcher implements the independent or interactive relationship of a mixed methods study. It is the point where the strands integrate. Mixing may occur at four potential points during a research study: (a) interpretation; (b) data analysis; (c) data collection; and (d) design. Creswell and Plano Clark (2011, p. 66) identify four mixing strategies “(1) merging the two data sets, (2) connecting from the analysis of one set of data to the collection of a second set of data, (3) embedding of one form of data within a larger design or procedure, and (4) using a framework (theoretical or program) to bind together the data sets”.

Within mixed methods methodology, six research designs are generally used: (a) sequential explanatory design, (b) sequential exploratory design, (c) sequential transformative design, (d) concurrent triangulation design, (e) concurrent nested design, and (f) concurrent transformative design. These six designs are grouped into sequential designs or concurrent designs (Plano Clark & Creswell, 2008; Tashakkori & Teddlie, 2010). These are described next.

3.5.1 Sequential Designs

3.5.1.1 Sequential Explanatory Design

This design is termed ‘sequential explanatory design’ because it is *sequential* in that the qualitative phase is followed by the quantitative phase, thus occurring in sequence, and it is *explanatory* because the initial quantitative results are explained further with qualitative data (Creswell, 2014). This occurs in two distinct interactive phases (Creswell & Plano Clark, 2007). This means that the researcher would first conduct the quantitative research by collecting data and analysing the data. Thereafter, the researcher conducts qualitative research by collecting data and analysing the data in an attempt to build on and interpret the findings of

a primarily quantitative study (Creswell, 2014). This design is considered straightforward by Creswell and Plano Clark (2007). These authors claim that, on the one hand, the straightforward nature, easy implementation, and the fact that the report can be written in two phases, which makes it easier to understand and see the distinctions, are the strengths of this design. On the other hand, the length of time it takes to complete the two distinct phases can be described as its weakness (Creswell & Plano Clark, 2007). This study made use of the sequential explanatory design.

3.5.1.2 Sequential Exploratory Design

The *sequential explanatory design* also occurs in sequential timing where the qualitative phase (data collection and data analysis) is prioritised. The quantitative results build on the initial qualitative results to explain or explore a phenomenon and interpret relationships (Creswell & Plano Clark, 2007). The sequential explanatory design is also conducted in two phases, like the sequential exploratory design, then integrated during the interpretation phase (Creswell & Plano Clark, 2007). The order of interpretation is to first report the qualitative findings, then the quantitative results. The one builds on the other, therefore the findings are not compared (Creswell, 2014). The strengths are similar to the sequential exploratory design as it is also a two-phase design; therefore, it is easy to implement, and straightforward to describe and report. This design is useful to a researcher wanting to explore a phenomenon. The challenges of this design are that it is time consuming, and building on the qualitative element may be difficult, depending on the researcher's expertise (Creswell, 2014).

3.5.1.3 Sequential Transformative Design

A *sequential transformative design* has two distinct phases, like the sequential explanatory design and sequential exploratory design; however, in this method, either method can be used first. Priority can be given to quantitative, qualitative, or both (Creswell & Plano

Clark, 2007). Unlike the previous two designs, the sequential transformative design allows the results of the two phases to be integrated together during the interpretation phase. Also, the sequential transformative design has a theoretical perspective (conceptual framework, a specific ideology, or advocacy) which guides the study; therefore, the purpose of this design is to employ the methods that will best serve the theoretical perspective of the researcher (Creswell & Plano Clark, 2007). The two-phase approach allows the researcher to discuss diverse perspectives, advocate for participants, or understand a phenomenon better. The sequential transformative design shares the same methodological strengths and weaknesses as the sequential explanatory design and sequential exploratory design. However, one additional weakness exists: there is little guidance on how to use the transformative vision to guide the methods. Likewise, it may be unclear how to move from the analysis of the first phase to the data collection of the second phase (Creswell & Plano Clark, 2007).

3.5.2 Concurrent Designs

3.5.2.1 Concurrent Triangulation Design

The *concurrent triangulation design* uses quantitative and qualitative methods to corroborate, cross validate, or confirm findings within a single study. The separate methods are used to combat the weaknesses of the other strand. Quantitative and qualitative data collection occurs concurrently (at the same time) and equal priority is given to both methods (Plano Clark & Creswell, 2008). The results of the two methods are integrated at the interpretation phase. This interpretation either may note the convergence of the findings as a way to strengthen the findings of the study or must explain any lack of convergence that may be found (Plano & Creswell, 2008). Creswell and Plano Clark (2007) identify the following strengths of this design: (a) most researchers are familiar with this design, (b) it results in well-validated and substantiated findings, and it has (c) a shorter data collection time period. The limitations include: (a) it requires great effort and expertise to adequately study a

phenomenon with two separate methods, (b) it is difficult to compare the results of two analyses using data of different forms, and (c) the researcher may be unclear how to resolve discrepancies that arise in the results.

3.5.2.2 Concurrent Nested Design

According to the *concurrent nested design* (also referred to as the embedded design), a single data set is not sufficient to address the numerous research questions in the study, so the various questions require diverse methods to address the questions at different levels (Plano Clark & Creswell, 2008; Tashakkori & Teddlie, 2010). Therefore, this approach is referred to as a multilevel design. A nested design has a predominant method that guides the project, and the nested method plays more of a supportive role to the dominant method (Creswell, 2014). The data collected from the two methods are mixed during the analysis phase of the project. This design may or may not have a guiding theoretical perspective (Creswell, 2014). The collection and analysis of the second data set may occur before, during, and/or after the implementation of the data collection and analysis procedures of the dominant method. This design is used so that a researcher may gain broader perspectives from using the different methods as opposed to using the dominant method alone (Creswell & Plano Clark, 2007). The purpose of this design is to enhance the finding of the predominant method. The strengths of this method include: (a) simultaneously collecting the data during one data collection phase, (b) has the advantages of both quantitative and qualitative data, and (c) gain perspectives from the various types of data and from different levels within the study (Creswell & Plano Clark, 2007). Creswell and Plano Clark (2007) identified the following limitations of this design: (a) the need for data to be transformed so that they can be integrated within the analysis phase of the research, (b) the unequal priority of the two methods, and (c) unequal evidence when interpreting the final results.

3.5.2.3 Concurrent Transformative Design

The *concurrent transformative design* is informed by the researcher's use of a theory. This theory may be a theoretical framework, critical theory, conceptual framework, or participatory research (Creswell & Plano Clark, 2007). This design may take on the features of the nested or triangulation design which means that quantitative and qualitative data can be collected at the same time and they may have equal or unequal priority. The integration of the data gathered from the qualitative and quantitative method will more often than not occur during the analysis phase (Plano Clark & Creswell, 2008). However, during the interpretation phase, a possible variation would occur. The concurrent transformative design shares strengths, weaknesses, and common features with the triangulation and nested designs (Creswell, 2014).

3.6 Intervention Mapping

Intervention mapping was designed to create effective behaviour change or systems change interventions. In order to create systems change, an ecological approach to planning is emphasised (Bartholomew-Eldredge et al., 2016). This approach involves the consideration of the individual level, interpersonal level, organisation level, community level, and societal level when addressing behaviour change (Bartholomew-Eldredge et al., 2016). Intervention mapping can be explained as a systematic approach to programme development, implementation, and evaluation. It follows a stepwise manner and provides a framework for decision-making at each step using an ecological approach (Peters, 2015). Essentially, intervention mapping outlines the path from the recognition of a need or problem to the identification of a solution. This is achieved by six steps, namely: (1) logic model of the problem (needs assessment); (2) programme outcomes and objectives; (3) programme design; (4) programme production; (5) programme implementation plan; and (6) evaluation plan (Bartholomew-Eldredge et al., 2016). These steps are described in Table 3.2 below.

Table 3.2: Intervention Mapping Steps

Step	Description
Needs Assessment	Need assessments are used to analyse specific behavioural or health problems within a target population. This assessment is made with the target population and important stakeholders. Contributing environmental, political, social, and behavioural factors must be considered when assessing the need. A needs assessment is necessary to create a logic model of the problem. In this study, the need is determined through Phase 1 of this study (systematic reviews, quantitative and qualitative research with the target population).
Programme outcomes and objectives	The outcomes of the intervention are broken down into specific, measurable, attainable, and realistic and time-bound objectives. These objectives must essentially lead to the desired outcome which, in this case, is a reduction in hookah pipe use. These outcomes and objectives guide the development of the intervention. The outcomes and objectives were derived from the findings in Phase 1 (systematic reviews, quantitative and qualitative research with the target population). The programme outcomes and objectives are important for the logic model of change.
Programme design	In order to design an effective programme, theories must be identified and applied to create change in the determinants of behaviours, in this case, hookah pipe use. Therefore, theory and evidence-based change methods must be considered. In this study, self-determination theory, adolescents' development stage, and the findings of the systematic reviews form the theoretical underpinning. Therefore, the design of this programme is a theory informed programme. It was also important to select practical applications to deliver change methods. These applications were derived from the quantitative and qualitative responses of participants.
Producing programme components and materials	To produce the programme components, the practical applications must be combined and refined to the specific needs of the programme. During this step, plans for the programme must be prepared. Once a programme has been produced, it is essential to pilot the intervention with members from the population. Feedback must be obtained from the participants, and the necessary adjustments must be made to the intervention.
Programme implementation plan	Potential adopters or implementers of the intervention must be identified, and the programme outcomes and objectives must be clearly communicated with the implementing parties. The target population, efficacy expectancies, adoption methods, intervention, and impact or maintenance outcomes must be explicitly communicated with the implementing parties. It is important to have meetings with important stakeholders and community members as they can positively or negatively influence the adoption and acceptance of the intervention within sectors and communities.
Evaluation plan	Process and impact evaluation is very important for interventions as it will determine the measure of success or efficacy of the intervention; therefore, clear indicators must be stated and measured. An evaluation design must be determined, and an evaluation of the intervention must be conducted in accordance with the evaluation plan that is set up prior to conducting the evaluation. All programme objectives must be defined in a measurable form. These objectives are measured in this final step of the intervention mapping framework.

The intervention mapping framework was used as a backdrop for the current design.

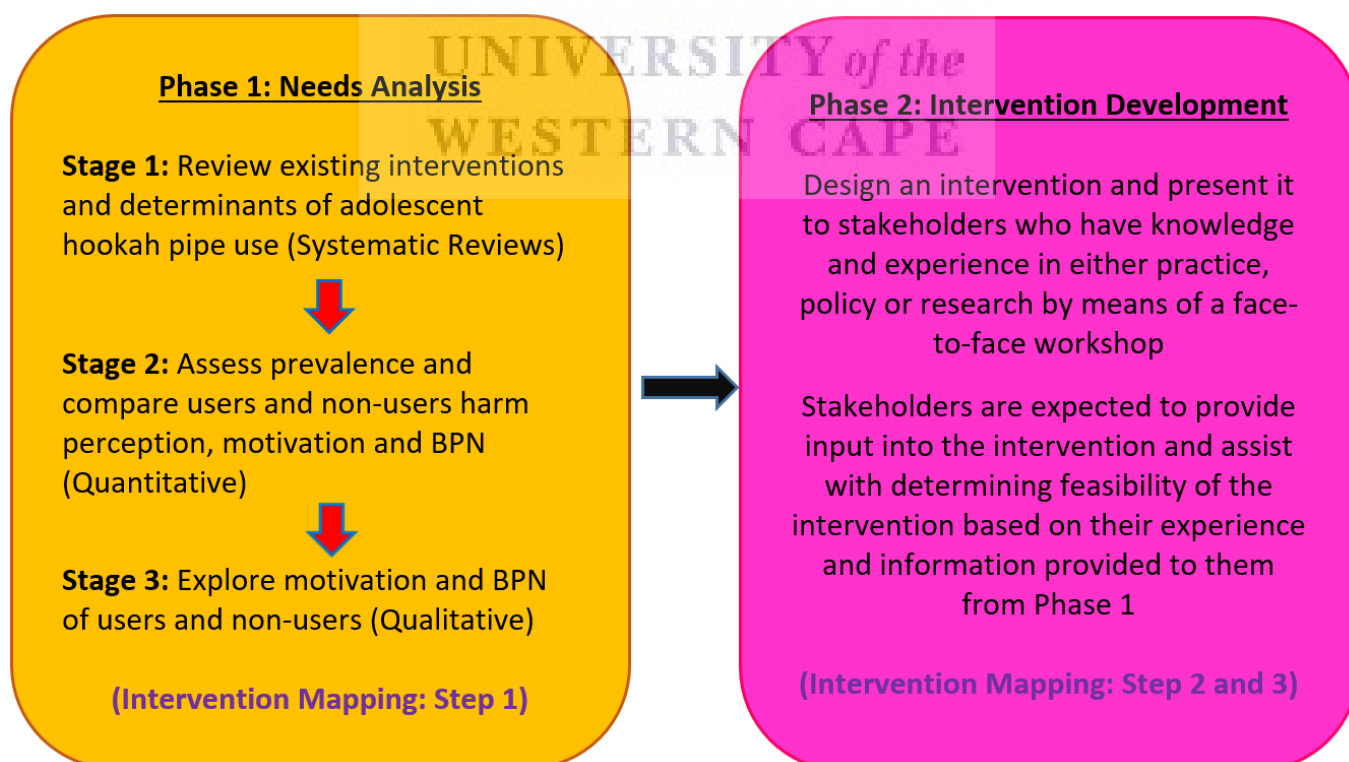
However, this study only focused on the first three steps, namely, (1) identifying the need, (2) setting out programme outcomes and objectives, and (3) designing the programme.

Intervention mapping was well suited for this study because it provided a framework to satisfy the aim of this study, which was to design an intervention to reduce hookah pipe use for adolescents and satisfy their BPN. The framework clearly described the steps involved to design an effective intervention.

3.7 Research Design of the Current Study

This study employed a mixed methodology using an explanatory research design and intervention mapping framework because it provided a deeper understanding of the problem compared to one approach alone. In this study, the qualitative component built on the quantitative component, thereby strengthening the findings. A mixed methods approach is essential as it captures the scientific and philosophical views of the respondents which will culminate in reaching the aim of this study – design an intervention to reduce hookah pipe use and satisfy the BPN of adolescents (Clark & Ivankova, 2015). This study adopted an *intervention mapping* approach within the implementation of the mixed methodological framework to guide the design of the intervention. Bartholomew-Eldredge et al., (2016, p. 7) explain intervention mapping as a framework for effective decision making, planning, implementation, and evaluation of interventions. This study consisted of two phases as depicted in Figure 3.1.

Figure 3.1: Research Design of the Current Study



3.8 Research Setting

The research study was conducted in the Western Cape, South Africa. South Africa is divided into nine (9) provinces. The Western Cape is one of the nine provinces of South Africa. South Africa has a rich history and apartheid has been highlighted as the greatest struggle of the country (Clark, 2000). Apartheid means “separateness” in Afrikaans. Under the apartheid regime, all South Africans were classified into one of the following races: White, Indian, Coloured, or Black. The distinctive races had various rights and they were treated differently. Whites were considered the most superior and Blacks were considered the most inferior. Indians and Coloureds fell in the middle and were given somewhat similar rights. This study will include participants from all four races. Also, under this regime, the Group Areas Act (Act 41 of 1950) was developed and implemented, assigning various racial groups to distinct residential and business areas in an attempt to keep the races separate (Clark, 2000). Post-apartheid, a new government was elected, and a new Constitution was written, and people could enjoy their freedom.

However, in the Western Cape (formerly known as the Cape Province during apartheid), many people remained in the residential areas assigned to them during apartheid as they had built a life for themselves there and considered it home (Walker, 2009). Due to apartheid, Cape Town (urban city in the Western Cape) is viewed as two cities in one because of the great disparity between the rich and the poor, even though it is one City (Bowden, 2006). Low socio-economic communities are characterised by high levels of poverty, gangsterism, and substance abuse (Walker, 2009). Since substance abuse is so rife in the low-socio economic communities (Khan et al., 2016), the study will predominantly target schools in those areas. The Western Cape is divided into eight educational districts, namely: Metro South, Metro North, Metro East, Metro Central, Eden Karoo, Cape Winelands, West Coast, and Overberg. The study targeted adolescents from these districts.

3.9 Implementation of the Current Study

3.9.1 Phase 1: Needs Analysis

Phase 1 focused on establishing the need for intervention. This was achieved by determining existing interventions, the reasons why adolescents smoke the hookah pipe, adolescents' perception of harm, motivation for use, satisfaction and frustration of BPN, and the role of the family in adolescent hookah pipe use.

3.9.1.1 Stage 1: Systematic Reviews – Determinants and Interventions

This is a review stage focusing on the following objectives.

3.9.1.1.1 Objectives:

- Review determinants of adolescent hookah pipe use
- Review interventions aimed at reducing hookah pipe use

3.9.1.1.2 Five Steps of Conducting a Systematic Review

Systematic reviews locate, appraise, and synthesise the best available evidence (Boland et al., 2013). A review is considered systematic when it is based on a well formulated question, identifies appropriate and relevant studies, appraises the quality and summarises the evidence through an explicit and rigorous methodology (Khan et al., 2003). According to Khan et al., (2016), it is this methodological rigour that distinguishes systematic reviews from other types of reviews or commentaries. Systematic reviews are done in a stepwise manner and should be followed accordingly. Khan et al., (2003) describe five steps involved in conducting systematic reviews. These are indicated in Table 3.3.

Table 3.3: Steps Involved in Conducting Systematic Reviews

Steps	Description
Framing questions for a review	The research problems that must be addressed by the review should be stated in a clear and structured question without ambiguity before the commencement of the review.
Identifying relevant work	Studies should be searched for extensively. The study selection criteria should be guided by the research questions. Careful consideration must be given to inclusion and exclusion criteria.
Assessing the quality of studies	Quality studies must be included in the review. Quality studies should describe the minimum acceptable level of design and included studies should undergo a quality assessment.
Summarising the evidence	Data is synthesised in a data extraction Table. The study characteristics, quality, and other important aspects relevant to the research question are tabulated.
Interpreting the findings	The important information is presented in the results Table and data analysis. However, strengths and weaknesses of the included studies must be discussed. The purpose of this section of a systematic review is to make conclusions based on best available scientific evidence. Authors should also make recommendations for future studies. Systematic reviews provide insight into what has been adequately investigated and identify deficient areas to focus future research efforts and resources.

This study followed the five steps highlighted by Khan et al., (2003).

3.9.1.1.3 Framing Questions for a Review

This review aimed to guide the design of an intervention, prevent redundancy, and identify the challenges and successes of existing interventions. In order to achieve the objectives of this stage, the following research questions guided the review: (1) What are the findings of previous research examining the determinants of hookah pipe use amongst adolescents?; and (2) What are the findings of previous research examining interventions to reduce hookah pipe use?

3.9.1.1.4 Identifying Relevant Work

Based on the research questions, keywords or search terms were created. The search terms for the determinants of the systematic review were: determinants and hookah; determinants and shisha; determinants and water pipe; factors and hookah; factors and shisha; factors and water pipe; predictors and hookah; predictors and shisha; predictors and water pipe; reasons and hookah; reasons and shisha; reasons and water pipe; perception and hookah; perception and shisha; perception and water pipe; motivation and hookah; motivation and shisha; motivation and water pipe; hookah and adolescent or preadolescent; why and hookah smoking; attitude and hookah and adolescent or preadolescent; belief and hookah and adolescent or preadolescent. Thereafter, appropriate databases that potentially hold relevant

articles on determining factors and intervention studies were determined. The following electronic databases were searched: Cinahl, Dentistry and Oral Sciences Source, Green file, Health source – Consumer Edition, Health source – Nursing/Academic Edition, Medline, PsychArticles, SosIndex, SportDiscus, Cochrane, Wiley, and PubMed.

The search terms for the systematic review of interventions were: intervention and hookah pipe; intervention and hookah smoking; hookah; intervention and hookah or shisha or water pipe; intervention and water pipe; intervention and shisha; intervention and narghile; intervention and hookah and preadolescent; intervention and hookah and pre-adolescent; intervention and hookah and preteen; intervention and hookah pipe and preadolescent; intervention and hookah and adolescent; intervention and hookah and teenagers; hookah and preadolescent; hookah and adolescent; water pipe and preadolescent; water pipe and adolescent; shisha and preadolescent; shisha and adolescent; narghile and preadolescent; narghile and adolescent; intervention strategies and hookah; intervention or strategies and hookah; best practice and hookah; treatment or therapy and hookah; program and hookah.

Thereafter, appropriate databases that potentially hold relevant articles on determining factors and intervention studies were determined. The following electronic databases were searched: Cinahl (through EBSCOhost), Dentistry and Oral Sciences Source (through EBSCOhost), Green file (through EBSCOhost), Health source – Consumer Edition (through EBSCOhost), Health source – Nursing/Academic Edition (through EBSCOhost), Medline (through EBSCOhost), PsychArticles (through EBSCOhost), SosIndex (through EBSCOhost), SportDiscus (through EBSCOhost), Cochrane, Wiley, and PubMed using the search terms created to identify relevant literature.

The studies that were included in this systematic review were studies that focus on determinants of hookah pipe use and interventions to reduce hookah pipe use. Systematic Review 1 focused on: (a) adolescents; (b) studies pertaining to determinants of hookah pipe use; (c) articles published in the past ten years (2007–2017) for examining the determinants,

as there has been prolific research on the hookah pipe during this time period. Hence, it would yield valuable research on the topic; (d) the articles were full-text and peer-reviewed in the English language; and (e) this study included quantitative, qualitative, and mixed methodology articles. For this review, studies older than 10 years or studies that did not exclusively focus on preadolescents or adolescents were excluded.

Systematic Review 2 focused on preadolescents, adolescents, young adults, and adults. There were no date limiters, since Maziak et al., (2015) highlighted the lack of interventions globally and identified the need for interventions. The articles were full-text and peer-reviewed in the English language, and included pre- and post-test studies, pilot studies, feasibility trials, randomised control studies, and quasi-experiments.

Studies that were not focused on interventions or determinants were excluded. For example, guidelines, discussion papers, protocols, reviews, editorials, legislation, identifying a need for an intervention, animal studies, and studies focusing solely on cigarettes and e-cigarettes (and not on the hookah pipe) were excluded. Studies that were not in the English language were also excluded.

3.9.1.1.5 Assessing the Quality of Studies

Full-text articles that were potentially relevant to the systematic study were retrieved and screened according to the critical appraisal tool. The tool was first piloted with 10% of the studies prior to applying it to all the included studies. The pilot assessed appropriateness and adequacy of the appraisal tool. Included studies had to be appraised to assess the adequacy of a study to be considered within these reviews. A quantitative, qualitative, and mixed method critical appraisal tool was adapted for Systematic Review 1, and articles selected for Systematic Review 2 were appraised using the RE-AIM model.

3.9.1.1.6 Summarising the Evidence

Data extraction involves taking out relevant information from various data sources and tabulating the information for analysis. Data from the included studies were extracted and

placed in a data extraction tool (table). The data extraction tool used for these studies were piloted with 10% of the retrieved studies. The pilot assessed appropriateness and adequacy of the data extraction tools.

The following data was extracted for Systematic Review 1: author, year of study, sample details, number of participants, mean age or age range of participants, gender distribution of participants, relevant variables (determinants), odds ratio of the relevant variables (determinants), and confidence intervals. Thereafter, the significant variables were placed into a table according to five themes, namely: family factors, peer/friends factors, individual factors, school factors, or other factors. The following data was extracted for Systematic Review 2: author, year, study design, aim of study, target population and recruitment, limitation of intervention, recommended for practice, adoption (setting, consultations, and participant feedback), intervention, interventionist and training/experience, maintenance of results, and effect size. After data extraction, final inclusion and exclusion decisions were made regarding the included studies.

3.9.1.1.7 Interpreting the Findings

The included studies were compared according to their strengths and weakness as well as their key characteristics. When the review process was complete, the findings were synthesised and collated and submitted for publication in a peer-reviewed journal.

3.9.1.2 Stage 2: Prevalence and Comparison of the Variables (Quantitative)

This stage is a quantitative stage focusing on the following objectives:

3.9.1.2.1 Objectives

- Determine the prevalence of hookah use in the Western Cape, South Africa;
- Compare (a) harm perception, (b) motivation for hookah use/non-use, and (c) BPN of adolescent hookah pipe users and non-users;

- Determine how families influence the decision to smoke the hookah pipe and how they contribute to the satisfaction of BPN.

3.9.1.2.2 Population and Sample

The population for the present study were adolescents attending secondary or public high schools in the Western Cape. Probability sampling techniques were used. A simple random sampling technique was used. Adolescents in Grades 7 to 12 were selected to be a part of this study as these are the grades where experimentation is most likely to occur (Morojele et al., 2013). Grade 7, 8 and 9 (secondary/high school) participants represented early adolescents, and Grade 10, 11 and 12 (secondary/high school) represented late adolescents. The final sample consisted of 1279 adolescents from 5 educational districts, namely: Metro South, Metro Central, Cape Winelands, West Coast, and Eden Karoo.

3.9.1.2.3 Data Collection Instruments

To address the quantitative objectives of this study, the researcher sought reliable and valid instruments that would assist in meeting the objectives of this study. The data was collected with a battery of instruments. The English instruments were self-reported and translated into Afrikaans and isiXhosa, as these are the three official languages of the Western Cape. The Afrikaans and isiXhosa versions were then back translated into English. The participant was able to choose his/her language preference.

The instruments included in the questionnaire comprised nine sections:

- I. Demographic Information
- II. Prevalence – *Adapted from the hookah pipe questionnaire*
- III. Hookah Pipe – *Hookah pipe questionnaire adapted from the College Health Behavior Survey (2010-2011).*
- IV. Motivation (hookah pipe users only) – *Adapted from the intrinsic motivation inventory*
- V. Motivation (hookah pipe non-users only) – *Adapted from the treatment self-regulation questionnaire (smoking)*

- VI. BPN Scale – Adapted *from the BPN scale*
- VII. Role of the family – Adapted *from the family functioning scale*
- VIII. Family Satisfaction – Adapted *from the satisfaction with life scale*
- IX. Need for an intervention to reduce hookah pipe use

These are described in more detail below.

- Section A: Demographics

A self-constructed demographics questionnaire was developed specifically for the present study. Participants were required to indicate their age, grade, school, area of residence, race, employment status of family, and home language.

- Section B and C: Hookah Pipe Questionnaire

Section B provided descriptive information about hookah pipe use, whereas section C investigated knowledge, risk perceptions, and behavioural aspects of hookah pipe use. The hookah pipe questionnaire was constructed from The College Health Behaviour Survey (2010–2011). The survey was developed at the University of Missouri, Columbia. This survey focuses on the wellness of the individual, with reference to knowledge, perceptions, attitudes, and behaviours towards all aspects of their health and risk-taking behaviours, which include substances and hookah pipe use.

- Section D: Intrinsic Motivation Inventory

The Intrinsic Motivation Inventory (IMI) is a multidimensional measurement device intended to assess participants' subjective experience related to a specific activity – in this case, hookah pipe use. The IMI has been used in several experiments related to intrinsic motivation and self-regulation (e.g., Ryan et al., 1983; Ryan et al., 1990; Ryan et al., 1991; Deci et al., 1994). The instrument has seven subscales and assesses participants' interest/enjoyment, perceived

competence, effort, value/usefulness, felt pressure and tension, perceived choice and relatedness while performing a given activity, thus yielding seven subscale scores. This study used the interest/enjoyment, felt pressure and tension, and perceived choice subscales to determine motivation for hookah pipe use. The interest/enjoyment subscale is considered the self-report measure of intrinsic motivation. The perceived choice concept is theorised to be a positive predictor of both self-report and behavioural measures of intrinsic motivation, and pressure/tension is theorised to be a negative predictor of intrinsic motivation (Deci et al., 1994).

Factor Structure and Reliability: The IMI consists of varied numbers of items from these subscales, all of which have been shown to be factor analytically coherent and stable across a variety of tasks, conditions, and settings. The general criteria for inclusion of items on subscales have been a factor loading of at least 0.6 on the appropriate subscale, and no cross loadings above 0.4. Past research suggests that order effects of item presentation appear to be negligible, and the inclusion or exclusion of specific subscales appears to have no impact on the others (Ryan et al., 1991). For more than 30 years, various iterations of the IMI have been used with well-established subscale reliability across tasks, settings, and conditions. Mixing and matching the six primary subscales to suit research needs has also proven to be reliable (Tsigilis & Theodosiou, 2003; Ostrow & Heffernan, 2018).

Validity: Correlations between self-reports of effort or interest and behavioural indices of these dimensions are modest – often around 0.4. Ego-involvements, self-presentation styles, reactance, and other psychological dynamics must be considered. Another issue is that of redundancy. Items within the subscales overlap considerably, although randomising their presentation makes this less salient to most participants. The incremental R for every item above 4 for any given factor is quite small. Still, it is very important to recognise that multiple item subscales consistently outperform single items for obvious reasons, and they have better

external validity (McAuley et al., 1989). McAuley et al., (1989) did a study to examine the validity of the IMI and found strong support for its validity.

- Section E: Treatment of Self-Regulation Questionnaire (smoking)

The Treatment Self-Regulation Questionnaire (TSRQ) is a set of questionnaires concerning why people engage in specific behaviours. The purpose of the questionnaires is to determine the degree to which a person's motivation for a particular behaviour is relatively autonomous or self-determined. There are three subscales to the scale: (a) the autonomous regulatory style; (b) the controlled regulatory style; and (c) amotivation (which refers to being unmotivated). This scale (smoking) has 15 items: 6 that assess autonomous motivation, 6 that assess controlled motivation, and 3 that assess amotivation (Ryan & Connell, 1989).

Reliability: The TSRQ introduced as a measure to assess how people behave in health ways. The TSRQ appeared in Williams, Freedman, and Deci (1998), Williams, Rodin et al., (1998), and Williams et al., (1999), and several other studies. The TSRQ is widely used in the study of behaviour change in health care settings. TSRQ to measure self-regulation for behaviour change have provided reasonable evidence for the reliability of this measure and for its consistency across studies of tobacco use (Levesque et al., 2007). Interrater and test–retest reliabilities have been reported in the 0.69–0.86 range (Gross et al., 1990).

Validity: A validation article of the TSRQ was published by Levesque et al., (2007). Typically, the responses on the autonomous items are averaged to form the reflection of autonomous motivation for the target behaviours, and the responses on the controlled items are averaged to form the reflection of controlled motivation for the target behaviours. In the studies that assessed amotivation, the motivated responses were also averaged. These three subscale scores can be used separately. Exploratory factor analysis was performed, and the internal consistency of the subscales were assessed. The data was analysed using Cronbach's alpha. The internal consistency for factors was autonomous motivation (ranging from 0.85 to

0.93), and external regulation (0.85 to 0.93) was acceptable. For amotivation, one value was found to be unacceptable (0.41), but the rest were acceptable, ranging from 0.73 to 0.79. Overall, internal consistencies were adequate (Levesque et al., 2007).

- Section F: Balanced Measure of Psychology Needs Scale

SDT holds that BPN (autonomy, competence, and relatedness) are essential for psychological growth. These needs are innate. Sheldon and Hilpert (2012) use the Balanced Measure of Psychology Needs Scale to assess people's sense of autonomy, competence, and relatedness. This is an 18-item measure; the scale consists of 6 items per need. Within each scale, three items measure negative effect and three items measure positive effect. Participants were asked to rate how they had felt in the last week, using 1 = not at all to 4 = very true scale.

Reliability: Reliability analyses of the six BPNS subscales (ranging from 3 to 5 items) were .83 and .74 for positively and negatively worded relatedness, .65 and .75 for positively and negatively worded competence, and .72 and .46 for positively and negatively worded autonomy. The alpha coefficient of .46 for negatively worded autonomy does not meet conventional standards. After reverse-scoring the negatively worded items, reliabilities for BPNS – autonomy, competence, and relatedness were .68, .75, and .84, respectively (Sheldon & Hilpert, 2012).

Validity: The Cronbach alpha of this instrument reveals that for the six 3-item BPNS subscales, coefficients of 0.71 and 0.85 for positively worded relatedness were found, 0.71 and 0.70 for positively and negatively worded competence, and 0.69 and 0.72 for positively and negatively worded autonomy (Sheldon & Hilpert, 2012). Kesici (2015) tested concurrent validity by Edwards Personal Preference Schedule and significant correlations were obtained ($r=.36, .39, .58; p<.05$). Item-total correlations and item-remainder correlations were also checked and reported to be between .21 and .56 (Kesici, 2015).

- Section G: Family Functioning Scale

The Family Functioning Scale is a 75-item scale. Participants are asked to rate on a 4-point Likert scale how true each statement is for their own family. The family functioning scale consists of 15 subscales, but this study will only make use of 4 – cohesion, conflict, laissez-faire family style, and family sociability. The measure is created based on prior family assessment instruments. According to Koranek (1989), the family functioning scale is a comprehensive scale that is able to assess characteristics of family functions (Yousefi, 2012).

Reliability: Reliability of the family functioning scale was established in a study conducted by Yousefi, (2012) with internal consistency (Cronbach's alpha) being 0.77 and test-retest reliability for the 15 dimensions ranging from 0.45 to 0.78. This finding was found in Kapanee and Rao (2007). Scale scores are constructed by reversing the points allocated to reverse-scored items and simply summing the points.

Validity: The scale has adequate psychometric properties and discriminate validity. These dimensions have been cross-culturally validated (Yousefi, 2012). This scale consists of 75 questions and descriptive phrases about family features that Bloom (1985) has classified into 15 areas, which are significant and independent of each other, by factor analysis. Furthermore, the content validity of the family functioning test scale was approved by a group of professionals and family counsellors (Rezaei-Dehaghani et al., 2015).

- Section H: Satisfaction with Life Scale

The Satisfaction with Life Scale was adapted for this study to measure satisfaction with family. This is a 5-item scale with a Likert scale where participants indicate their agreement with each item by placing the appropriate number on the line preceding that item. For example: (1) strongly disagree, (2) disagree, (3) I don't agree or disagree, (4) agree, or (5)

strongly agree. This scale has been designed to measure global cognitive judgments of one's life and, in this case, family satisfaction (Diener et al., 1985).

Reliability: The scale has been shown to be reliable. It is suitable for a wide range of age groups and applications in different cultures, nations, and languages. The scale has a high internal consistency with Cronbach's alpha coefficients ranging from .79 to .87 (Pavot et al., 1991).

Validity: The scale has shown to be valid based on the high convergence of self- and peer-reported measures of subjective well-being and life satisfaction providing strong evidence that subjective well-being is a relatively global and stable phenomenon, not simply a momentary judgment based on fleeting influences (Pavot et al., 1991). According to Pavot and Diener (1993), the scale shows good convergent validity with other scales and with other types of assessments of subjective well-being. Furthermore, the scale shows discriminant validity from emotional well-being measures. Confirmatory factor analyses reveal a consistent factor structure (Pavot & Diener, 1993). The scale is recommended as a complementary scale because it assesses an individuals' conscious evaluative judgment of his or her life (or family) by using the person's own criteria (Pavot & Diener, 1993). This scale has shown sound structural and convergent validity within the context of South Africa (Roman et al., 2019). This is evidenced by Westaway and colleagues (2003) who found that the item-total correlation coefficients exceeded the item 'convergent validity criterion' of .40 and ranged between .71 and .86. The mean increment r was .70 (range: .54-.81). This indicates a more than acceptable index of homogeneity. Coefficient alpha was .92, indicative of very good internal consistency (1, 9).

- Section I: Need for Intervention

Three questions to determine the need for intervention was self-constructed. The three questions were: (1) Do you think people who smoke the hookah pipe need help?; (2) Explain

your answer in question one, and (3) What do you think will make people who smoke the hookah pipe stop smoking it? Question one requires a 'yes' or 'no' response, and questions 2 and 3 allow the respondent to elaborate. This information was used to determine the needs of people and the needs of the intervention.

3.9.1.2.4 Pilot Study

The instruments were piloted prior to the main study. Permission was obtained from the principal to conduct a pilot study at the school. The study was explained to the children using the information sheet; when they agreed to participate, they signed assent forms. The children that signed assent forms received information sheets and consent forms for their parent to complete in their preferred language. Participants had one week to return the consent form.

Three groups of Grade 5 learners at a school that was not included in the main study participated in the pilot. The reason for piloting with a younger group was to ensure that there would be minimal difficulty with language and understanding for the older grades in the main study. It was assumed that the older grades would have a better understanding and language ability compared to grade fives. The purpose of the pilot was to determine the technical qualities, language difficulty, and levels of understanding of the instruments.

The participants completed the questionnaire in a quiet room, free from disturbance. The questionnaire took 45–60 minutes to complete. The questionnaire was self-report, but the researcher read each item to the child and provided an explanation if the need arose (need was determined by a confused look on a child's face or a child asking for an explanation). Once the questionnaire was complete, the researcher held a debriefing session with each group. The debriefing sessions allowed the participants to speak about their experience of completing the questionnaires. This afforded the researcher the opportunity to identify flaws in the data collection plan and make the necessary changes before conducting the bigger study.

3.9.1.2.5 Questionnaire Modifications

Based on the input of the participants of the pilot study, the following amendments were made:

- a) From the outset, every child received a consent form and information sheet for parents to sign. Once this was returned, children were given the opportunity to sign an assent form and complete the questionnaire. This course of action was decided so that it would be less disruptive during class time. In other words, there would only be one disruption (get assent and complete the questionnaire at one time), instead of two (gain assent and then complete the questionnaire). It is also less resource intensive, as it would minimise the number of times the researcher would need to go to each school as well as reduce printing costs.
- b) In the Afrikaans questionnaire, the spacing in the Likert scale options were not easily readable because the words were broken up over two lines. Thus, for the main study, the columns were made wider so that the full word would fit in the block on one line.
- c) The children were a bit confused by section D (only hookah pipe users should complete) and E (only hookah pipe non-users should complete). The font of this instruction was made bigger and it was emphasised more in the main study.
- d) Section E: Instead of having “I would not smoke the hookah pipe because” on top with the items listed in the questionnaire below, it was changed so that each item started with “I would not smoke the hookah pipe because...” to make it easier for the participants to read and understand.

Apart from the above, the participants said that the questionnaire was easy to understand; they appreciated that each item was read out to them, and also indicated that although the length of time was a bit long, it was manageable.

3.9.1.2.6 Data Collection for Main Study

A letter explaining the study was given to the principal. The principal appointed a person with whom the researcher could liaise. The letter and consent form were explained to the contact teacher, who then explained the study to the Grade 7 and 12 teachers. The teachers provided the learners in their class with a consent form and an information sheet for their parents. Both documents were in English, Afrikaans, and isiXhosa, so parents could respond in their preferred language. Participants had one week to return the signed consent forms to their teacher. Once the consent forms were received, assent was obtained, and the questionnaire was completed with the participants at their respective schools. Parents, teachers, and children were notified that the consent form applies to the quantitative and qualitative stages of the study. Both stages were explained in the information sheet and mentioned in the assent and consent forms.

3.9.1.2.7 Data Analysis

Once the raw data was obtained from the participants, it was entered into the Statistical Package for the Social Science (SPSS). The data was coded, cleaned, and checked for errors. The nature of the study required the researcher to use descriptive and inferential data analysis (Pretorius, 2007). Descriptive statistics included percentages, means, and standard deviations. Inferential statistics included a two-sample t-test to compare BPN and motivation of hookah pipe users and non-users.

3.9.1.3 Stage 3: Exploration of Motivation and Needs (Qualitative)

This stage is a qualitative stage focusing on the following objectives:

3.9.1.3.1 Objectives

- Describe the motivation for hookah use/non-use and BPN of adolescent hookah pipe users and non-users;

- Explore how families influence the decision to smoke the hookah pipe and how they contribute to the satisfaction of BPN.

3.9.1.3.2 Participants

The population for the present study were adolescents attending secondary or high public schools in the Western Cape. Non-probability sampling techniques were used. A purposive sampling technique was used. Hookah pipe users and hookah pipe non-users that participated in the quantitative component of this project were targeted as participants for the qualitative component of this study. The final sample consisted of 30 adolescents from 3 educational districts, namely: Metro South, Metro Central, and Cape Winelands. Sixteen adolescents were hookah pipe non-users and fourteen were hookah pipe users.

3.9.1.3.3 Interview Schedule

To address the qualitative objectives of this study, the researcher designed an interview schedule. The interview schedule was guided by components of Reasoned Action Theory and SDT. Furthermore, the quantitative questionnaires and analysis were assessed in the development of the interview schedule. The interview schedule was designed in English. It was then translated into Afrikaans, and then translated back into English. There was no need for an isiXhosa version because the learners could communicate effectively in English as they attended an English or Afrikaans medium school. Also, none of the participants that participated in the quantitative component opted for an isiXhosa questionnaire. Participants could also choose their language preference. A thematic approach was used, meaning that the research questions were used to define a classification into main topics for the interview schedule.

The interview schedule comprised nine sections, viz.:

- I. Demographics (*e.g., How old are you? How many people live in your home?*)
- II. Knowledge, Attitude and Perception (*e.g., What do you know about the hookah pipe? What do you think are the advantages and disadvantages of smoking hookah pipe?*)

- III. Prevalence (*e.g., When should people start smoking the hookah pipe? When should they stop smoking the hookah pipe?*)
- IV. Motivation (*e.g., Why do you smoke the hookah pipe? What do you enjoy most about smoking (user) or not smoking (non-user)?*)
- V. BPN – Autonomy (*e.g., In life, how free do you feel to do the things you like to do? How free do you feel to make important choices about your life?*)
- VI. BPN – Competence (*e.g., What makes you feel successful or proud? When do you feel successful or proud?*)
- VII. BPN – Relatedness (*e.g., How often do you feel lonely? Are there people in your life who you feel close and connected with?*)
- VIII. Family (*e.g., Tell me about your family. What do you like and what don't you like about your family?*)
- IX. Behaviour Change (*e.g., Do you think people can change their hookah pipe smoking behaviour? How?*)

3.9.1.3.4 Piloting of Interview Schedule

The interview schedule was piloted before it was applied to the main study.

Permission was obtained from the principal to conduct a pilot study at the school. This was the same school where the quantitative pilot was conducted. The study was explained verbally to the principal and to the learners who participated in the study. The learners were aware of the study, so greater clarity was provided about this component, explaining the purpose and importance of interviews. Learners signed assent forms again, even though assent and consent was provided in the first stage of the study – the quantitative component. This was done as a reminder as well as to refresh their memory that participation was a choice. The pilot was conducted by means of one-on-one interviews in a private space, free from distraction, at the school where the participants attend. The pilot was done with Grade 7 learners that were not part of the main study. The reason for piloting with such a young group is to be able to ensure

that there would be minimal difficulty with language and understanding for the older grades that were going to participate in the main study. It was assumed that the older grades would have a better understanding and language ability compared to grade sevens. The purpose of the pilot was to determine the technical qualities, language difficulty, and levels of understanding of the interview schedule.

The interview took 40–60 minutes to complete. The researcher asked the questions in the exact order of the interview schedule. When participants did not understand the question or looked confused, the researcher explained the question. Debriefing took place after each interview. This allowed the participants to speak about their experience of the interview and any challenges or feelings it may have ignited within them.

3.9.1.3.5 Modifications for the Main Study

No modifications were needed for the main study. The participants and the researcher were satisfied with the process and outcome of the interviews.

3.9.1.3.6 Data Collection for Main Study

A letter reminding the principal of the study was sent prior to the day of data collection, together with the list of names identified for the main study. The researcher manually went through the questionnaires and class lists to determine a representative sample from each school in terms of demographics and users and non-users. The researcher also made a backup list in case the learners were absent, left the school, or decided not to participate. On the day of data collection, the school was prepared, a liaison person had been assigned and had ensured that the venue was ready. The liaison person informed the participants the day before the data collection was scheduled to take place. The participants arrived one at a time for the interview. Since there were no modifications made to the interview schedule based on the pilot, the same process was followed. The researcher and participants experienced no challenges in terms of data collection.

3.9.1.3.7 Data Analysis

The audio-recordings of the interviews were transcribed and then thematically analysed. Thematic analysis was used in this study to identify, analyse, and report patterns, referred to as themes within the data (Braun & Clarke, 2006). The thematic analysis techniques of Braun and Clarke (2006) were employed in this study. They recommend six phases of analysis, namely: (1) familiarising oneself with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining concepts, and (6) report writing.

3.9.2 Phase 2: Developing the Intervention

This phase built on Phase 1 by using the acquired information from the needs analysis to design an intervention to reduce adolescent hookah pipe use and satisfy their BPN. The design of the intervention was then presented to a panel of stakeholders to determine feasibility.

3.9.2.1 Objectives

- Explore and describe the need for an intervention to reduce hookah pipe use among adolescents;
- Design a programme to reduce adolescent hookah pipe use and satisfy their BPN.

3.9.2.2 Research Design

Phase 2 focused on the design of the intervention. Conventional Delphi studies involve multiple rounds of structured communication, such as questionnaires, whereby each round builds on the findings of the previous round in an attempt to obtain consensus amongst experts about the design of an intervention (Avella, 2016). However, this study made use of a modified Delphi design. Avella (2016) explains that modified Delphi designs typically do not engage the panel by means of questionnaires in an attempt to generate answers, they use other means to collect initial answers and present them to the expert panel. This study made use of systematic reviews as well as surveying and interviewing adolescents to gain initial answers.

These findings were presented to the expert panel in the form of a workshop. The panel was able to comment and add to the findings in this workshop.

3.9.2.3 Pilot Workshop

In order to discuss the findings of Phase 1 and gain input about the design of the intervention from the expert panel, a pilot workshop was hosted on 14 October 2019 from 09h00–13h00. The purpose of the pilot workshop was to test the efficacy of the workshop layout and content. A faculty as well as department level invite was sent to staff and post-graduate students to participate. One NGO and one FBO was also invited in order to assess whether the content was relevant and applicable to a diverse panel. The workshop was hosted, with the feedback session digitally recorded. Feedback provided in the pilot workshop was incorporated in the main workshop. Participants in the pilot study indicated that the intervention should have an added component focusing on teachers, the community, and social media. This was added to the intervention.

3.9.2.4 Main Workshop

3.9.2.4.1 Participants

International, provincial, and local members of government, non-governmental organisations (NGOs), faith-based organisations (FBOs), and academia were invited to participate in the main workshop. Participants were sourced based on their experience or academic contribution towards substance use, SDT, adolescents, or involvement in the design of interventions. The participants were identified through their biography or referral from their colleagues. In addition, participants were sourced from the South African Community Epidemiology Network on Drug Use (SACENDU). The participants were recruited by use of non-probability, biographic information (Internet searches), and snowball and convenience sampling. All recruitment and communication occurred via email. Responses were received

within the first week. Re-invites were sent one week before the workshop. Consent was explained and signed at the workshop.

3.9.2.4.2 Data Collection Procedures

In order to gain insights from the expert panel, a workshop was held on 13 November 2019 from 09h00–13h00. The workshop followed the following format: (a) introductions; (b) activity: myth, truth, and question mark; (c) presentation of the findings of Phase 1; (d) presentation of the intervention; (e) small group discussions about the intervention with a specific focus on the theme, aim, objectives, activities, and RE-AIM components; and (f) feedback to the large group. The researcher made copious notes about the gaps and recommendations of the intervention whilst the group was presenting. Clarifying questions were asked at the end of each presentation by the plenary and the researcher.

3.9.2.4.3 Data Analysis

The full duration of the workshop was audio-recorded and transcribed verbatim. During the group discussions, the groups made notes on large pieces of paper that they used to present. During the presentations, the researcher (ZK) made detailed notes to ensure accurate reflections of the groups' ideas. The transcriptions, participants' notes, and the researcher's notes were thematically analysed using Braun and Clarke's (2006) six step approach to thematic analysis, which included: (1) familiarising oneself with the data, (2) assigning preliminary codes to describe data, (3) searching for patterns and themes from the codes, (4) reviewing themes, (5) defining and naming themes, and (6) generating a report.

3.10 Reflexivity

Reflexivity facilitates insight into personal and social experience as it allows researchers to turn a critical gaze towards themselves (Finlay, 2012). Introspective reflexivity was used in this study as it allowed the researcher to recognise the attitudes, experiences, and emotions that may affect engagement with the participants and the data analysis, but in an attempt to minimise this and maintain research focus, bracketing biases and attitudes of the

researcher was used too (Patnaik, 2013). Dowling (2006) suggested a three-phase process of bracketing which involves documenting in a reflective journal. The three phases include: (1) *pre-action bracketing* – occurs during the preparation stage where attitudes, emotions, and ideas are likely to influence the data is identified and dealt with; (2) *in action bracketing* – emerges during the empirical work; and (3) *bracketing on action* – use of this new insight in subsequent empirical work. The researcher followed this process in this study.

3.11 Trustworthiness

Connelly (2016) asserts that research should be trusted in order for it to have a positive impact on the world. This can be achieved through a rigorous, systematic, and trustworthy process. Trustworthiness is achieved by research being credible, dependable, confirmable, and transferable.

Credibility: The current study made use of triangulation which refers to “use of different methods, especially observation, and individual interviews, which form the major data collection strategies for much qualitative research” (Shenton, 2004, p. 65). This study made use of a sequential explanatory research design which included questionnaires, observations, and individual interviews.

Dependability: This study ensured dependability by thoroughly explaining the methodological processes of this study. Reflections were done and discussed with the supervisor.

Confirmability: This study employed a mixed method methodology and strengthened the study with systematic reviews and a modified Delphi study.

Transferability: This study was carried out in the various educational districts in the Western Cape in rural and urban contexts. This determined that the findings were transferable. In addition, a mixed method methodology allowed for a broader range of participants. This was useful because different contexts were considered.

3.12 Ethics Statement

O’Leary (2004) asserts that researchers are responsible for shaping the character of knowledge presented as well as the responsibilities associated with this knowledge production. This is achieved through recognising, considering, and adhering to sound ethical principles. Ethics was prioritised in this study. There was full adherence to the ethical considerations stipulated by the University of the Western Cape. Permission to conduct the study was obtained from the University of the Western Cape and ethical clearance to conduct this study was granted by the Senate Research Committee at the University of the Western Cape (Project number HS17/4/5). Thereafter, permission was requested from the Western Cape Education Department to conduct the study in schools. Permission was granted (20170531 –1547 and 20180629–3893). The researcher then set up meetings with the principals at the various schools in the Western Cape to explain the study and request permission to access the schools.

3.12.1 Informed Consent

The principals received an information letter explaining their role and the researcher’s aims and objectives. The letter also explained the benefits, risks, and ethics of this study. According to Parsons and colleagues (2016), research aims, moral justification, information about the project, benefits, permission, reporting, anonymity, and confidentiality are imperative in any research study. In order to adhere to the ethical processes, the aims, justification, information about the project, the benefits and the reporting were provided in the information letter and read and explained to the participants. Participants were informed that it was a voluntary process, and this was emphasised when reading the information letter. When they agreed to participate in the study, they had to sign assent. A consent form and information letter were sent home with the children for their parents to provide written consent. The consent form and information letter that was sent to parents were in English,

Afrikaans, and isiXhosa, so that all parents can read and understand in their preferred language. English, Afrikaans and isiXhosa are the three official languages of the Western Cape.

Contact details were provided on the information letter in the event that the principals, participants, parents, or caregivers needed clarity. Informed consent was presented in a language that can be easily understood by the participants.

3.12.2 Right to Withdraw

Should the participant feel that he or she no longer wanted to participate, they had the right to withdraw from the study at any time without any repercussions.

3.12.3 Privacy, Anonymity and Confidentiality

Participants were made aware that their privacy would be protected during the process of data collection, data analysis, and after the data had been captured and analysed. In order to ensure privacy, names were not requested as each questionnaire had a code number to ensure anonymity. During the qualitative assessment, pseudo names were assigned to the participants, so that their responses would remain confidential and anonymous. Participants were assured that all information provided would remain confidential. All audio-recordings and completed questionnaires were stored in a locked filing cabinet accessible only to the researcher and her supervisors. If a publication or report arises from this information, there would be no descriptors to identify participants in any way.

3.12.4 Risk of Potential Harm to the Subjects

Participants were not harmed in the study. Some questions may have evoked discomfort, but the researcher ensured that a referral system was in place. At all times, the researcher was cognisant of her role in ensuring beneficence and non-maleficence.

3.12.5 Justice

The researcher tried to prevent bias and discrimination by including all genders, ethnicity, culture, social status, ages, geographical location, and race in the grades under study. Respect, dignity, and integrity of participants was maintained throughout the research process. Schools were randomly selected in each education district, which allowed any school to be a part of the identified population and have equal opportunity for inclusion in this study. The information regarding consent and information about the study was made available in the language that parents and participants could understand. The human rights of all participants were respected at all times.

3.13 Conclusion

This chapter discussed the methodology used in this study. It provided insight into the overall process of collecting the data and ensuring that all ethical procedures were followed. It also provided an understanding of the population, data collection tools, research design, and methodological approach employed in this study. This chapter explained how the pilot study was implemented and identified how the process was amended to improve the experience for the participants in the main study.

The next chapter focuses on the determinants of adolescent hookah pipe use.

3.14 References

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UNIVERSITY of the
WESTERN CAPE

CHAPTER 4

DETERMINANTS OF ADOLESCENT HOOKAH PIPE USE

4.1 Introduction

The previous chapter provided an outline of the methodology employed in the study to address the aim and objectives as presented in Chapter One. The current chapter addresses Objective 1, which was to systematically review determinants of adolescent hookah pipe use. This chapter has been published in the *Journal of Child and Adolescent Substance Use*.

Kader, Z., Roman, N. V., & Crutzen, R. (2020). Determinants of Adolescent Hookah Pipe Use: A Systematic Review. *Journal of Child & Adolescent Substance Abuse*, 1-20. DOI: 10.1080/1067828X.2020.1789525

Determinants of Adolescent Hookah Pipe Use: A Systematic Review

4.2 Abstract

Adolescent hookah pipe use is increasing at a rapid rate, thus posing a major public health concern globally. The hookah pipe is a gateway substance to other substances that may be more harmful. Yet, at present, little is known about why adolescents are so drawn to this mechanism. It is this gap that this study attempted to fill. This study, therefore, aimed to review the determinants of adolescent hookah pipe use. An electronic search of 12 databases identified studies investigating determinants of adolescent hookah pipe use. Twenty-five studies sampling a total of 88,988 adolescents who use the hookah pipe were included. This study found that adolescent hookah pipe use is determined by an interplay of family factors, peer/friends factors, individual factors, school factors, the actual hookah pipe mechanism, advertisements, and awareness of hookah pipe lounges or bars. Prevention and early intervention strategies aimed at reducing adolescent hookah pipe use is needed.

Keywords: Determinants, Hookah Pipe, Prevention and Early Intervention Strategies, Smoking, Systematic Review, Tobacco

4.3 Introduction

Hookah pipe smoking is a global public health concern affecting people of all ages. Experimentation with hookah pipe smoking most often begins during adolescence (Roman et al., 2017). Adolescence is an overwhelming period in one's life where intense development occurs in preparation for adulthood (Sugar, 2014). In their endeavor to become independent and unique individuals, adolescents often engage risk-taking behaviors. As they develop, they establish norms and lifestyles congruent with the values and culture of their peers, school, families, and communities (Case-Smith & O'Brien, 2014). During this vulnerable time, adolescents are easily influenced, seek peer approval, and are inquisitive (Louw & Louw, 2014). Hence, it is not uncommon that experimentation of hookah pipe smoking begins in adolescence (Roman et al., 2017).

The hookah pipe is a way of smoking any smokable substance that may be legal or illegal (Castaneda et al., 2016). It is typically used to smoke flavored tobacco, although some people mix cannabis with the tobacco (Jacobs et al., 2015) and/ or replace the water used in the vase of the hookah pipe with alcohol (Fielder et al., 2012). Others may drink alcohol or smoke other substances concurrently (Sterling & Mermelstein, 2011). Therefore, hookah pipe smoking can be regarded as a gateway substance to cigarettes, alcohol, or cannabis (Merianos et al., 2018).

The hookah pipe is usually smoked in bars, restaurants, cafes, or even at home in groups (Roskin & Aveyard, 2009). Needless to say, tobacco companies have capitalized on this growing trend and have introduced new appealing flavors to increase the demand (Sepetdjian et al., 2008). Most hookah pipe users believe that hookah pipe smoking is less harmful and a healthier alternative to cigarette smoking (Castaneda et al., 2016). This perception has resulted in the popularization and romanticizing of hookah pipe smoking over the last decade (World Health Organization [WHO], 2005, 2015).

Haroon et al. (2014) argues that even though hookah pipe smoking is perceived by users as less harmful than cigarette smoking, this is not the case, as it contains tobacco as well as toxins found in cigarettes, such as tar, nicotine, and carbon monoxide. This makes it hazardous not only for the user, but also for people in close proximity to the user as well as the environment (Kocak et al., 2017). In addition to the harmful toxins entering the body when smoking the hookah pipe, Haroon et al. (2014) and Waziry et al., (2017) mention other harmful long-term effects of hookah use, such as nicotine dependence, pulmonary dysfunction, cardiovascular disease as well as the transmission of infectious diseases, since the same mouth piece is passed from person to person. Hookah pipe smoking carries more than just health concerns as Sterling and Mermelstein (2011) found that hookah use in the last 30 days' affects school performance in terms of average grades. These effects are concerning for adolescents whose health and school performance is cardinal for the opportunities that they may be exposed to in future (Kola, 2014). If hookah pipe smoking is associated with so many concerns, why do adolescents use it? This study aimed to review determinants of adolescent hookah pipe use in order to understand why adolescents smoke the hookah pipe. This understanding is important so that it can guide the development and implementation of interventions since the behaviors, circumstances, and beliefs of the target group is paramount to the success of any intervention.

4.4 Methods

The review was prepared according to the Preferred Reporting Items for Systematic Reviews (PRISMA) standards (Moher et al., 2009). The review process occurred during June and July 2017. A protocol was prepared in advance. It can be accessed at:

https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=76814

Information sources and search strategy: The study included peer reviewed data-based papers in English that were published between 2007 and 2017. The publication dates were selected based on a broad scope of literature done by the authors and study conclusions

of Combrink et al. (2010), Daniels and Roman (2013), Jacobs et al. (2015), Senkubuge and Mayosi (2012) and Theron et al. (2010) which stated that hookah pipe research has significantly gained momentum during this period. Therefore, the researchers thought that it would be an opportune time to review the research. The following electronic databases were searched: Cumulative Index to Nursing & Allied Health (CINAHL), Dentistry and Oral Sciences Source, Green File, Health Source—Consumer Edition, Health Source—Nursing/Academic Edition, Medline, PsycARTICLES, Sosindex, SPORTDiscus, Cochrane, Wiley, and PubMed. Keywords relating to determinants and hookah pipe use were used. The following three sets of keywords were used for each search (a) hookah pipe, (b) determinants, and (c) age group. Similar words were used within each set of keywords, for example (a) shisha and water pipe; (b) factors, predictor, reasons, perception, motivation, why, attitude, and belief; and (c) preadolescent and adolescents. The same keyword variations were used for all 12 databases. Additionally, the reference lists of the retrieved articles were manually searched for potentially eligible studies.

4.4.1 Review Procedure

The review process consisted of three rounds to identify appropriate studies for this study. Round one was focused on title screening. At this point, duplicates were removed. Round two was focused on abstract screening. Round three was focused on full text screening. At each round, articles that did not meet the eligibility criteria were eliminated. Thereafter, the reference lists of the eligible full texts were manually scanned for any relevant studies that could be included in this study. To establish reliability of eligible studies at the full text stage, a random selection of six articles were screened by all researchers and the results pertaining to inclusion and exclusion were discussed among all three researchers. Once consensus was reached, the primary researcher reviewed each of the remaining articles to determine the nature of the study and the determinants of adolescent hookah pipe use.

4.4.2 Inclusion and Exclusion Criteria

English full text and peer reviewed studies published in academic journals were included. Quantitative, qualitative, and mixed method studies focusing on the determinants, correlates, factors, motivation, predictors, reasons, perceptions, attitudes, and beliefs of hookah pipe use among adolescents within the timeframe (2007–2017) were included. Study outcomes included the determinants of adolescent hookah pipe use. Hookah pipe use included experimentation only, continued use, ever use, or recent use. Intervention studies, animal studies, studies that focused solely on any other form of tobacco (such as cigarettes or e-cigarettes) besides hookah pipe, guidelines, protocols, legislation, editorials, reviews, and discussion papers, were excluded.

4.4.3 Quality Assessment

All studies meeting the inclusion criteria underwent quality assessment. The following appraisal tools were designed for this study: (1) adapted qualitative appraisal tool (Critical Appraisal Skill Program [CASP], 2014), (2) adapted quantitative appraisal (Roman & Frantz, 2013), and (3) adapted mixed methods appraisal tool (Roman & Frantz, 2013). However, the results of the study included only quantitative studies; therefore, the adapted quantitative appraisal (Roman & Frantz, 2013) was used in this study, since the use of the tool was based on the methodology of the included study. The methodological quality was assessed on sampling methods, measurement tools, source of data, ethics, reference to hookah pipe and specific age group, research design, and appropriateness of method. The quality of the studies was rated using a percentage score. Based on the content of the manuscripts, each component was assessed and rated according to a three-grade scale: good (67–100%), satisfactory (34–66%), or bad (0–33%). Two researchers independently assessed the quality of the included studies. Disagreements between the two reviewers were discussed until consensus was

reached. The opinion of a third researcher was consulted to come to agreement in case of indecisions

4.4.4 Data Extraction

Once consensus was reached around the inclusion and exclusion of studies, the data from the included studies were extracted and placed in a data extraction tool which was developed and piloted prior to the search. The data was extracted by one researcher (ZK) and verified by the other two researchers (RC and NVR) so that accuracy of extraction was confirmed by all three researchers. In the event of any disagreements, discussions were held to gain consensus. This was done to strengthen the quality of analysis of the included studies and to not exclude studies immediately that could potentially be eligible. The data was extracted from eligible studies and tabulated into Microsoft Excel. The following data were extracted: the author, year of study, sample details, number of participants, mean age or age range of participants, gender distribution of participants, relevant variables (determinants), and the associations of these relevant variables (determinants) with hookah pipe use (e.g. odds ratio [OR]).

4.4.5 Data Analysis

Narrative synthesis using thematic analysis was used in this study because each study reported the strength of the determinant differently, for example, some made use of OR, whilst others made use of percentage, Nagelkerke R², or crude prevalence ratio (PR). The relevance of the determinants was based on the effect size of the associations with the outcome of interest. The data was analyzed according to the study properties and the strength of the association. This meant that the greater the odds or higher the percentage, the more relevant the determinant for hookah pipe use. Once all the results were presented and analyzed, the researcher further analyzed all the results and then identified the most relevant

determinants of hookah pipe use amongst adolescents and grouped them into family factors, peers/friends factors, individual factors, school factors, and other factors.

4.5 Results

Hookah pipe use included experimentation only, continued use, ever use, or recent use. The search yielded 9656 hits. After removal of duplicates (n=116), 9540 title records were screened. Titles that did not meet the inclusion criteria were excluded. Forty-four abstracts were screened for eligibility, only 30 of these records were found eligible for the study. The reference list of these records was scanned to identify any potentially eligible studies. Four references were found eligible. This resulted in 34 studies being eligible for the final step (full text review) of determining appropriate studies that would be included in the review. Nine studies were excluded. The reasons for exclusion include: (a) intervention study (k=1), (b) did not report associations (k=6), and (c) only reported on tobacco and alcohol use but did not specify hookah use (k=2). During data extraction, only one study used a qualitative methodology while the remainder of the sample made use of a quantitative methodology. For this reason, the three researchers decided to exclude this study post hoc. The final sample for this review comprised 25 studies. Figure 4.1 shows the flow diagram of the review process.

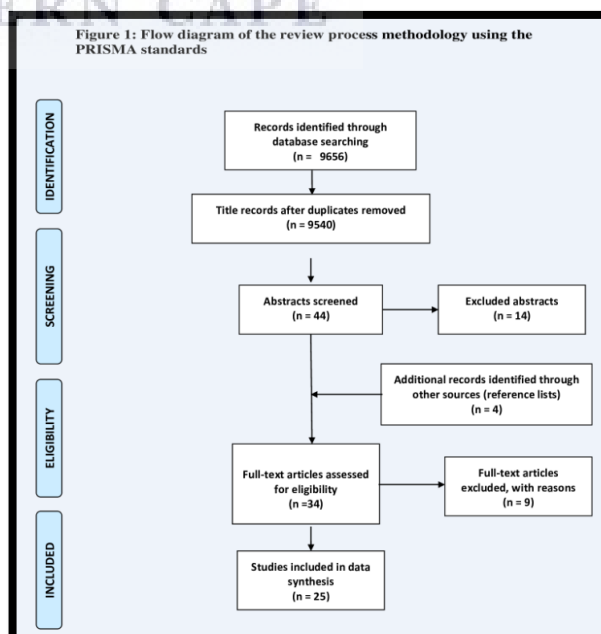


Figure 4.1: Flow Diagram of the Review Process Methodology Using the PRISMA Standards

4.5.1 Study Characteristics

The studies were from Asia (72%), North America (16%), South America (8%) and Europe (4%). The majority of the studies used a cross-sectional study research design (84%). The remainder of the studies made use of longitudinal (8%), quasi- experimental (4%), and prospective (4%) research designs. Studies referred to hookah pipe use as past, current, or ever use.

4.5.2 Methodological Quality

The methodological quality of the studies was assessed using methodological quality rating scales (Roman & Frantz, 2013). The studies satisfied an average of 86% of the criteria, with 88% of the studies considered strong, and 12% of the studies considered moderate, indicating moderate to strong methodological quality. All studies focused on children aged 10–19 and made reference to the hookah pipe. All 25 studies made use of appropriate quantitative methods and successfully addressed the research questions with appropriate research designs. All studies reported their measures but only 56% reported on the reliability and validity of this measured in the respective studies. Majority of studies made use of primary data sources (76%). Ethical approval was indicated in 72% of the studies. Table 4.1 shows the methodological quality of the studies used to identify the determinants of adolescent hookah pipe use.

Table 4.1: The Methodological Quality of The Studies Used To Identify The Determinants of Adolescent Hookah Pipe Use

No.	Author, Year	Age group/target population identified in methodology	Sampling method	Measurement tool valid and reliable	Source of the data	Hookah pipe use by participants included in sample details	Ethical approval obtained	Quantitative methodology	Research design addresses the research question	Score	Percentage	Interpretation
1	Agili & Park, 2012	1	1	1	1	1	1	1	1	8	100%	Good
2	Alavijeh et al., 2016	1	1	1	1	1	1	1	1	8	100%	Good
3	Al-Lawati et al., 2008	1	1	1	0	1	1	1	1	7	87,50%	Good
4	Amin et al., 2011	1	1	1	1	1	1	1	1	8	100%	Good
5	Baker & Rice, 2008	1	1	1	0	1	1	1	1	7	87,50%	Good
6	Charandabi, 2015	1	1	1	1	1	0	1	1	7	87,50%	Good
7	Fakhari et al., 2015	1	1	1	1	1	1	1	1	8	100%	Good
8	Fedele et al., 2016	1	1	0	0	1	0	1	1	5	62,50%	Satisfactory
9	Hussain & Satar, 2013	1	1	0	1	1	0	1	1	6	75%	Good
10	Jawad et al., 2013	1	1	1	1	1	1	1	1	8	100%	Good
11	Jawad et al., 2015	1	1	1	0	1	0	1	1	6	75%	Good
12	Karimy et al., 2013	1	1	1	1	1	1	1	1	8	100%	Good
13	Kelishadi et al., 2016	1	1	1	1	1	1	1	1	8	100%	Good
14	Moamary et al., 2012	1	1	1	1	1	1	1	1	8	100%	Good
15	Nohair, 2011	1	0	0	1	1	0	1	1	5	62,50%	Satisfactory
16	Palamar et al., 2014	1	1	0	0	1	0	1	1	5	62,50%	Satisfactory
17	Reveles et al., 2013	1	1	0	1	1	1	1	1	7	87,50%	Good
18	Roofafa, Heidari et al., 2015	1	1	0	1	1	1	1	1	7	87,50%	Good
19	Roofafa, Kasaei et al., 2015	1	1	0	1	1	1	1	1	7	87,50%	Good
20	Shujaat, 2013	1	1	0	1	1	0	1	1	6	75%	Good
21	Smith et al., 2011	1	1	0	1	1	1	1	1	7	87,50%	Good
22	Sterling & Mermelstein, 2011	1	1	0	0	1	1	1	1	6	75%	Good
23	Tamim et al., 2007	1	1	0	1	1	1	1	1	7	87,50%	Good
24	Urrutia-Pereira et al., 2016	1	1	1	1	1	1	1	1	8	100%	Good
25	Ziaei, 2016	1	1	1	1	1	1	1	1	8	100%	Good

4.5.3 Sample Characteristics

Only preadolescents and adolescents aged 10–19 years old that use the hookah pipe were considered for analysis in this study. Age is reported differently in the studies; therefore, a mean age cannot be reported across all studies, nor can an age range be conclusively reported. Forty-six percent of the study sample were female and 96% of the population was school going students; hence, the sample was drawn from the school population. Shujaat et al. (2013) studied the general population visiting hookah pipe bars, hookah pipe cafes, and tobacco shops, and that is how he drew his sample. In total, 88,988 adolescents were studied across the 25 included studies.

4.5.4 Determinants of Hookah Pipe Use Amongst Adolescents

Table 4.2 identifies the determinants of adolescent hookah pipe use and highlights the relevance of the determinants regarding adolescent hookah pipe use. Table 4.3 places the relevant determinants into themes. The most dominant themes were the family factors, peer/friends factors, individual factors, and school factors, while the factors that could not be placed under these themes were referred to as “other” factors. Tables 4.2 and 4.3 are presented below followed by a discussion of each theme. All references were given an alphabetic code and are, therefore, reported with a code in the next section. The alphabetic codes are listed in Table 4.2.

Table 4.2: Relevance of Determinants Regarding Adolescent Hookah Pipe Use

No	Code	Author, year	Sample details	n	Age	% ♀ (F)	Relevant variables (Determinants)	Odd's Ratio of determinant of hookah pipe use	95% Confidence Interval (CI)	
1	a	Al Agili & Park, 2012	Jeddah, Saudi Arabia 7–9 grade students	1019	R: 11 -19 M: 14.3	46%	Involved in religious activities Involved in study Exercise or play sport Engage in recreation activities or hobbies Male students Skip class often Skip class few times Skip class once Live in middle-income community Live in upper middle-income community Live in high-income community Receive 5–6 riyals pocket money Receive 7+ riyals pocket money	0.39 0.43 2.07 3.77 1.99 9.13 4.46 2.09 2.18 2.69 1.66 1.73 3.18	0.2 0.27 1.37 2.07 1.23 3.96 2.55 1.02 1.01 1.10 0.58 0.86 1.42	0.76 0.70 3.12 0.48 3.11 21.04 7.81 4.29 4.69 6.55 4.77 3.49 7.09
2	b	Alavijeh et al., 2016	Ahvas, Iran school students	120	M: 14.93	100%	Smoked for leisure Smoked to test taste Close family and relatives smoked usually Relatives experience substance use	1* Prevalence 30.8% 17.5% 81.2% 96.2%		
3	c	Al-Lawati et al., 2008	Oman, school students	1962	Mean: 15	43.5%	Male gender Smoking in some friends Smoking in most/all friends Believed smoking was harmful More pocket money (> US \$1.3) One or both parents smoke	4.46 3.76 5.65 0.31 3.3 1.25	2.38 2.28 2.87 0.29 2.3 0.75	8.35 6.22 11.13 0.92 4.6 2.09
4	d	Amin et al., 2012	Al-Hassa, Saudi Arabia school students	1652	R: 15-19 M: 17,5	46,3%	Male gender Adolescent age Lower paternal education status (secondary) Fathers who smoke hookah Brothers who smoke hookah Fathers and brothers who smoke hookah Smoking among all close friends Smoking among most close friends Smoking among some close friends <i>Higher proportions of the following conditions compared to non-smokers</i> "Other depression" Major depression	18.3 3.02 1.59 9.73 5.18 6.67 7.42 9.25 1.99 1.51	2* P value P=0.001 P=0.001 P=0.005 P=0.001 P=0.001 P=0.001 P=0.001 P=0.001 P=0.001 P=0.001 P=0.44 P=0.001	

							Any depression Panic disorder Anxiety Any anxiety or depression	2.94 1.72 4.7 2.2 6.7	P=0.003 P=0.001 P=0.001 P=0.001	
							<p>^{3*} Among current regular hookah users, 43 (32.1%) were former cigarette smokers. Adolescents mentioned primary motives for current hookah use was outings with friends, boredom, and meeting friends and family members. Negligence by the family and imitating friends, fathers, and big brothers were stated in >50% of the responses. The presence of emotional and family problems and hookah smoking as a method to relieve stress was stated by about 20%. Pleasure as a motive was stated in less than 10% of the responses.</p> <p>^{4*} Current Hookah use is identified in 13.3% by male gender and increasing age of adolescent (Nagelkerk R²=.133, Δχ²=26.44, P=0.001). In model 2, hookah smoking could be attributed in 19.5% to the current hookah smoking status among close family members and friends as these variables imposed a positive association (Nagelkerk R²=.195, Δχ²=28.17, P=0.003); the effect of smoking among family members was attenuated in the final model. Cigarette smoking was a significant positive predictor for hookah smoking in model 3 (Nagelkerk R²=.216, Δχ²=31.32, P=0.005), while higher knowledge level lacks in its influence as a negative predictor in the final model. Primary motives in the form of outing, meeting friends, and passing time were other positive predictors for hookah smoking while the presence of anxiety and/or depressive disorders was not strongly associated with the current hookah smoking behavior in the final regression model (Nagelkerk R²=.238, Δχ²=3,384, P=0.019).</p>			
5	e	Baker & Rice, 2008	Yemen school students	297	M: 15,73	33,7%	Experimentation with tobacco	9.37	2* P=0.001	
6	f	Charandabi et al., 2015	Iran school students	1524	R: 14-18 M: 15,1	50%	Adolescent users not currently working Attending non-governmental schools Adolescents smoke cigarettes Increase in self-efficacy High school educated fathers Employed fathers vs. self-employed fathers Older adolescents (age 17/18 vs. age 14)	0.3 0.3 8.1 0.5 2.8 2.1 1.8	0.1 0.1 5.3 0.4 1.2 1.2 1.0	0.5 0.9 12.6 0.7 6.4 3.8 3.3
7	g	Fakhari et al., 2015	Tabriz, Iran 10th-grade students	5197	R: 14-19 M: 15,7	56,9%	Students not working vs working Attending non-governmental schools Smoked cigarettes High school educated fathers vs university Employed fathers' vs self-employed fathers Age 17-18 vs age 14	0.3 0.3 8.1 2.8 2.1 1.8	0.1 0.1 5.3 1.2 1.2 1.0	0.5 0.9 12.6 6.4 3.8 3.3
							Self-efficacy: Increasing every score, the odds were reduced by half (OR:0.5; 0.4-0.7)			
8	h	Fedele et al., 2016	Florida High School students	32921	No age; only Gr 9-12	48,7%	Diagnosed with asthma Live in home where hookah is used	1.32 10.55	1.12 7.32 25.4	1.54 15.20 29.8

							Students diagnosed with asthma believe smoking hookah makes people look cool or fit in vs students without asthma Helps people feel more comfortable in social situations	27.6 61.2%	58.8	63.7
9	i	Hussain & Satar, 2013	Baghdad Iraq preparatory and secondary school students	1750	R: 13-18	44%	16 years or older vs younger than 16 Male gender Parents or siblings who smoke Have some friends who smoke Most/all friends smoke	2.85 2.31 1.97 2.67 8..18	1.78 1.57 1.04 1.83 4.65	4.41 3.42 2.77 3.89 14.39
10	j	Jawad et al., 2013	London Secondary Schools students	2399	R: 11-21 M: 14,5	50,5%	School year 12/13 Black South Asian Middle Eastern Other substance use Friends who smoke	3.64 0.77 1.49 2.34 3.25 10.36	1.91 0.41 0.87 1.16 1.99 5.58	6.95 1.47 2.54 4.74 5.29 19.23
11	k	Jawad et al., 2015	Lebanon 6th and 7th grade students	1128	M: 12,3	51,3%	12 years old 13 years old Older than age 13 Moderate or not committed religious beliefs Peers who use hookah only Peers who use hookah and cigarettes Parents who use cigarettes only Parents who use hookah only Parents who use cigarettes and hookah Hookah pipe advertisement in last 6 months	1.64 1.83 3.65 1.58 3.40 3.50 2.34 2.45 3.07 1.53	0.99 1.09 2.10 1.12 2.09 2.18 1.22 1.26 1.64 1.09	2.71 3.09 6.34 2.23 5.60 5.60 4.49 4.75 5.76 2.15
12	l	Karimy et al., 2013	Iran Male High School students	365	M: 16,49	0%	Parents who smoke Smoking sibilings Smoking friends	4.75 4.21 3.76	1.38 1.17 1.20	12.35 11.16 11.76
13	m	Kelishadi et al., 2016	Iran school student with high-risk behaviors	13486	R: 6-18 M: 12,47	49,2%	Age Time spent with friends (1-3 days) Time spent with friends (more than 3 days) Hookah smoking by the father Hookah smoking by siblings Hookah smoking by other members of family Cigarette smoking by the father More than 2 hours/day screen time Female gender Living in rural area Boys vs. girls Living in urban area	1.37 1.43 1.96 3.02 4.01 4.00 1.63 1.64 0.51 0.62 2.49 2.14	1.29 1.07 1.38 2.15 2.76 2.82 1.26 1.26 0.38 0.40 2.02 1.79	1.44 1.91 2.79 4.25 5.8 5.67 2.1 2.14 0.70 0.97 3.08 2.56
14	n	Moamary et al., 2012	Riyadh, Saudi Arabia High School students	1272	R: 16-18	34,1%	Age: older than 11 Accepting hookah from friends	7.7 10.6	1.3 1.4	43.6 83.4
15	o	Nohair, 2011	Riyadh, Saudi Arabia	255	R: 16-22	n/a				^{5*} Percentage of population

			Secondary school students				Mimic others Smokers in family Teachers smoke Feel relaxed Free time Stress relief Feeling strong Interest in smoking Special smell Influence of friends To attract attention Advertisement To sit with friends	52% 30% 62% 50% 82% 63% 21% 46% 32% 61% 41% 32% 40%			
16	p	Palamar et al., 2014	United States of America high school senior students	5540	45.6% is less than 18yrs old	51,4%	Population density: Small metropolitan statistical area (MSA) Population density: Large MSA Residing in a non MSA High parent education Smoked cigarette once or twice Smoked cigarette regularly in the past Smoked cigarette occasionally Smoked cigarette regularly Lifetime alcohol use Lifetime marijuana use Lifetime illicit substance use	2.67 2.64 1.00 1.58 2.22 2.45 4.19 5.12 3.34 4.48 1.53	2.04 1.95 - 1.24 1.69 1.66 3.03 3.61 2.12 3.38 1.22	3.49 3.56 - 2.02 2.1 3.61 5.78 7.26 5.25 5.94 1.92	
17	q	Reveles et al., 2013	Brazil school students	495	R: 10-19	53,8%	Final years of adolescence Enrolment in private school Presence of work activities	^{6*} Crude PR 6.54 2.23 1.80	2.79 1.73 1.17	15.32 2.88 2.78	
18	r	Roofaza, Heidari et al., 2015	Iran Middle and high school students (grades 6–12) from September to October 2010	5408	M: 15,37	50%	After a bad event Feeling angry Feeling distressed (it relaxes me) Having fun with friends Everyone smokes (good entertainment) After eating a meal After waking up (helps to start good day) Decreases appetite Others smoke so it is encouraging	^{5*} % of current smoker population 65% 63% 67% 54% 55% 71% 61% 67% 49%			
19	s	Roofaza, Kasaei et al., 2015	Iran Students in middle and high schools (grades 6–12)	5500	M: 14,37	50%	Boys (gender) Residing in urban areas Siblings who smoke hookah pipe Parent smoking hookah pipe Students who thought parents would show no reaction to hookah pipe use	6.06 1.87 5.06 2.41 3.89	4.87 1.35 4.07 2.02 3.22	7.46 2.58 6.29 2.87 4.71	

							Appealing because of taste Appealing because of smell Appealing because of preparation Appealing because of sound Provides stress relief	18.07 13.40 1.79 1.87 1.69	14.80 11.00 1.32 1.38 1.23	22.07 16.69 2.42 2.54 2.33
20	t	Shujaat et al., 2013	Lahore City, Pakistan General population visiting shisha bars, tobacco shops, and shisha cafés.	300	R: 15-34	35,3%	7* Significance was found in Pearson's correlation between gender and duration, expenditure and frequency of consumption, addiction and duration, status symbol and stress reliever, company and status symbol, and addiction with duration and wanting to quit (p<0.05). A high significance was observed in age with duration, expenditures, company, stress reliever, and status symbol (p<0.01). Frequency of consumption with addiction, and stress reliever (p<0.01); stress reliever with age (p<0.01); addiction with stress reliever and status symbol (p<0.01); wanting to quit with gender and duration (p<0.01); and lastly expenditures with encouragement, addiction, status symbol, and stress reliever (p<0.01) were also observed in 2-tailed significance of Pearson's correlation.			
21	u	Smith et al., 2011	San Diego High School students	689	R: 16-19 M: 17,1	49,1%	Smoked cigarette in the past 30 days Know of a hookah lounge in the community where they live Belief that hookah is more socially acceptable than cigarette	3.06 2.07 4.59	1.54 1.09 1.27	6.11 3.91 16.57
22	v	Sterling & Mermelstein, 2011	Chicago High School students	951	M: 17,6	57,2%	Asian (race) Current cigarette use Current cigar use Current bidi use Current kretek use Alcohol use in the past three months Marijuana use in the past three months Attending a hookah bar, lounge, or restaurant	1.55 1.16 1.29 1.64 1.70 1.39 1.75 6.25	0.65 1.08 1.09 0.97 1.05 1.14 1.46 4.24	3.67 1.26 1.53 2.78 2.77 1.69 2.10 9.23
23	w	Tamim et al., 2007	Beirut, Lebanon Intermediate and secondary school students	2443	M: 15	55%	Male Age 13-15 Age 15-17 Age 17 Mothers education (Intermediate) Fathers education (Primary) Fathers occupation (Administrative) Mothers occupation (skilled/unskilled)	1.9 2.3 4.0 6.9 2.0 1.9 1.8 4.1	1.4 0.8 1.4 2.4 1.2 1.1 1.5 1.8	2.7 6.6 11.2 19.7 3.2 3.3 3.7 9.2
24	x	Urrutia-Pereira et al., 2016	Brazil school students	798	R: 12-19	50%	Smoking amongst close friends	5.67	2.06	7.09
25	y	Ziaei, 2016	Iran High school students	1517	R: 15 -17 M: 16.1	52.1%	Experimentation with cigarettes Final level of high school Accept hookah pipe from best friends	1.57 1.54 4.36	1.12 0.79 2.69	2.20 3.04 7.07
1* Percentage (prevalence) 2* P-Value 3* % of motives and mental health characteristics in relation to current smoking status 4* Nagelkerke R2 5* Percentage of population 6* Crude Prevalence Ratio (PR) 7* Correlations Bold text: Significant Codes are used because it becomes more practical when reporting on the studies in the results section										

Table 4.3: Most Relevant Determinants Regarding Adolescent Hookah Pipe Use

FAMILY FACTORS	PEERS/FRIENDS FACTORS	INDIVIDUAL FACTORS	SCHOOL FACTORS	OTHER FACTORS
<ul style="list-style-type: none"> • Fathers who smoke hookah • Close family who smoke hookah • Parents who smoke tobacco products • Siblings who smoke tobacco products • Live in home where hookah is used • Lower parental education • High parent education • Employed fathers vs. self-employed fathers • Fathers occupation (Administrative) • Mothers occupation (skilled/unskilled) • Students who thought parents would show no reaction to hookah pipe use 	<ul style="list-style-type: none"> • Smoking in friends • Peers who use hookah only • Peers who use hookah and cigarettes • Outings with friends • Meeting friends • Passing time with friends • Time spent with friends (more than 3 days) • Accepting hookah from friends • Accepting hookah from best friend • Status symbol amongst peers • Company/peer group • Encouragement from peers • Engage in recreation activities or hobbies 	<ul style="list-style-type: none"> • Male • Live in middle-income community • Live in upper middle-income community • Live in high-income community • Living in an urban area • Population density: Small Metropolitan Statistical Area (MSA) • Population density: Large MSA • More pocket money • Age – older adolescents are more likely to smoke (Age 11+) • Experimentation with tobacco • Students diagnosed with asthma believe smoking hookah makes people look cool or fit in vs students without asthma • Depression and/or anxiety • Provides stress relief • Moderate or not committed religious beliefs • More than 2 hours of screen time • Middle Eastern • Adolescents who smoke cigarettes • Other substance use including cigarette smoking, marijuana use, and alcohol use • Helps people feel more comfortable in social situations • Presence of work activities 	<ul style="list-style-type: none"> • Skip class • School year 12/13 (approx. age 16/17) • Final level of high school • Enrolment in private school 	<ul style="list-style-type: none"> • Taste • Smell • Preparation methods • Hookah pipe advertisement in the last 6 months • Sound • Awareness of hookah bar, restaurant, or lounge in community

4.5.4.1 Family Determinants

A number of significant family factors emerged. Two subthemes were identified from the family factors: (1) parents' or sibling tobacco use and adolescents' perception of how parents would respond to their hookah pipe use and (2) parents' education levels and employment status or occupation.

4.5.4.1.1 Theme 1: Parents or sibling tobacco use and adolescents' perception of how parents would respond to their hookah pipe use

Adolescents' hookah pipe use is determined by the smoking habits of one or both parents, (particularly the father), siblings (particularly brothers) as well as other family members^{b, c, d, h, i, k, l, m, s}. Adolescents who lived in a home where hookah pipe is used are 10.55 times more likely to use the hookah pipe (OR = 10.55; 95% CI, 7.32–15.20)^m. Higher odds of hookah pipe smoking among adolescents is determined by fathers who smoke (OR=9.73, P=0.001)^d, parents who smoke (OR = 4.75; 95% CI, 1.38–12.35)^l, hookah smoking siblings (OR = 4.01; 95% CI, 2.76–5.8)^m, brothers who smoke the hookah pipe (OR=5.18, P=0.001)^d, and fathers and brothers who smoke the hookah pipe (OR=6.67, P=0.001)^d. Having other family members who smoke the hookah pipe increases the likelihood of adolescents smoking the hookah pipe by four times (OR = 4.00; 95% CI, 2.82–5.67)^m. Eighty-one percent of adolescent respondents reported having close family or relatives that regularly smoked and 96.2% reported relatives who had experience of substance abuse^b. Sixty-two percent of adolescents reported smoking the hookah pipe because they were imitating their fathers and brothers^d. Seventy-three percent of adolescents felt that their families were negligent, and this served as a motive to smoke^d. Adolescents who thought that their parents would show no reaction to their hookah pipe use were 3.89 times more likely to smoke the hookah pipe (OR = 3.89; 95% CI, 3.22–4.71)^s.

4.5.4.1.2 Theme 2: Parents education levels and employment status or occupation

Adolescent hookah pipe use is determined by parents' education levels and occupations^{d,f,g,p,w}. Three of the five studies focused on fathers only^{d,f,g}; one study did not specify which parent and made reference to parent education^p; and one study focused on fathers' and mothers' education levels and type of employment^w. Parents who did not attend university and only had a high school education were considered to have lower education levels^{d,g,p,w}.

Adolescents who have fathers with lower education levels were 1.59–2.8 times more likely to smoke the hookah pipe (OR=1.59, P=0.001) (OR = 2.8; 95% CI, 1.2–6.4)^{d,f,g,w}, whereas adolescents who have mothers with lower education levels were twice as likely to smoke the hookah pipe (OR = 2.0; 95% CI, 1.2–3.2)^w. Unspecified parents' education increased the odds of adolescent hookah pipe use by 1.58 times (OR = 1.58; 95% CI, 1.24–2.02)^p. Employed fathers increased the likelihood of adolescents smoking hookah by 2.1 times compared to self-employed fathers (OR = 2.1; 95% CI, 1.2–3.8)^f (OR = 2.1; 95% CI, 1.2–3.8)^g. Fathers with an administrative job increased the likelihood of adolescent hookah smoking by 1.8 times (OR = 1.8; 95% CI, 1.5–3.7)^g. The odds of adolescent smoking was 4.1 times more likely if mothers were employed, irrespective of whether the occupation required her to be skilled or unskilled (OR = 4.1; 95% CI, 1.8–9.2)^w.

4.5.4.2 Peers/friends Determinants

Factors pertaining to adolescents' peers and friends are significant determinants of hookah pipe use. Three subthemes emerged from the peer/friends factors: (1) peers and friends who smoke, (2) socializing with friends, and (3) encouragement and status symbol amongst peers.

4.5.4.2.1 Theme 1: Peers and friends who smoke

Smoking amongst close friends is a strong determinant of adolescent hookah pipe use. More specifically, smoking among all close friends increased the likelihood by 7.42 times (OR=7.42, P=0.001)^d and smoking among most close friends increased the likelihood by 9.25 times (OR=9.25, P=0.001)^d. Having any friends that smoke increases the odds of adolescents using the hookah pipe by 2.67–10.36 times (OR = 2.67; 95% CI, 1.83–3.89)ⁱ (OR = 10.36; 95% CI, 5.58–19.23)^j. These results indicate that the peer group has a significant influence on determining adolescent hookah pipe use. These findings are corroborated by 61% of respondents who confirmed their friends' influence on their hookah pipe smoking behaviour^x.

4.5.4.2.2 Theme 2: Socialising with friends

Socializing with friends was reported by adolescents as the main predictor of hookah pipe use. Outings with friends (87.3%), meeting friends (76.1%), and escaping boredom/passing time (78.4%) were their most cited reasons for hookah smoking^d. Forty percent of respondents reported that they smoke the hookah pipe to sit with friends (40%)^o, have fun with friends (54%)^f, or because everyone smokes so it's considered good entertainment (55%)^f. Adolescents who spent more than 3 consecutive days with friends were 1.96 times more likely to smoke the hookah pipe (OR = 1.96; 95% CI, 1.38–2.79)^m. It was also found that adolescents who engage in recreational activities or hobbies are 3.77 times more likely to smoke the hookah pipe (OR = 3.77; 95% CI, 1.37–3.12)^a.

4.5.4.2.3 Theme 3: Encouragement and status symbol amongst peers

Accepting hookah from a friend was more likely (OR = 10.6; 95% CI, 1.4–83.4)ⁿ to motivate one to smoke compared to accepting hookah from a best friend (OR = 4.36; 95% CI, 2.69–7.07)^y. Sixty-one percent of respondents felt their friends encouraged them to smoke^t. While 69% perceived smoking the hookah pipe as a status symbol, making them feel more admired by their peers^t.

4.5.4.3 Individual Determinants

Individual factors also play an important role in hookah pipe use. Four subthemes emerged from the individual factors: (1) demographics, religion, pocket money, and screen time; (2) living conditions; (3) substance experimentation or use, and (4) physical or mental health. These are described below in more detail.

4.5.4.3.1 Theme 1: Demographics, religion, pocket money and screen time

All studies that considered gender reported that being male is a determinant for hookah pipe use^{a,d,i,m,s,w}. One study found that being male increased the odds of hookah pipe smoking by 18.3 times (OR = 18.3, P=0.001)^d. In terms of age, clear distinctions cannot be made whether younger adolescents are more likely to smoke hookah pipe compared to older adolescents, or vice versa, because adolescents in the final year of adolescence are 6.54 times more likely (OR =6.54; 95% CI, 2.79–15.32)^q to smoke hookah, but adolescents eleven years old and older are 7.7 times more likely to smoke (OR =7.7; 95% CI, 1.3–43.6)ⁿ. It is unclear what the mean age is for the respondents that are older than eleven years old; therefore, clear conclusions cannot be made, but it is evident that adolescents are very likely to smoke the hookah pipe based on these results. Respondents who identified themselves as Asian (OR = 1.55; 95% CI, 0.65–3.67)^v or Middle Eastern (OR =2.34; 95% CI, 1.16–4.74)^j proved to be more likely to use the hookah pipe compared to adolescents from other backgrounds. Furthermore, adolescents who had moderate or non-committed religious beliefs were 1.58 times more likely to smoke the hookah pipe (OR =1.58; 95% CI, 1.12–2.23)^k compared to adolescents who reported having committed religious beliefs. Participants who had more than two hours screen time were 1.64 times more likely to smoke the hookah pipe (OR =1.64; 95% CI, 1.26–2.14)^m compared to less than 2 hours/day screen time. The amount of pocket money received also increased the likelihood of smoking the hookah pipe. In one study, adolescents who received 5–6 Saudi riyals were 1.73 times more likely (OR =1.73; 95% CI,

0.86–3.49)^a to smoke the hookah pipe compared to adolescents who received 7 or more riyals. In the case of the latter, adolescents were 3.18 (OR =3.18; 95% CI, 1.42–7.09)^a times more likely to smoke the hookah pipe. Similarly, adolescents who received more than 1.3 USD were 3.3 times more likely to smoke the hookah pipe (OR =3.3; 95% CI, 2.3–4.6)^c.

4.5.4.3.2 Theme 2: Living conditions

Living conditions appear to be a significant factor for determining hookah pipe use. Adolescents living in small metropolitan statistical areas that are densely populated are 2.67 times more likely to smoke the hookah pipe (OR =2.67; 95% CI, 2.04–3.49)^p. Similarly, adolescents living in large metropolitan statistical areas that are also densely populated are 2.64 times more likely to smoke the hookah pipe (OR =2.64; 95% CI, 1.95–3.56)^p. Conversely, living in an urban area makes one 1.87 times more likely to smoke the hookah pipe (OR =1.87; 95% CI, 1.35–2.58)^s.

Likewise, living in a middle-income community makes adolescents 2.18 times more likely (OR =2.18; 95% CI, 1.01–4.69)^a to smoke the hookah pipe, whereas living in an upper middle-income community makes one 2.69 times more likely to smoke the hookah pipe (OR =2.69; 95% CI, 1.10–6.55)^a. However, living in a high-income community makes one 1.66 times more likely to smoke (OR =1.66; 95% CI, 0.58–4.77)^a. These results show that living in higher income communities makes adolescents less likely to smoke the hookah pipe compared to middle-income and upper middle-income communities, or areas that are densely populated.

4.5.4.3.3 Theme 3: Substance experimentation or use

Past, present, or ever-use of cigarette smoking is a strong determinant of hookah pipe use^{e,f,g,p,u,v}, followed by marijuana use^p, alcohol use^p, and other substance use^{j,p}. When adolescents experiment with tobacco, they are 9.37 times more likely to smoke the hookah pipe (OR =9.37; P = 0.001)^e. This is especially true if the form of tobacco smoked is cigarettes because this makes adolescents 8.1 times more likely (OR =8.1; 95% CI, 5.3–12.6)^f

to smoke the hookah pipe. Adolescents who have ever used marijuana are 4.48 times more likely to smoke the hookah pipe compared to those that have not used marijuana (OR =4.48; 95% CI, 3.38–5.94)^p. Adolescents who have ever used alcohol are 3.34 times more likely to smoke the hookah pipe compared to those who have not used alcohol (OR =3.34; 95% CI, 2.12–5.25)^p.

4.5.4.3.4 Theme 4: Physical or mental health

Hookah pipe is commonly used among people who have physical or mental health concerns. In the views of students diagnosed with asthma, 28% are convinced that smoking the hookah pipe makes them look cool and fit in with their peer groups, while 61% reported that it makes them feel more comfortable in social situations^h. Adolescents with any anxiety or depression are 6.7 times more likely to smoke the hookah pipe compared to adolescents who do not experience anxiety or depressive symptoms or disorders (OR =6., P= 0.001)^d. Adolescents reported smoking the hookah pipe after a bad event (65%), when they feel angry (63%), and when they feel distressed because it relaxes them (67%)^r.

4.5.4.4 School Determinants

School determinants can all be grouped in one theme, namely, attending school. Adolescents who engage in class truancy are 9.13 times more likely to smoke the hookah pipe compared to those who do not skip class often (OR =9.13; 95% CI, 3.96–21.04)^a. Adolescents who have skipped class a few times are 4.46 times more likely to smoke the hookah pipe compared to those who do not skip class (OR =4.46; 95% CI, 2.55–7.81)^a, while those who have skipped class once are 2.09 times more likely to smoke the hookah pipe compared to those who have never been truant (OR =2.09; 95% CI, 1.02–4.29)^a. Adolescents who are enrolled at private schools are 2.23 times more likely to use the hookah pipe (OR =2.23; 95% CI, 1.73–2.88)^d. Adolescents in their final level of high school are 1.54 times more likely to smoke the hookah pipe compared to those at other levels (OR =1.54; 95% CI,

0.79–3.04)^y. However, another study found a higher odds of learners of this age group (16–18) smoking the hookah pipe (OR =3.64; 95% CI, 1.91–6.95)^j. Although the difference cannot be definitively concluded, the one noticeable difference between the two studies is that the first one is located in Iran and the second one in London. Therefore, context may play a role in schooling and hookah pipe use. Additionally, 62% of adolescents reported that their teacher smokes cigarettes at school.

4.5.4.5 Other Determinants

Factors that could not be placed under family, peers/friends, individual, or school factors were placed under ‘other’ factors. Two themes emerged from this set of factors: (1) the hookah pipe mechanism or process, and (2) awareness of hookah pipe smoking.

4.5.4.5.1 Theme 1: The hookah pipe mechanism or process

Adolescents found hookah pipe smoking appealing because it made them feel relaxed (50%), they smoked for leisure (30.8%), they had an interest in smoking (46%), they attracted attention when they smoked (41%) and they enjoyed the taste (17.5%)^{b,r,o}. This view was corroborated by another study who found hookah pipe smoking was 18.07 times more appealing to adolescent users because of the taste (OR =18.07; 95% CI, 14.80-22.07)^r. Furthermore, adolescents were 13.40 times more likely to smoke the hookah pipe because of the smell (OR =13.40; 95% CI, 11.00-16.69)^r. Adolescents were intrigued by the sound so they were 1.87 times more likely to smoke the hookah pipe (OR =1.87; 95% CI, 1.38-2.54)^r. Adolescents enjoyed preparing the hookah therefore they were 1.79 times more likely to smoke the hookah pipe because of the preparation methods (OR =1.87; 95% CI, 1.38-2.54)^r.

4.5.4.5.2 Theme 2: Awareness of hookah pipe smoking

Thirty-two percent of adolescents reported being motivated to smoke after seeing a hookah pipe advertisement in the last six months^o. Adolescents were 2.07 times more likely to smoke the hookah pipe when they knew of a hookah lounge in the community where they

reside (OR =2.07; 95% CI, 1.09–3.91)^u. Attending a hookah bar, lounge, or restaurant increased the odds of usage by 6.25 times (OR =6.25; 95% CI, 4.24–9.23)^v. Due to the perception that smoking the hookah pipe is more socially acceptable than smoking cigarettes, adolescents were 4.59 times more likely to smoke the hookah pipe (OR =4.59; 95% CI, 1.27–16.57)^u.

4.6 Discussion

This review was conducted to discover the determinants of adolescent hookah pipe use in order to answer the research question: ‘why do adolescents use the hookah pipe?’ This study found that hookah pipe use is determined by family, peer, individual, school, and other factors, such as use of the hookah pipe mechanism and hookah pipe awareness. These findings differ from the determinants of other nicotine products such as e-cigarettes and cigarettes. In terms of the latter, Soneji et al., (2017) found that these may activate cognitive or behavioural processes that increase the risk of smoking and that users of these products may show increases in positive expectancies about cigarette smoking and increases in affiliation with peers who smoke these products. However, it has not been conclusively reported that affiliation with peers is a determinant for use. The findings of the current study clearly identified that the social milieu as a defining determinant of hookah pipe use, making hookah pipe use more of a social phenomenon compared to e-cigarettes or cigarette smoking, which appears to be the result of activating a cognitive or behavioural response (Soneji et al., 2017). This could be attributed to the fact that the hookah pipe is often smoked with friends and family, and therefore, its experienced effects are more than just physical. Oyewole et al (2018) conducted a systematic review which focused on identifying tobacco use among Nigerian youth. In their research, they found similar results to the current study. Being male increased the likelihood of using tobacco products, such as the hookah pipe. This could be related to the fact that male tobacco use is influenced by different cultural, psychosocial, and socioeconomic factors, which views male tobacco use as more favourable

compared to female tobacco use (Oyewole et al., 2018). The role of other substances cannot be minimized as substances such as cigarettes and alcohol act as gateway substances for hookah pipe use, or vice versa. Also, adolescents tend to experiment with substances at a young age, and then as they get older, their usage may become more frequent to gain the same effects or they may experiment with more or different substances, such as the hookah pipe (Bracken, Rodolico & Hill, 2013).

Individuals and groups exist within a social context. It is not uncommon that environmental factors such as residential settings, peer and media influences, and access to establishments where the hookah pipe is sold plays an integral role in whether one smokes or not (Hawkins et al., 1992; Oyewole et al., 2018). Moreover, the role of the family, whether it be family modelling or family structure, influences members' hookah pipe use, since positive or negative attitudes toward smoking the hookah pipe is experienced within the family as is also influenced by how parents respond to adolescent hookah pipe use. When substance use is considered acceptable by parents, siblings, and friends, it increases the risk of use because it may be perceived that using the hookah pipe is allowable, and in some cases desirable (Hawkins et al., 1992). Interestingly, Brook et al (1990) examined the role of older brothers in younger brothers' substance use and found that an older brother's substance use can influence a younger brother's substance use. This finding is supported in the current study as well as in the study by Oyewole et al., (2018) which showed that older brothers play a central role in the lives of their younger siblings, especially regarding substance use, particularly hookah pipe use (Hawkins et al., 1992).

Furthermore, the role of mental health also needs to be considered. Once again, this study as well as that of Oyewole et al., (2018) found conclusive evidence that mental health conditions, such as anxiety and depression, plays a major role in adolescent hookah pipe use. Adolescence is a period marked by significant developmental changes. Thus, the use of substances may have a negative effect on their development. This is especially true for

adolescents with symptoms of anxiety, depression, or other psychosocial problems because smoking the hookah pipe may be used as a coping mechanism to ameliorate their condition but could instead be exacerbating their already difficult situation (Schulte & Hser, 2013). Despite having mental health conditions, curiosity and experimentation remains a common feature of adolescents. Specific interventions need to be aimed at meeting the emotional needs of adolescents who use the hookah pipe in an attempt to minimize hookah pipe use and create awareness about the harmful effects of using substances and having a mental health condition or psychosocial stressor.

A study by Perikleous and colleagues (2018) focusing on e-cigarettes found similar results to this study. The study found that curiosity, male gender, lower school performance, studying at a disadvantaged school, increasing age and gender, using other substances, family or peer smoking, or being in employment and being affluent increases the odds of using e-cigarettes (Perikleous et al., 2018). Akl et al., (2015) conducted a narrative review assessing the determinants of hookah pipe use in young people aged 10–29 years. The study revealed that hookah pipe use is on the rise because of the positive attitude towards hookah pipe smoking, perceptions of addictive properties and health hazards (less harmful than cigarette smoking), and ability to quit. Youth provided the following reasons for smoking the hookah pipe: entertainment; relaxation; to escape boredom; curiosity and experimentation; to socialize; and the resultant positive somatic experience that engages almost all the senses—taste, smell, sight, sound, and touch. Hookah users expressed that they associate use with culture and heritage.

The findings of all these studies indicate that the determinants of hookah pipe use and other tobacco products are similar. However, Siddiqi (2018) identified that the interventions that are effective in tobacco cessation cannot simply be applied to hookah pipe users because it has been found that tobacco cessation interventions do not yield the same results for hookah pipe cessation. This means that an alternative intervention specifically aimed at

reducing hookah pipe use is needed. Conventional tobacco interventions use methods such as the drug varenicline, and behavioural counselling and support to address some of the psychological aspects of addiction. This is achieved by short-term prevention and early intervention support by means of supportive, educational or counselling sessions (Dogar et al., 2014; Lipkus, Eissenberg, Schwartz-Bloom, Prokhorov & Levy, 2011). Siddiqi (2018) argues that conventional tobacco cessation interventions lack the social element that is prominent in hookah pipe smoking, since hookah pipe users mainly smoke with friends and family. Additionally, when planning an intervention, the development phase and context of the target population is very important in order to captivate their attention and implement the intervention tools, skills, or practices (Bailey et al., 2015).

4.7 Limitations

In this study, a number of limitations were identified. Although 12 databases were used with broad search categories, only articles published in journals within the included databases were accessed for this study. This means that there may be other relevant studies describing the determinants of hookah pipe use that have not been included in this study. Due to the heterogeneity of the methodology, data, and analysis of the trends within the identified studies, it was challenging to compare the studies in terms of the strengths and weaknesses of factors related to determinants of hookah pipe use. Not all studies provided sufficient information about the strength of the determinants, as some only provided descriptive data making it difficult to ascertain whether this was a determinant for adolescent hookah pipe use or not. Some studies allowed the age group to extend beyond the years of adolescence making it difficult to clearly say that the determinants are specific to adolescents. The majority of the studies drew their samples from the school setting, which means that adolescents that do not attend school are not accounted for—this may or may not have yielded additional determinants of hookah pipe use. Lastly, we did not include studies prior

to 2007 and studies in languages other than English, inclusion of these articles may have yielded more results.

4.8 Recommendations

Based on the findings of this study, assessment, prevention, and treatment recommendations are provided for practitioners and researchers. *Assessment* could include an understanding of the adolescent's current home, school, and family circumstances; physical and mental health challenges; substance use and patterns of use; knowledge, beliefs, and attitudes towards smoking; existing coping strategies; and adolescents' perception of their authority figures' ideas of hookah pipe smoking. The results of these assessments allow clinicians to plan treatment strategies and researchers to identify and fill gaps in hookah pipe research in order to form a basis to propose interventions. The target population for *prevention* strategies should not only include adolescents, but also people who have a direct impact on the lives of adolescents. In addition, we argue that prevention activities should occur where they are accessible to the target audience, and can be incorporated into school curriculums, doctor visits, and life-skills sessions offered by organizations offering psychosocial support. This study found that advertisements encouraged hookah pipe smoking. This finding highlights the influential role of advertisements on viewers' lives. Therefore, advertisements advocating healthier alternatives to hookah pipe smoking, preventing hookah pipe use, and communicating the risks of hookah pipe smoking should be prioritized. Other age appropriate social events happening in the community should be marketed through various mediums, thereby capturing and redirecting the interests of adolescents away from attending a hookah bars or lounges. Awareness campaigns are needed in the school and community setting to educate teachers, learners, and families about the implications of hookah pipe use as well as the impact of allowing younger children to witness or smoke with parents, older siblings, or other family members. Since hookah pipe use increases with age, it is necessary to intervene as early as possible with prevention and early

intervention activities to prevent adolescent hookah pipe use. In terms of research, there is a need to gain an understanding of the role of the family in hookah pipe use. Also, comparative studies can be done between users and non-users to determine the significant differences between these two groups of adolescents. In terms of *treatment*, interventions should be holistic in nature, taking the individual, family, school, peers, and other factors into account. As noted in the study, all these factors have an integral role in hookah pipe use. Treatment encompasses an array of activities including parent education and support sessions emphasizing the need to monitor and supervise adolescents and their activities, toolkits to understand adolescent development, understanding how the hookah pipe can be a gateway to other substances, group therapy, life skills, peer mentoring, leadership activities, and ideas on how to use pocket money wisely. Interventions must be tailored for the specific population and context. It is very important that beneficiaries of the treatment feel respected and valued—this will encourage attendance and cooperation. Treatment must occur in a space and setting where the adolescent will feel comfortable attending, for example, a park may be a more conducive environment than a clinic. Since hookah pipe smoking is a social phenomenon, the intervention needs to incorporate social elements so that attending the treatment is appealing. From a research perspective, it would be interesting to note the determinants of hookah pipe use for other age groups. Determining what drives males and females to use the hookah pipe will be helpful to decide whether an alternative intervention is needed for males and females, which in turn will guide the development of relevant and appropriate interventions. This is a noteworthy point as this study found that being male increases the odds of hookah pipe smoking. However, the other determinants can be true for males and females. Thus, the question is raised, ‘what makes males more likely to smoke the hookah pipe than females?’ Determining adolescents’ motivations and identifying what needs are being met by hookah smoking would also produce an invaluable study on the subject. A review can be done of existing interventions to retrieve previous guideline recommendations

aimed at reducing hookah pipe use. Lastly, studies should be conducted to propose a potential intervention that could reduce hookah pipe use amongst adolescents.

4.9 Conclusion

The findings highlight that numerous factors contribute to adolescent hookah pipe use. These findings also suggest that there is an interplay of family, school, friends, and individual factors that determine hookah pipe use. While friends, family use, and existing substance use appear to be the strongest determinants of hookah pipe use, individual factors such as race, context, religion, and screen time were found not to be strong determinants of adolescent hookah pipe use. Hookah pipe use should be included in clinically and empirically validated assessments as well as using evidence-based practices when addressing adolescent hookah pipe use. The use of evidenced-based assessments and practice will aid future investigators in examining adolescents' hookah pipe use and effectively reduce such behaviors. This review is a good starting point for further discussion and work on developing impactful interventions to reduce hookah pipe use.

4.10 References

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CHAPTER 5

INTERVENTIONS AIMED AT REDUCING HOOKAH PIPE USE

5.1 Introduction

The previous chapter identified the determinants of adolescent hookah pipe use. This chapter addresses Objective 2, which was to systematically review interventions aimed at reducing hookah pipe use. This chapter has been accepted for publication by the South African Medical Journal.

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Systematic Review of Interventions Aimed at Reducing Hookah Pipe Use: Implications for Practitioners and Clinicians

5.2 Abstract

Background: Globally, tobacco ranks as one of the major risk factors for death, disease and disability. While strong measures have been implemented to reduce cigarette use, there are alternative ways to smoke tobacco, such as the hookah pipe. Hookah pipe use appears to pose a significant public health concern and has serious short- and long-term health consequences for users and those exposed to second-hand smoke. To date, few studies have reviewed hookah pipe interventions beyond the efficacy-based paradigm. **Objectives:** To systematically review interventions aimed at reducing hookah pipe use through the RE-AIM framework (reach, efficacy, adoption, implementation and maintenance of results) in order to provide a practical means of evaluating interventions. **Methods:** A systematic review spanning 12 databases identified studies aimed at reducing hookah pipe use. All methodological types of intervention studies that were peer reviewed and in the English language were considered for inclusion. The quality of each study was assessed. Ten studies were deemed eligible. For each study, data were extracted

using the RE-AIM framework. **Results:** All studies focused solely on the smoker, and their recruitment strategies were described. Eight studies reported meeting their objectives. Overall, the studies presented limited information regarding adoption success. The interventions were mainly supportive, educational or counselling sessions. Only five studies reported on the maintenance of results post intervention. **Conclusions.** Interventions focusing on reducing hookah pipe use are limited. Counselling and educational support sessions seem to be the most feasible and potentially successful approaches for intervention.

Keywords: Tobacco, hookah pipe, systematic review, interventions

5.3 Introduction

Tobacco is a global public health concern, ranking among the top three causes of death, disability and disease for most regions of the world, including Africa, the Middle East, Australia, southern Latin America, Eastern Europe and Asia (Lim et al., 2012). In South Africa (SA), one out of five people report using tobacco products (Ware et al., 2018). While strong measures have been implemented to reduce cigarette consumption, there are alternative ways of smoking tobacco; one of these is the hookah pipe. Unfortunately, this device does not minimise the burden but exacerbates it. SA studies found that use of hookah pipes is prevalent among students (Ware et al., 2018) and that it is initiated at a young age (Combrink et al., 2010). There is a misconception that smoking tobacco through a hookah pipe reduces the harm from smoking. In fact, hookah pipe smokers may inhale an amount of smoke during one session that is equivalent to smoking 100 or more cigarettes (Klocke & Sylvester, 2018). Smoking the hookah pipe can also be a gateway to cannabis and alcohol use (Roman et al., 2017).

Moreover, smoking the hookah pipe can cause shortness of breath, nausea, vomiting, dizziness, fainting, headaches, coughing and loss of taste (Van der Merwe et al., 2013). Some of the longer-term effects include increased risk of periodontal disease, chronic obstructive pulmonary disease, lung cancer, nicotine dependence, oral cancer, low birthweight for babies

of mothers who smoke hookah pipes during pregnancy, mouth ulcers and poorer health-related quality of life (WHO, 2015). Some of these effects can strike people after as little as one hookah-smoking session (Klocke & Sylvester, 2018). However, hookah smoking prevalence rates remain high. Hookah pipe use typically begins in adolescence, with 67% beginning to smoke in high school and only 26% beginning at university (Van der Merwe et al., 2013). The average age of onset of hookah pipe use is ~17 years (Roman et al., 2017), but children have been reported to have begun as early as age 10 (Combrink et al., 2010). It is therefore important to include age groups in studies reviewing hookah use to understand the extent of the problem.

In 2005, the World Health Organization released an advisory note about the growing concerns surrounding increased tobacco smoking using the hookah pipe (WHO, 2005). More than a decade later, hookah use is on the rise globally. There is a need for interventions specifically designed to prevent and control hookah pipe smoking (Lopez et al., 2017). However, in order to design an effective intervention, it is important to determine what interventions already exist. Drawing conclusions about their strengths and weaknesses will help researchers and practitioners improve existing interventions or develop new ones. While there are reviews on hookah pipe interventions (Maziak et al., 2007, 2015; Jawad et al., 2016; Gardner, 2018), the present review extends the efficacy paradigm by extracting data using the RE-AIM framework, which assesses the reach, efficacy, adoption, implementation and maintenance of interventions, allowing researchers and practitioners to explore the interventions at a deeper level than if their effectiveness alone was assessed. Presently, interventions on hookah pipe use either use the same methodology as reducing cigarette smoking and/or information sharing about health hazards. These interventions are showing little impact over time therefore alternative approaches are needed. Efficacy studies alone may not help in developing these, as they mainly focus on the outcomes and not the properties of interventions.

5.4 Objectives

To systematically review interventions aimed at reducing hookah pipe use using the RE-AIM framework in order to put forward recommendations for clinicians and practitioners.

5.5 Methods

The review was prepared according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) standards (Moher et al., 2009). The review process occurred during April and May 2017. A protocol was prepared in advance:

https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=69514).

5.5.1 Inclusion and Exclusion Criteria

Studies were included based on the following criteria: (i) full-text studies in the English language; (ii) all types of intervention studies aimed at reducing hookah pipe use for any age group and in any setting; and (iii) single-group or multi-group trials of an intervention (or interventions) aimed at reducing hookah pipe use. Studies that were not in the English language and non-intervention studies (e.g. guidelines, protocols, discussion papers, reviews, editorials, legislation, identifying an intervention need, animal studies, and studies focusing solely on cigarettes and e-cigarettes and not on the hookah pipe) were excluded.

5.5.2 Search Strategy

There was no specific search period, because the present study aimed to include as many hookah pipe intervention studies as possible. As the literature identifies age of onset as young as 10 years, preadolescents and adolescents were emphasised in the search terms. The following electronic databases were searched: Cinahl, Dentistry and Oral Sciences Source, GreenFILE, Health Source – Consumer Edition, Health Source – Nursing/Academic Edition, Medline, PsycARTICLES, SocINDEX, SPORTDiscus, Cochrane, Wiley and PubMed. Three

sets of key words relating to interventions and hookah pipe use were used, focusing on the following main key words: (i) hookah pipe; (ii) interventions; and (iii) age group. Similar words were used within each set of key words, for example: (i) *shisha*, *narghile* or waterpipe; (ii) strategies, treatment, therapy, best practice or programme; and (iii) preadolescents and adolescents. The same key word variations were used for all 12 databases. In addition, the reference lists of the retrieved articles were manually searched for potentially eligible studies.

5.5.3 Review Procedure

The review process consisted of three phases to identify appropriate studies to include in the present study. Phase 1 involved screening titles of the records, phase 2 involved screening of abstracts, and phase 3 involved reviewing full texts to ensure that they were eligible for the study. Lastly, reference lists of all eligible full texts were scrutinised for any more potential intervention studies that could be included in the current study. At each point, studies that did not meet the inclusion criteria were eliminated. Duplicates were manually sought and removed.

In total, 36 344 titles were identified. After removal of duplicates ($n=143$), 36 201 title records were screened, and the titles that did not meet the inclusion criteria were excluded. This screening process resulted in 31 abstracts being eligible for phase 2 (abstract review). The reference lists of these studies were reviewed and yielded 4 studies that were eligible for the present study. A total of 16 full-text articles were deemed eligible, but only 10 of these studies met the inclusion criteria. Six studies were excluded because 2 were interventions that focused solely on cigarette smoking, 1 was a study protocol, and 3 were not intervention studies. Figure 5.1 shows the flow diagram of the review process described.

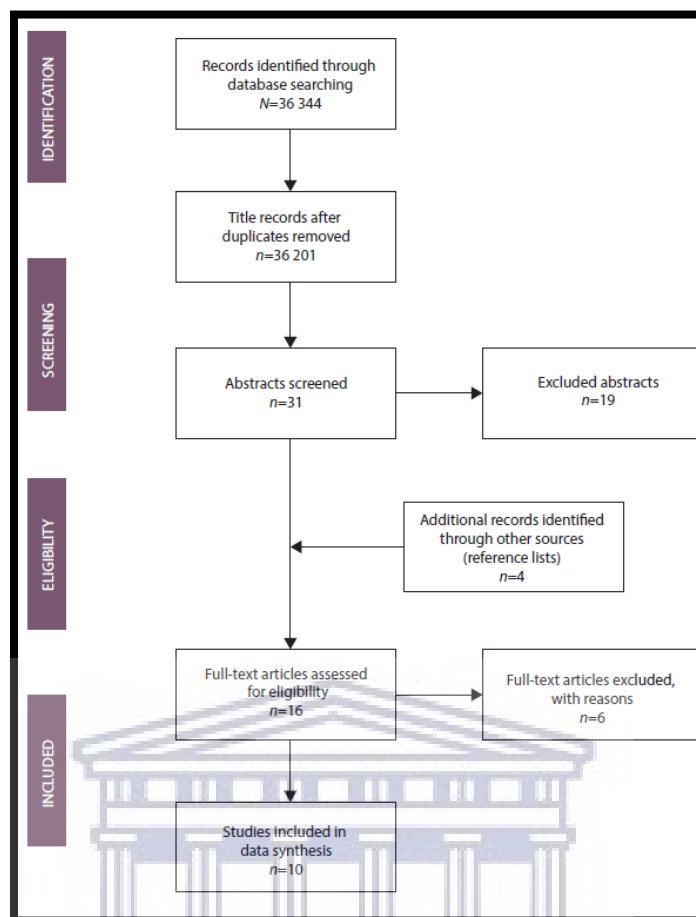


Figure. 5.1 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) Flow Diagram Illustrating the Review Process (adapted from Moher et al. 2009)

5.5.4 Data Extraction

Data from the included studies were extracted by ZK and placed into a data extraction tool that was developed prior to the search and piloted. The following data were extracted: author, year, title, country and study design. This information provided a description of the studies. The data were then extracted according to the RE-AIM (reach, efficacy, adoption, implementation and maintenance of results) framework, as follows: reach (intended and reached target population); efficacy (effects of the intervention regarding hookah pipe use by determining the effect size using Cohen's *d* or odds ratio); adoption (the extent to which target staff, venues or organisations adopted the intervention); implementation (consistency

and adaptation of implementing the intervention protocol in practice); and maintenance (intervention effects on individuals or settings over time, i.e. >6 months).

5.5.5 Quality Assessment

All studies meeting the inclusion criteria underwent quality assessment using the adapted RE-AIM framework appraisal tool (Glasgow et al., 1999). The quality of the studies was rated using a percentage score on the five dimensions of the RE-AIM framework based on the content of the manuscripts. Each component was assessed and rated according to a three-grade scale: strong (67 - 100%), moderate (34 - 66%) and weak (0 - 33%).

5.5.6 Methodological Quality of Studies

The methodological quality of the studies is described in Table 5.1. Eight studies reported moderately well in relation to their intervention to reduce hookah pipe use. Two studies had strong reporting in terms of the RE-AIM dimensions. The studies seemed to report extensively on efficacy but sparsely on maintenance of results. To obtain a global rating, the ratings were summed according to the guidelines of the quality assessment tool (Glasgow et al., 1999). Table 5.1 shows the methodological appraisal of the included studies.

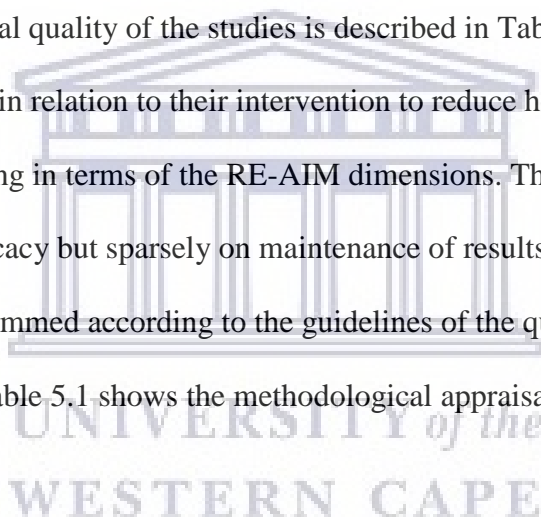


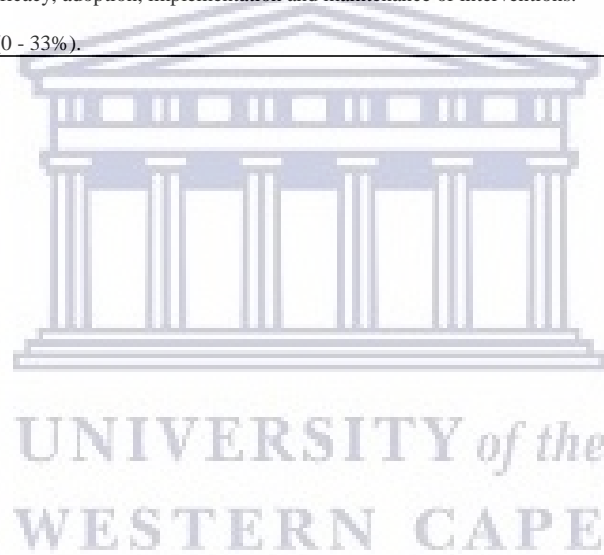
Table 5.1 Methodological Appraisal of Hookah Pipe Interventions in Terms of The RE-AIM Framework* (N=10)

	Alavijeh <i>et al.</i> , 2016	Asfar <i>et al.</i> , 2014	Dogar <i>et al.</i> , 2014	Essa-Hadad <i>et al.</i> , 2015	Lipkus <i>et al.</i> , 2011	Little <i>et al.</i> , 2015	Mohlman <i>et al.</i> , 2013	Siddiqi <i>et al.</i> , 2011	Stamm Badjerahn <i>et al.</i> , 2012	Thomas <i>et al.</i> , 2015
REACH[†]										
Does the article indicate who the intervention is intended for (inclusion criteria)?	1	1	1	1	1	1	1	1	1	1
Does the article report on exclusion criteria?	1	1	1	0	0	0	1	1	0	0
Does the article report on the representativeness of the target population? (gender)?	1	0	0	1	1	0	1	0	0	1
Does the article report on the participation rate?	1	1	1	1	1	1	1	1	1	1
Are there reports on indirect beneficiaries?	0	0	0	0	0	0	0	0	0	0
Reach score	4	3	3	3	3	2	4	3	2	3
EFFICACY[†]										
Did the intervention achieve the intended objectives?	1	1	1	0	1	1	0	1	1	1
Does the article report on the limitations of the intervention?	1	1	1	1	1	1	1	1	1	1
Are there reports of attrition (number of people who completed the programme)?	0	1	0	1	0	1	1	1	0	0
Does the article include recommendations to	1	1	1	1	1	1	1	1	1	1

improve the intervention?										
Does the article include recommendations for practice?	1	1	1	1	1	1	1	1	1	1
Efficacy score	4	5	4	4	4	5	4	5	4	4
ADOPTION [†]										
Is the setting described in terms of country and place of intervention (e.g. school, clinic)?	1	1	1	1	1	1	1	1	1	1
Is the context described (low socioeconomic, rural, etc.)?	0	0	0	0	0	1	1	1	0	1
Is reference made to how accessible the place of intervention was to the participants (e.g. their school, local clinic, etc.)?	0	0	1	1	1	1	1	1	1	1
Are there reports on the adoption of the intervention by the participants (e.g. were they open to the intervention, resistant, etc.)?	0	1	1	1	0	1	0	0	0	0
Are there reports on consultation or partnering with community/school/family/other stakeholders prior to the intervention?	0	0	1	0	0	0	1	1	1	0
Adoption score	1	2	3	3	2	4	4	4	3	3
IMPLEMENTATION [†]										

Are there reports of resources required to conduct the intervention?	1	1	1	1	1	1	1	1	1	1
Are there reports of who did the intervention (social worker, teacher, etc.)?	0	1	1	0	1	1	1	1	1	1
Are the duration and frequency of the intervention described?	1	1	1	1	0	1	1	1	1	1
Is training or experience required to implement the intervention?	0	1	1	0	0	0	1	0	0	0
Did participants evaluate the intervention?	0	1	0	1	0	1	0	0	0	0
Implementation score	2	5	4	3	2	4	4	3	3	3
MAINTENANCE†										
Does the article report on long-term effects of the intervention (after 6 months)?	0	0	1	0	1	0	0	1	1	1
Does the article report on indicators used for intervention follow-up?	0	0	1	0	0	0	0	0	0	0
Are there reports on the attrition rates (number of those who completed the intervention v. number who participated in the follow-up)?	0	0	0	0	1	0	0	1	1	1
Are there reports on relapse?	0	0	0	0	1	0	0	0	1	0

Is the method of follow-up indicated (telephone calls, interviews, questionnaire, etc.)?	0	0	1	0	1	0	0	1	1	1
Maintenance score	0	0	3	0	4	0	0	3	4	3
Total Score/25	11	15	17	13	15	15	16	18	16	16
Percentage score	44%	60%	68%	52%	60%	60%	64%	72%	64%	64%
Grade scale [‡]	Moderate	Moderate	Strong	Moderate	Moderate	Moderate	Moderate	Strong	Moderate	Moderate
<p>*The RE-AIM framework (Glasgow et al., 1999) assesses the reach, efficacy, adoption, implementation and maintenance of interventions. [†]0 indicates no, 1 indicates yes. [‡]Three-grade scale: strong (67 - 100%), moderate (34 - 66%) or weak (0 - 33%).</p>										



5.5.7 Data Synthesis

Narrative synthesis within the RE-AIM framework was used in this study. The quality of each study was based on the properties of each study according to the RE-AIM framework. The data were described on the basis of the reach, efficacy, adoption, implementation and maintenance aspects of the study.

5.6 Results

Table 5.2 describes the interventions located through this review by discussing the properties of each intervention using the RE-AIM framework. Table 5.3 specifically looks at the efficacy of each intervention. All references were given an alphabetic code and are, therefore, reported with a code in the next section. The alphabetic codes are listed in Table 5.3.

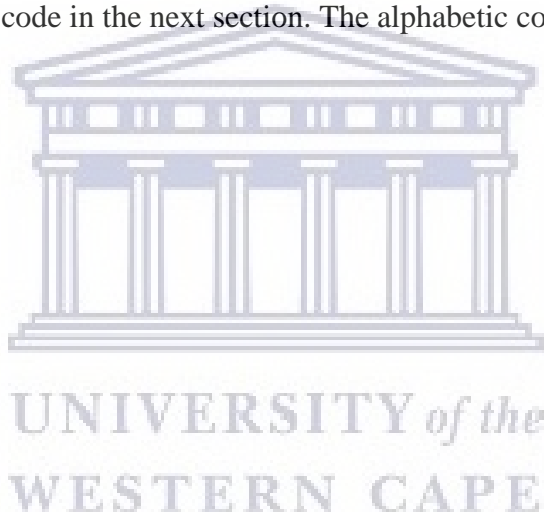


Table 5.2. Hookah Pipe Interventions Using the RE-AIM Framework ($n = 10$)

Table 2. Hookah pipe interventions using the RE-AIM framework* (N=10)									
Study	Study design	Objectives of study	REACH	EFFICACY (Refer to Table 3 for further information about efficacy.)		ADOPTION	IMPLEMENTATION		MAINTENANCE
			Target population and recruitment	Limitation of intervention	Recommendation for practice	Adoption (setting, consultations and participant feedback)	Intervention	Interventionist and training/experience	Maintenance of results
Alavijeh <i>et al.</i> , 2016	Quasi-experimental study with a pre- and post-test design	To verify the impact of training high-school female students to have the social skills needed to avoid the use of drugs	Female 1st-year students in high school Age ≥ 14 years Excl.: severely ill N=162	Small sample size Findings not generalisable to general public	Emphasis on divergent preventive interventions Self-efficacy skills must be taught to high-school students	Ahvaz, south-western Iran Setting and adopters not specified	8 sessions in a 45-day period After presenting intervention material, free discussion was held with the students participating Sessions included training on hookah and impact on health	Not specified	Not reported
Asfar <i>et al.</i> , 2014	Pilot two-arm, parallel-group, randomised, open-label trial	To develop and pilot test a behavioural intervention for waterpipe users interested in quitting, to: (i) evaluate the feasibility of the developed intervention; (ii) test its potential efficacy; and (iii) determine adequacy of the intervention 'dose' in terms of contact frequency	Current cigarette smokers who smoked >1 cigarette per day Age ≥ 18 years Referred by physician or word of mouth or media Excl.: inability to understand study and consent N=50	Participants followed for a short period of 3 months Better nicotine assessments needed to measure hookah use	Investigate where behavioural intervention must be coupled with pharmacological intervention Brief intervention should provide education and skills training Consider mobile health such as phone/internet interventions	Aleppo, Syria Participants were open to intervention, they reported that behavioural intervention was most helpful especially encouraging physical activity, following rules of relapse, social support and receiving educational information Intervention was facilitated by physician	Brief arm: 1 \times 45 min in-person educational/counselling session + 3 \times 10 min telephonic counselling Intensive arm: 3 \times 45 min. individual in-person session with 5 \times 10 min telephone sessions If person could not attend, session was covered telephonically Participants who relapsed were encouraged to set a new quit day	Physician with 6 hours' training	Not reported
Dogar <i>et al.</i> , 2014	Re-analysed data from ASSIST major cluster randomised controlled trial	To explore differential effect of cessation interventions (BSS+ and BSS) between hookah and cigarette smokers	Age ≥ 18 years Attending primary healthcare centres and secondary healthcare centres with suspected pulmonary TB Regular smokers	Straightforward adoption of cigarette measure for hookah smoking may not be optimal for capturing nicotine dependence for hookah users	Add group therapy or advise smoke-free homes in individual therapy, as this might cater for social dimension of addiction	Jhang and Sargodha districts of Pakistan Participants were asked about their effects and treatment adherence Delivered by TB DOTS paramedics	Consenting participants were either in BSS (2 brief behavioural support sessions) or BSS+ (2 brief behavioural support sessions + 7 weeks bupropion), and control group received usual care Provided a self-help leaflet on smoking cessation to everyone	Delivered by TB DOTS paramedics (nurses or auxiliary nurses who follow a physician's clinical directions) Received a full day's training on intervention protocol and delivery tool	Continued abstinence at 25 weeks post intervention

			Excl.: hospitalisation required <i>N</i> =1 955						
Essa-Hadad <i>et al.</i> , 2015	Mixed method; pre- /post-test study design	To examine the acceptability and feasibility of a pilot web-based programme that provides tailored feedback to increase smoking knowledge and reduce cigarette and <i>nargila</i> smoking behaviours among Arab college/university students in Israel	Age ≥ 18 years Must have access to internet Recruitment: flyers, social media announcements, message boards, and entering classes Arabs entering Israeli university/college <i>N</i> =225	Small sample size Many smokers did not smoke from outset	Improved recruitment process to recruit cigarette and hookah users from onset to guarantee large sample	Israel During focus-group sessions, participants were asked about how thoroughly they read educational material and how interesting or helpful it was No details about facilitator (target staff)	5 focus-group sessions lasting ~90 min each Web-based programme in Arabic Consisted of a self-administered questionnaire Dissemination of tailored health education materials via text and videos Males and females were separate	Facilitator (details about the facilitator or their training or experience not specified)	Not reported
Lipkus <i>et al.</i> , 2011	Randomised control trial	To modify college waterpipe smokers' perceived risks and worry about waterpipe tobacco smoking	Age ≥ 18 years Enrolled in a 4- year programme at college/university Smoked hookah at least once in the past month Recruited through colleges and media <i>N</i> =91 (study 1) <i>N</i> =112 (study 2)	Materials were viewed online and participants could view at their leisure, so it is unclear how environmental factors such as noise affected the findings Not sure whether peer discussions contaminated the results Failure to use comparable measures limits making comparisons of effect sizes	Future studies should examine effects of this intervention on change in waterpipe use based on adequately powered studies	Central North Carolina, USA Setting was online in participants' own space On logging onto the website, participants were randomised to control or experimental groups where they had to complete online surveys	Participants needed to log onto the website Those who did not were reminded by a research assistant Participants in the experimental group were shown 20 PowerPoint slides Control group were shown 8 of the 20 slides Participants in both groups completed main study measures	Reference was only made to a research assistant	At 6 months in study 1, 41% reported no longer smoking hookah pipe Among those in the control group, 33% reported not smoking hookah pipe, compared with 62% in the experimental group Control group: quit rates at 6 months were 33.3% among those who at baseline smoked monthly, 30% for weekly and 50% for daily Experimental group: quit rates at 6 months were 56% among those who at baseline smoked monthly,

									44% for weekly and 0% for daily
Little <i>et al.</i> , 2015	Pretest and post-test	To evaluate the efficacy of a 40-min intervention designed to intervene on 4 TNCPs in a sample of US military personnel during an 11-week period of involuntary tobacco abstinence, for reducing intentions to use TNCPs and increasing perceptions of harm of TNCPs	Adult airforce airmen undergoing technical training at a joint base <i>N</i> =1 055	Follow-up should be several weeks after initial intervention Findings may not be generalisable to civilian population because joining the military imposes strict standards	Discussion about negative aspects of tobacco products Emphasis self-control Explore career goals for the next 5 years Enhance self-efficacy and encourage avoiding smoking areas	Texas, USA Adopted by study staff Using a 5-point Likert scale, participants had to rate the different components of the intervention Intervention was developed with tobacco experts and pilot-tested over 4 months	40 min Delivered in a group format Used Socratic teaching, interactive Used motivational interviewing principles so that intrinsic motivation could be enhanced to maintain a tobacco-free lifestyle after their service	Study staff members delivered to intervention to squadrons of airmen	Not reported
Mohlman <i>et al.</i> , 2013	Pretest and post-test	To improve the target population's knowledge regarding the hazards of smoking and ETS and to change attitudes and smoking behaviours within the community and the household	Villages Door-to-door visits and community mapping Age ≥ 12 years Current hookah smokers Smoked hookah at least once in the past month <i>N</i> =7 657 in pre-intervention study <i>N</i> =5 934 in entire study	Too resource-intensive (financial and personnel) Design did not show what was effective and what was not effective – it assessed the entire campaign	Recruitment process High overall participation and retention rates Home visits	Qalyubia, Egypt Engagement with community leaders Villages were assessed according to criteria to limit contamination Adopted by locals in a community setting	Primary school students participated in traditional and non-traditional activities Preparatory and secondary school students engaged in an experiential learning programme Engaged mosques and churches in educating their communities Female social change agents provided information to adult women All trainees received a guide booklet, a pamphlet on smoking and passive smoking hazards, and CDs with lectures on smoking hazards. Intervention period was 12 months	Locals trained and supervised by the study team Locals were selected so that there would be a sense of ownership of the intervention	Maintenance of results not clear
Siddiqi <i>et al.</i> , 2011	Randomised controlled trial	To assess the effectiveness of behavioural support intervention and bupropion in achieving 6-month continuous abstinence in adult smokers with	Age ≥ 18 years Attending a healthcare centre Excl.: needing hospitalisation or urgent medical attention Referred by physician <i>N</i> =1 955	Imbalance of urban and rural proportions and smoking habits among treatment groups Inability to confirm adherence to bupropion Cannot validate/measure	Include household smoking restrictions Scaling up smoking cessation interventions in tuberculosis programmes	Pakistan, Tehsil headquartered health centres and rural health centres The facilitators were paramedics who were responsible for registering new patients, providing education, and	BSS: 30-min session – think of themselves as non-smokers and plan for a quit day 1 week later. Session 2: 10 min, was arranged to coincide with the quit day to review progress BSS+: 7-week course of bupropion in addition to BSS Control group: received usual care and self-help leaflet on smoking cessation	Facilitators were paramedics	Continuous smoking abstinence at 25 weeks follow-up visit in the BSS and BSS+ groups

		suspected pulmonary TB		long-term abstinence Collection of medication		supervising treatment			
Stamm Badjerahn <i>et al.</i> , 2012	Case-control study with quasi-experimental design	To determine the efficacy of the programme	Students aged 12 - 19 attending secondary school Apprentices aged 17 - 22 attending vocational school Recruitment: Provided information via flyers and register class N=760	No randomisation Members of the intervention and control groups were not significantly different at baseline Low frequency of hookah pipe users in comparison with cigarette smokers – consider when interpreting the findings related to smokers Observation period was only 6 months	Offer intervention to students before they start smoking Awareness about hookah smoking should be given to adolescents who may be unaware Minimum 5 sessions embedded in a school concept	Germany, Berlin Lung Hospital Delivered by physician	2-hour presentation on health consequences of smoking at Berlin Lung Hospital Introduced someone suffering from a tobacco-related illness Lung function test with 2 - 3 participants per school, and results were discussed with the group Precondition: intensive preparation of the topic at school	Physician A patient suffering from a tobacco-related illness	At 6 months, 41 students had given up smoking: 22 in the intervention group and 19 in the control group
Thomas <i>et al.</i> , 2015	Two-by-two factorial randomised clinical trial	To examine baseline characteristics and biochemically verified 1-, 4- and 6-month tobacco quit rates among college students enrolled in a 'Quit and Win' cessation trial, comparing those who concurrently smoked both hookah and cigarettes with those who denied hookah use	College students Smoked at least 1 cigarette per day on 10 or more days in the past month Hookah use was determined by asking if participants had smoked in the past 30 days N=1 217	Study was observational in nature, identified associations cannot be considered causal Sample consisted of college students enrolled in a 'Quit and Win' contest, so they could have been motivated to quit in exchange for the opportunity to win financial incentives	Develop recruitment strategies to target non-daily smokers who concurrently smoke hookah	Midwest, USA Implemented at colleges in the Midwest	Single, lottery-incentivised cessation contest (i.e. 30-day period) v. 3 successive 30-day contests, with and without counselling, on tobacco cessation quit rates at 1, 4 and 6 months after study baseline (i.e. end of first contest period, end of treatment, and end of study, retrospectively)	Not specified	Hookah users in comparison with non-users had a 63% decrease in odds in biochemically verified continuous abstinence at 6 months

*The RE-AIM framework (Glasgow *et al.*, 1999) assesses the reach, efficacy, adoption, implementation and maintenance of interventions.

BSS = behavioural support without bupropion; BSS+ = behavioural support with bupropion; TB = tuberculosis; DOTS: directly observed treatment, short-course; TNCP = tobacco- and nicotine-containing product; ETS = Environmental Tobacco Smoke

Table 5.3: Efficacy Of Interventions Aimed At Reducing Hookah Pipe Use

Code	Author	Effect size	Cohen's <i>d</i>
a	Alavijeh <i>et al.</i> , 2016	Outcome measure	
		Overall situational self-efficacy score (control)	0.03 (small effect)
		Overall situational self-efficacy score (experiment)	0.46 (medium effect)
		Overall score drug avoidance self-efficacy (control)	0.03 (small effect)
		Overall score drug avoidance self-efficacy (experiment)	0.46 (medium effect)
		Social skills (control)	0.01 (small effect)
		Social skills (experiment)	0.18 (small effect)
b	Asfar <i>et al.</i> , 2014	Those who had successfully quit water-pipe smoking for at least 1 month during the last year were 3.75 times more likely to quit smoking at the 3-month follow-up (OR 3.75, 95% CI 1.03 - 12.43)	
c	Dogar <i>et al.</i> , 2014	Compared with the control group, the relative risk of smoking abstinence for behavioural support sessions plus 7 weeks of bupropion therapy (BSS+) was 2.5 times more likely (OR 2.5, 95% CI 1.3 - 4.7) and behavioural support sessions (BSS) 2.2 times more likely (OR 2.2, 95% CI 1.3 - 3.8) among hookah-only smokers	
d	Essa-Hadad <i>et al.</i> , 2015	Participants smoked at least 1 cigarette during the past week ($n=225$): pre-study 22.2%, post-study 20.0% Participants smoked <i>nargila</i> at least once a week in the past month ($n=225$): pre-study 58.2%, post-study 22.2%	
e	Lipkus <i>et al.</i> , 2011	Participants in the experiment group were 1.89 times more likely to report no longer a smoking water pipe compared with those in the control group (OR 1.89, 95% CI 0.72 - 5.00) Controlling for study groups, neither perceived risk of harm nor worry about the physical consequence of water pipe smoking assessed immediately after review of the material online was significantly associated with quitting (OR 0.968, 95% CI 0.674 - 1.390 for perceived risk; OR 1.055, 95% CI 0.724 - 1.536 for worry). Neither perceived risk of addiction nor worry about becoming addicted was significantly associated with quitting (OR 0.917, 95% CI 0.585 - 1.438 for perceived risk; OR 0.921, 95% CI 0.620 - 1.367 for worry). Desire to quit was also not associated with cessation (OR 1.184, 95% CI 0.898 - 1.562)	
f	Little <i>et al.</i> , 2015	Outcome measure	Cohen's <i>d</i>
		Change in perception of harm (non-users) pre and post	1.23 (large effect)
		Change in perception of harm (users) pre and post	1.38 (large effect)
		Intention following ban (non-users)	0.25 (medium effect)
		Intention following ban (users)	0.29 (medium effect)
		Intentions in the next 12 months (non-users)	0.28 (medium effect)
		Intentions in the next 12 months (users)	0.40 (medium effect)
g	Mohlman <i>et al.</i> , 2013	<p>Respondents in the intervention group were 4.5 times more likely to smoke on public transportation before the intervention than after; the control respondents were only 2.8 times more likely to do the same</p> <p>Additionally, intervention respondents were 2 times more likely to have smoked shisha before than after the intervention; there was no significant change in the control group</p> <p>On the subject of asking smokers to stop, both the control (OR 0.8) and intervention (OR 0.6) respondents were less likely to ask someone on public transportation to stop smoking before the intervention than after, a trend true to a greater degree in the intervention group</p> <p>Respondents in the control group were less likely to ask a relative to smoke outside before the intervention than after (OR 0.8); however, relatives were more likely to agree to the request before the intervention (OR 1.7)</p> <p>Finally, control respondents were less likely to ask a stranger to stop smoking before the intervention than after (OR 0.7)</p> <p>There were no significant changes in responses from the intervention group in these last three questions</p> <p>On the issue of a smoking ban in all or part of the home, both the control (OR 0.56) and intervention (OR 0.3) groups were less likely to have a ban before the intervention than after; however, this trend was clearer in the intervention group</p> <p>Lastly, respondents in the intervention group were 0.9 times less likely to avoid places where they would be exposed to smoking before the intervention than after, while control respondents were 1.13 times more likely to avoid exposure before than after the intervention</p>	
h	Siddiqi <i>et al.</i> , 2013	<p>Primary outcomes: Participants in the BSS+ group had 89% decreased odds of having continuous abstinence at 6 months compared with the control group (OR 0.11, 95% CI 0.08 - 0.15)</p> <p>Participants in the BSS group had 87% decreased odds of having continuous abstinence compared with the control group (OR 0.13, 95% CI 0.10 - 0.18)</p> <p>Secondary outcomes: Participants in the BSS+ group were less likely to have continuous abstinence at the 1-month point compared with the control group (OR 0.10, 95% CI 0.07 - 0.13)</p> <p>Participants in the BSS group had 99.9% decreased odds of having continuous abstinence at the 1-month point compared with the control group (OR 0.07, 95% CI 0.05 - 0.10)</p>	

		Participants in the BSS+ group had 84% decreased odds of having continuous abstinence at the 6-month point compared with the control group (OR 0.16, 95% CI 0.12 - 0.20) Participants in the BSS group had 72% decreased odds of having continuous abstinence at the 6-month point compared with the control group (OR 0.28, 95% CI 0.22 - 0.36)
i	Stamm-Balderjahn <i>et al.</i> , 2012	Compared with their counterparts in the control group, the non-smokers in the intervention group were 4 times more likely to stay abstinent (OR 4.14, 95% CI 1.66 - 10.36) Female school students were twice as likely as male students in the control group to stay abstinent (OR 2.26, 95% CI 1.05 - 4.88) In the intervention group, females were approximately twice as likely as males to remain abstinent (OR 2.56, 95% CI 1.06 - 6.19)
j	Thomas <i>et al.</i> , 2015	Outcome measure
		Cigarettes per day
		Days smoked, past 30 days
		Quit attempts, past year
		Cohen's d
		0.34 (medium effect)
		0.15 (small effect)
		0.16 (small effect)
	Hookah users had 36% decreased odds of self-reported quit at end of treatment (i.e. 4-month assessment) compared with non-hookah users (OR 0.64, 95% CI 0.45 - 0.93). Compared with non-users, hookah users had a 55% decrease in odds of self-reported continuous abstinence (OR 0.45, 95% CI 0.25 - 0.81) and a 63% decrease in odds of biochemically verified continuous abstinence (OR 0.37, CI 0.14 - 0.99)	
OR = odds ratio; CI = confidence interval; BSS = behavioural support without bupropion; BSS+ = behavioural support with bupropion.		



5.6.1 Description of Studies

Sixty percent of the studies were from Asia, 30% from North America and 10% from Europe. There were no studies from Africa. The studies showed that the interventions were contextualised for these continents and settings. Of the 10 studies, 7 focused on the efficacy of the intervention^{a,c,e,f,h,i}, 2 on the feasibility of the intervention^{b,d}, and 1 on describing the intervention^g. Fifty percent (n=5) of the studies were of randomised controlled design, 30% (n=3) pre-test and post-test design, and 20% (n=2) quasi-experimental design. No interventions focused on preadolescents, but 2 studies included adolescents^{a,d,i}. The reasons for focusing on adolescents were that the period of adolescence was a higher risk factor for hookah use than any other age group^a and that smoking often started during adolescenceⁱ. Some studies focused on adult smokers and included college or university students^{e,j} and adults^{b,c,f,g,h}.

5.6.2 Reach

All 10 interventions targeted the hookah pipe user. Participants were recruited through physician referrals, word of mouth, newspaper adverts^b, flyers, announcements, internet messages, social media, and entering college or university classes^d. Participants were also recruited door-to-door^g and via advertisements at the hospital where the study was conducted^c. Four studies made reference to their exclusion criteria^{a,b,c,h}, which were mainly severe medical conditions and inability to understand consent procedures. The inclusion criteria included age, and that participants needed to have attended high school^{a,i}, vocational schoolⁱ, college or university^{d,e,j} or the healthcare facility^{c,j}, be current smokers who smoked either one cigarette or hookah pipe per day^b or month^e, be part of the US Air Force undergoing technical training^f, have access to the Internet^d or have suspected pulmonary tuberculosis^c. The total enrolment of the 10 interventions was 13 516 people.

When conducting intervention studies, participation or retention rates are usually a concern. Only 3 studies mentioned participation or retention rates, which were: (i) 99%^g; (ii) 82.2%ⁱ; and (iii) 37% of the participants completed all three in-person sessions, 40.7% completed all 5 telephonic sessions, and 26% completed all treatment sessions (3 in person and 5 telephonic sessions) in the intensive intervention arm; in the brief arm (i.e. less intensive intervention), 78.3% completed the single in-person session, 39.1% completed 3 telephonic sessions, and 34.8% completed all treatment sessions (1 in-person and 3 telephonic sessions)

^b. No studies discussed strategies for preventing loss to follow-up or encouraging retention of participants.

5.6.3 Efficacy

Two studies did not meet their objectives and stated that their intervention had little to no effect^{d,g}. However, 8 of the 10 studies (80%) reported having met their objectives and displayed some degree of efficacy^{a,b,c,e,f,h,i,j}. Table 5.3 describes how effective the interventions were. Interventions were effective because they enhanced the social skills needed to avoid the use of drugs and improved the self-efficacy. The brief cessation treatment for hookah pipe smokers appeared feasible. Behaviour support interventions with or without bupropion achieved 6-month smoking abstinence among hookah pipe smokers. Modified perceptions of harm and addiction related to the hookah pipe and the intervention had a primary preventive effect on study participants. In one study, while the intervention helped prevent hookah pipe use, it was not effective in terms of convincing people who already smoked to quitⁱ. Furthermore, reports of decreased use and short- and long-term abstinence were not maintained^j.

5.6.4 Adoption

Interventions were adopted in Iran, Syria, Pakistan, Israel, the USA, Egypt and Germany by physicians, paramedics, facilitators, research assistants, study staff and locals.

Interventions were located online^e, at Berlin Lung Hospitalⁱ and at colleges in the US Midwest which participants enrolled in the Quit and Win contest to quit smoking attended^j.

For an intervention conducted in the community, requirements were a population between 10 000 and 20 000 persons; at least one primary, preparatory and secondary school; a public health clinic; a youth club and a mosque^g; Siddiqi and colleagues (2013) needed to include a balance of urban and rural health centres, because the prevalence of cigarette smoking was higher in urban areas and hookah use was more prevalent in rural areas. Prior to the intervention, Mohlman and colleagues (2013) identified a need to engage with community leaders in the villages identified for intervention. Interventions were developed in collaboration with tobacco experts, and the intervention was pilot tested over 4 months^f.

5.6.5 Implementation

There were mixed findings in the reporting of implementation. Numbers of sessions ranged from 1 to 8 and duration of sessions from 10 minutes to 2 hours, while for the period of the implementation, interventions ranged from a 2-hour once-off session to a 12-month programme. None of the studies reported the frequency of sessions. Most interventions focused on brief short-term activity where participants entered voluntarily and provided consent. Popular intervention sites included the local hospitalⁱ and the communities where participants resided^g. The interventions were mainly supportive, educational or counselling, with or without medication. Sessions were conducted online, in person and telephonically. Interventions were implemented by physicians, nurses, auxiliary workers, study staff, paramedics or trained community members. Training ranged from 6 hours for physicians^b to a full day's training on intervention protocol and delivery tools for nurses and auxiliary nurses^c; in another study, locals were trained by the study staff so that they could implement and take responsibility for the intervention^g. In terms of resources and modalities, slide-show

presentations^{a,e,i}, pamphlets^a, role-play^a, CDs^g, booklets^g and self-help leaflets^h on smoking cessation were used.

Four studies incorporated an evaluation element to the intervention^{b,c,d,f}. The behaviour intervention was considered helpful because it encouraged physical activity, they received educational information, and they followed the rules of relapse prevention and received social support^b. Some participants preferred group counselling, while others preferred medication^b.

5.6.6 Maintenance

Maintenance in the RE-AIM framework refers to whether outcomes were maintained at least 6 months' post intervention (Brinker et al., 2014). However, short-term intervention follow-up must also be considered, since this is also indicative of interventions reaching their goals (Mwaikambo et al., 2011). The period of follow-up as specified by 8 studies ranged from immediately post intervention to 6 months, but the latter was only the case in 5 studies. Three studies found that participants achieved prolonged abstinence at follow-up^{b,c,h}. At 1 month's follow-up, hookah pipe use decreased from 58.2% to 22.2% post intervention, and there was a slight increase in knowledge about the hookah pipe, but this increased knowledge was not found to be statistically significant^d. One study found little to no impact on the number of smokers and the amount of tobacco smoked among their participants^g. The studies made use of surveys, semi-structured interviews and the analysis of urine cotinine to determine maintenance of results. Four studies reported attrition rates (percentage of participants at baseline who participated in follow-up), which ranged from 61% to 83%^{b,d,g,h}. According to the findings presented, most of the interventions had a positive effect on participants. The studies did not report on the sustainability of the interventions. Two studies made reference to feasibility and found that the interventions were feasible^{b,d}.

5.7 Discussion and Recommendations

The objective of the present review was to assess all types of interventions aimed at reducing hookah pipe use in order to provide recommendations for practitioners and clinicians. This study provided an overview of what exists, what works and what can be built on to alleviate this public health concern. By reducing hookah pipe use, people can experience health, economic, environmental and family benefits because they will inhale fewer toxic substances; they can use their money for important necessities or desires; there will be less environmental pollution; and families and peers will not be encouraged to smoke or be affected by passive smoke (Zhou et al., 2017).

When considering what exists, the interventions describe short-term, prevention and early intervention support by means of supportive, educational or counselling sessions. All interventions targeted the smoker only, meaning that family members or significant others were not invited to be part of the intervention (Stamm Balderjahn et al., 2012; Asfar et al., 2014; Mohlman et al., 2013). However, school-based prevention programmes and family-based intensive interventions focusing on family functioning also show promise (Stamm Balderjahn et al., 2012; Alavijeh et al., 2016; Das et al., 2016). None of the 10 intervention studies included in this review focused on a family model, and this could potentially be a gap. Most of the interventions either aimed to change perceptions and behaviour or used the same interventions that are used for cigarette smoking abstinence, or ones similar to these. This approach is advised against, as hookah pipe smoking has its own characteristics and unique features that make it appealing (WHO, 2005). It is recommended that interventions should target these features, such as the attractive aroma, the taste, the pleasant bubbling sound, the social atmosphere, and the bonding and sharing over a hookah pipe (WHO, 2005). Moreover, hookah pipe users believe that smoking is relatively harmless compared with other substances, so awareness campaigns that clearly emphasise how hookah smoking affects health and wellbeing, including that of the wider community are needed (WHO, 2005).

When considering what works, none of the studies reported that recruiting participants was a challenge, which implies that the recruiting strategies described are likely to yield positive results if used in future interventions. Interventions were primarily concerned with improving health by encouraging participants to abstain. However, hookah pipe use affects the economy and the environment, and researchers and practitioners should take this into account when planning interventions. The studies reported that the intervention settings were familiar locations such as the home, local clinic, church or school; this made the interventions accessible to participants, which is important, especially in low socioeconomic contexts where people may not have the resources to travel far for an intervention. This factor could explain why retention rates were relatively high. Community members should be involved in the design of the intervention, to generate community support, commitment and interest (Mohlman et al., 2013; Bartholomew-Eldredge et al., 2016). It is also important for community members to provide input on details such as the venue. A clinic, for example, may be easily accessible, but people could feel stigmatised attending meetings there (Bartholomew-Eldredge et al., 2016). Involving the community where the intervention will occur is especially important when trying to change a specific behaviour that ultimately affects the health of the public, and will also encourage communities to adopt the programme and make it more sustainable. The interventions described were generally short term and shown to be effective during the intervention, implying that the resources and modalities employed worked. However, there is little evidence to indicate whether the effects would last over time or if the interventions were only effective for their duration. This issue is evidenced by studies that found decreased odds of staying abstinent at 4 months and 6 months' post intervention (Siddiqi et al., 2013; Thomas et al., 2015). It appears that brief interventions work, but failure to follow up is not conducive to maintaining the results. Cessation interventions are feasible and effective, but continuation beyond the implementation phase is unfortunately rare (Ballbè). Lack of follow up or continuation of care can be attributed to

organisational factors, funding and demand for service, hospital or school culture and community responsibility, but measures need to be put in place to enable follow-up, or the likelihood of results being sustained is slim.

While all 10 interventions showed promise, an opportunity exists to build on existing interventions. The present study has shown that no interventions to reduce hookah pipe use in Africa have been reported or evaluated, and we therefore present the following recommendations for clinicians and practitioners operating in resource-constrained settings, such as those typical of Africa. However, these suggestions are not limited to resource-constrained settings, and they may be applied in other contexts if it is feasible to do so. As information and interventions related to hookah pipe use and treatment are still in their early stages, it is advisable that clinicians and practitioners should attend training and familiarise themselves with hookah pipe research. This will give them a clear understanding of how hookah use differs from that of cigarettes and other tobacco products, so that they can advise and intervene appropriately. Governments also have an important role to play in the reduction of hookah pipe use, and awareness and information sessions should therefore be lobbied with government departments so that they can be prioritised in budgets in order to provide the service at schools, workplaces, clinics and community centres. Banning hookah pipes in public spaces and in the company of children is important to protect users: (i) from peers who may negatively influence them to add substances or use other substances concurrently; (ii) from being labelled; and (iii) from being caught by law officials, community leaders or parents, which may lead to dire consequences such as punishment, embarrassment or harassment. Banning smoking in public places is crucial for non-users too, as they may experience health problems from second-hand smoke and may be influenced by, exposed to or coerced into hookah pipe smoking. There should be stricter regulations and adherence to policies on the purchase of hookah pipes, tobacco and coals, as well as on advertising and display. In SA, the Tobacco Control Bill of 2018 (Tobacco Control Bill of South Africa,

2018) identifies the hookah pipe as a tobacco product. The Bill states that retailers may not display the tobacco product at the place of business but may make the product available to consumers over the age of 18 years. Furthermore, the Minister must prescribe standardised packaging and labelling of tobacco products in terms of colour, texture, size, manufacturers' details, tax stamps and health warnings. The Bill further stipulates that no person shall advertise or promote or cause any other person to advertise or promote tobacco products. As people view hookah pipe use as relatively harmless, awareness campaigns should occur in various settings such as schools and clinics and different communities. A roadshow involving hookah pipe users from different ages and backgrounds may be a possibility. A variety of actors is needed, so that the show can appeal to a wide range of audiences. For example, if the road show is aimed at adolescents, there should be adolescent actors so that it is seen as peer-based and relevant. At this point, recruitment could occur by means of methods described in this review. Intervention should follow soon after. Many people do not have the time or resources to stay out of school or work for long periods of time, so mutually convenient times and locations must be arranged. Emphasis should be placed on assertion training and skills training to decline hookah use and being comfortable with the consequences of saying 'No'. It has been noted that counselling and educational support sessions are the most feasible, so mental health practitioners should be involved to provide counselling if hookah pipe use is related to coping with stress, trauma or challenges within the family. Doctors and nurses play an instrumental role in teaching about both the short- and long-term health effects, which must be described in a way that is relevant to the subjects' interests and age groups and that makes the information understandable and relatable. For example, telling adolescents that they may get cancer when they are older may not be as effective as informing them how hookah smoking affects their ability to play football (if that is their interest). Similarly, telling a pregnant mother how hookah smoking may affect her unborn child would be more meaningful than informing her about its negative effects on the environment. As hookah pipe

use is a social phenomenon, a social element needs to be included when planning the intervention. Involving family members should be encouraged. Reasons why people use the hookah pipe should be explored; this may be done in individual or group counselling sessions. Once this understanding has been reached, it will be easier to educate, intervene or refer appropriately. It is very important that interventions be adapted to local culture, language and settings. Practitioners and clinicians must be cognisant about potential challenges (such as poor turnout, resistant beneficiaries, etc.) that may arise when attempting to intervene, and a plan to mitigate these challenges should be in place prior to the intervention. Most importantly, effective monitoring and evaluation strategies must be applied to measure progress over time to ensure the maintenance of results.

5.8 Proposals for Research

It is necessary for interventions to be studied in terms of their impact over time, including health, social, economic and environmental effects. It would also be interesting to compare interventions and attitudes to hookah pipe use in low socioeconomic communities, middle-income communities and high socioeconomic communities to determine how needs vary according to context. Comparisons can be made of interventions aimed at reducing cigarette smoking v. hookah smoking, to establish whether the same approach works for both or a different approach is needed for each practice. There is a clear need for rigorously designed interventions focusing on reducing hookah pipe use to be published and disseminated. Studies should focus on why people enjoy smoking the hookah pipe and what needs it satisfies.

5.9 Study Limitations

Although the current review utilised a broad search category and 12 databases, only trials published in journals within the included databases were located, thereby yielding only 10 appropriate studies. Owing to the heterogeneity of the identified studies, it was challenging to compare them in terms of strengths and weaknesses for the RE-AIM dimensions. Not all

studies provided sufficient information about the intervention, its effectiveness and its impact, making it difficult to discuss the sustainability of the interventions. Some studies included cigarette smoking and hookah smoking, so it was not possible to make conclusions on the hookah interventions specifically. Moreover, while the RE-AIM framework is a model that can be used to assess properties of various interventions and their effectiveness, several other models exist and could have provided different insights – for example, cost implications, scalability, feasibility and replicability of the interventions.

5.10 Conclusion

The present systematic review indicates that there are limited quality interventions globally that focus on reducing hookah pipe use, and none in Africa. However, by drawing from strengths and weaknesses of existing interventions and incorporating the recommendations for future ones, development of a means to reduce hookah pipe use may be on the horizon. Counselling and educational support sessions seem to be the most feasible and potentially successful approaches, but more work is necessary. The time for action is now, and all practitioners and clinicians need to play a role in intervening in this major public health concern that is spreading over not only our country and continent but also the globe. We consider that this review is a good starting point that can contribute to the design of and decision-making regarding effective public health interventions to reduce hookah pipe use.

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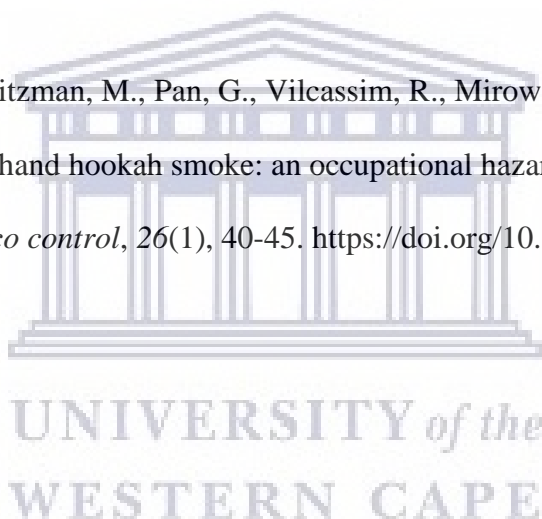
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CHAPTER 6

ADOLESCENT HOOKAH PIPE USE: COMPARING USERS' AND NON-USERS' HARM PERCEPTION, BPN AND MOTIVATION FOR USE AND NON-USE

6.1 Introduction

The previous chapter identified the interventions aimed at reducing adolescent hookah pipe use. This chapter addresses Objectives 3 and 4, which was *to determine the prevalence of hookah use and compare (a) harm perception, (b) motivation for hookah use/non-use, and (c) BPN of adolescent hookah pipe users and non-users*. This chapter has been submitted to the Journal of Psychology in Africa.

Adolescent Hookah Pipe Use: Comparing Users' and Non-Users' Harm Perception, BPN and Motivation

6.2 Abstract

Background: Adolescent hookah pipe smoking is a public health hazard. Self-determination theory (SDT) posits that people engage in behaviours because they are motivated and in pursuit of satisfying their basic psychological needs. This was the first study that assessed hookah pipe use from an SDT perspective. **Aim:** This study aimed to compare the harm perception, motivation, and basic psychological needs of adolescent hookah pipe users and non-users. **Setting:** This study was conducted at 12 public schools in the Western Cape Province. **Methods:** This study employed a quantitative methodology using a cross-sectional study design with 1,201 adolescents aged 13–19 years old. The data was collected with a battery of instruments. The data was analysed using SPSS. Users and non-users were compared using descriptive analysis as well as independent t-tests. **Results:** Twenty-one percent of adolescents were users. Users and non-users mostly had similar views in terms of the dangers of smoking the hookah pipe. Although, in some instances, users viewed hookah pipe smoking as less harmful compared to non-users, there were no significant differences

between users and non-users in terms their basic psychological needs. Users and non-users reported that they were intrinsically motivated to either smoke or not smoke.

Conclusion: There was no marked differences between users and non-users in terms of harm perception, basic psychological needs, and motivation. There is a need for increased health education focusing on health consequences to deter adolescents from smoking the hookah pipe. There is also a need for interventions to undo users' intrinsic motivation to smoke the hookah pipe and foster their intrinsic motivation to quit hookah pipe use.

Keywords: Hookah pipe; tobacco; adolescents; health; Self-Determination Theory; basic psychological needs; motivation; South Africa

6.3 Introduction

Hookah pipe use contributes to a significant and growing share of tobacco use globally (Drope & Schluger (Eds.), 2018). The hookah pipe is a device used to smoke flavoured tobacco. Traditionally, hookah pipe smoking was considered a cultural practice in the Middle East. However, over the last two decades, hookah pipe smoking has become increasingly popular for a number of reasons, including the sweet taste and smell of the tobacco, the communal experience of smoking, the attractive designs of the hookah pipe mechanism, and the social acceptance of the practice (Soulakova et al., 2018). In some parts of the world, hookah pipe use has surpassed cigarette use (WHO, 2015). Although used by people from all age groups, hookah pipe use is becoming increasingly popular amongst adolescents (Galimov et al., 2019). The average age of onset for hookah pipe use is approximately seventeen years old, but there are instances where children begin smoking the hookah pipe as young as ten years old (Combrink et al., 2010). In South Africa, where the burden of substance abuse is high, the trajectory of substance use often begins with cigarettes and/or smoking the hookah pipe during adolescence (Sommer et al., 2017). In some cases, hookah pipe users supplement hookah tobacco with cannabis and some add alcohol in place of the water (Tucker et al., 2019). Sixty percent of youth between the ages of 14–20 years old smoke the hookah pipe, with 33% smoking daily because they perceive that hookah pipe

smoking is safer than smoking cigarettes (Combrink et al, 2010). Hookah pipe use is becoming increasingly prevalent amongst adolescents living in the Western Cape province of South Africa (Peltzer & Phaswana-Mafuya, 2018).

Smoking the hookah pipe is a health hazard because it exposes adolescents to toxic content such as tar, heavy metals, nicotine, and carbon monoxide (Ali & Jawad, 2017). Exposure to tobacco in the hookah pipe negatively affects adolescents' cognitive functions, such as working memory, attention, and prefrontal cortex activation (England et al., 2015). Smoking the hookah pipe increases the risk for cardiac, respiratory, and oesophageal and oral infections, diseases, and cancers (El-Zaatari et al., 2015). Addiction to hookah pipe smoking is also a possibility (Soulakova et al., 2018). Nevertheless, despite the harmful effects of hookah pipe smoking, it is still commonly used by adolescents. For this reason, it is important to assess their perception of harm. While there is a growing body of international research focusing on hookah pipe use, research in the South African context is limited (Jawad et al., 2018). While the former provides valuable insights, research focusing on the South African context is of paramount importance for developing contextualised, practical, and relevant solutions to reduce the phenomenon of hookah pipe use (Nilsen & Bernhardsson, 2019). A reduction of hookah pipe use could lead to improved physical and mental health, minimise the burden of substance use, and promote healthier lifestyles. While this study was particularly interested in identifying adolescent hookah pipe users' (currently smoke) and non-users' (have never smoked or stopped smoking for more than six months) perception of harm, it was original in that it also wanted to determine what motivates adolescents to either smoke or not smoke the hookah pipe. Determining what adolescent users and non-users know about the harms of hookah pipe use puts a steppingstone in place for what health information needs to reach them. Furthermore, ascertaining what motivates them provides insight into why they smoke or do not smoke. These factors need to be considered when planning interventions.

Self-determination theory (SDT), a theory of motivation, posits that individuals

experience three distinct types of motivation to varying degrees. At the one end of the continuum is *intrinsic motivation*, *extrinsic motivation* is in the middle, and *amotivation* is at the other end. Intrinsic motivation occurs when adolescents participate in activities for the inherent enjoyment of the activity itself, extrinsic motivation occurs when behaviours are enacted for an instrumental reason, such as peer approval, and amotivation occurs when there is absence of any desire to act (Deci & Ryan, 2000). SDT further posits that adolescents are motivated to pursue behaviours that satisfy their basic psychological needs (BPN) (Howard et al., 2016). The needs are *autonomy* (sense of free will), *competence* (sense of mastery), and *relatedness* (experiencing a sense of care and connection with others). The satisfaction of these needs is essential for humans to thrive. Conversely, when these needs are frustrated, adolescents may engage in maladaptive behaviours (Chen et al., 2015). No known studies have looked at hookah pipe use from an SDT perspective. Therefore, this study was particularly interested in (1) determining if there are any differences between users' and non-users' satisfaction or frustration of BPN, and (2) identifying the type of motivation that drives adolescents to either smoke or not smoke the hookah pipe. This perspective was deemed interesting because it could account for the internal factors or feelings that influence hookah pipe use or non-use.

This study aimed to answer the research question: 'How do adolescent hookah pipe users and non-users differ in terms of harm perception, motivation, and BPN?' The answer to this question was considered important because it could provide new insights and recommendations when intervening to reduce hookah pipe use.

6.4 Research Methods and Design

6.4.1 Study Design and Setting

The study aimed to collect data on adolescent self-reported hookah pipe use, harm perception, BPN, and motivation for hookah pipe use or non-use. Adolescents were

considered hookah pipe users if they smoked the hookah pipe at the time of the data collection (i.e., within six months was regarded as current use). Adolescents were considered hookah pipe non-users if they had never smoked the hookah pipe or if they had stopped smoking more than six months prior to the data collection. This study employed a quantitative methodology using a cross-sectional study design. All reporting was in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) checklist (Von Elm, 2007).

6.4.2 Setting

Data was collected from adolescents who attended public schools in the Western Cape Province of South Africa during the period August 2017 - September 2017. In South Africa, schools are either referred to as public (government funded) or private (privately funded) schools. South Africa has a rich history and apartheid has been highlighted as the greatest struggle of the country. As a result, there are huge disparities between the privileged and the disadvantaged (Clark, 2000). Communities in the Cape are distinguished as high, middle, or low socio-economic status communities. High income communities are characterised by space, wealth, and access to excellent resources. Low socio-economic communities, on the other hand, are characterised by high levels of poverty, densely populated areas, access to overburdened health care facilities, poor service delivery, violence, gangsterism, and substance abuse. Middle income communities are considered in the middle of high and low socio-economic communities (Walker, 2009). This study targeted schools from low- and middle-income communities in rural and urban settings.

6.4.3 Study Population and Sampling Strategy

Twenty schools across the Western Cape Province were approached based on their geographic location; twelve schools in total agreed to participate in the study. One class per grade was randomly identified to participate in the study. Each grade has approximately 3-5

classes therefore classes could be selected at random. Each class had an average size of 30–35 learners. Data was obtained from adolescents in Grades 5–12 attending public primary and high schools. In an attempt to reduce bias, schools from rural and urban settings were selected as well as fee paying and non-fee paying schools. Any adolescent attending these schools in the selected class was offered an opportunity to participate in this study, irrespective of age, gender, language, culture, socio-economic status, smoking status, or religion. Adolescents who returned their parental consent forms were included in the study. A total of 1,201 participants participated in this study.

6.4.4 Data Collection Tools

The data was collected with a battery of instruments in the form of a self-administered questionnaire. The questionnaire was translated from English into Afrikaans and isiXhosa as these are the three official languages of the Western Cape. The Afrikaans and isiXhosa versions were then back translated to English by professional individuals fully proficient in both languages. The questionnaire focused on demographics, prevalence of hookah pipe use, knowledge and risk perceptions of hookah pipe use, motivation for use and non-use, and BPN. The following measures were used to form the final data collection tool. The entire data set supporting the results of this study has been deposited in a recognised repository (OSF) and is openly accessible via the following link: <https://osf.io/m472p/quickfiles>

Demographic measure: A demographics and prevalence questionnaire was developed for this study. Two response styles were used in this study: (1) marking the correct answer (“What language do you speak at home?” Participants could select the most applicable answer by marking “English, Afrikaans, IsiXhosa, or Other”); or (2) completing the answer in the blank space (Which school do you attend?).

Health Behaviour Survey: The survey was developed at the University of Missouri – Columbia. This survey focuses on the wellness of the individual with reference to knowledge,

perceptions, attitudes, and behaviours toward all aspects of their health and risk-taking behaviours, which include substances. The survey was adapted for hookah pipe use in the South African context. It measured prevalence of hookah pipe use, and knowledge and risk perceptions of hookah pipe use. Participants had to circle the answer that reflected their experience.

Intrinsic Motivation Inventory: The Intrinsic Motivation Inventory (IMI) is a multidimensional measurement device intended to assess participants' subjective experience related to an activity. The measure has seven subscales, but this study only made use of the three subscales that were relevant for this study – *interest/enjoyment, felt pressure and tension, and perceived choice*. These subscales were used to determine motivation for hookah pipe use only. Participants responded using a Likert scale with responses ranging from 1 (Not True At All) to 5 (Very True). The IMI consists of varied numbers of items from these subscales, all of which have been shown to be factor analytically coherent and stable across a variety of tasks, conditions, and settings. The general criteria for inclusion of items on subscales have been a factor loading of at least 0.6 on the appropriate subscale, and no cross loadings above 0.4. The items are quite face-valid. However, due to its straightforward nature, caution is needed in interpretation. The incremental R for every item above 4 for any given factor is quite small. Still, it is very important to recognise that multiple item subscales consistently outperform single items for obvious reasons, and they have better external validity (McAuley et al., 1987).

Treatment Self-Regulation Questionnaire (Smoking): The Treatment Self-Regulation Questionnaire (TSRQ) is a set of questionnaires concerning why people engage in specific behaviours, in this case, why people do not use the hookah pipe. The purpose of the questionnaires is to determine the degree to which a person's motivation for a particular behaviour is relatively autonomous or controlled by extrinsic factors. There are three subscales to the scale: the autonomous regulatory style; the controlled regulatory style; and

amotivation. This scale (smoking) has 15 items: 6 that assess autonomous motivation, 6 that assess controlled motivation, and 3 that assess amotivation (Ryan et al., 1990). Participants responded using a Likert scale with responses ranging from 1 (Not True At All) to 5 (Very True). The TSRQ is widely used in the study of behaviour change in health care settings and it has been used in several studies (Williams, Freedman & Deci., 1998; Williams, Rodin et al., 1998; Williams et al., 1999). A validation article of the TSRQ was published by Levesque and colleagues (2007).

Balanced Measure of Psychology Needs Scale: The Balanced Measure of Psychology Needs Scale (BMPN) is used to assess people's sense of autonomy, competence, and relatedness (Sheldon & Hilpert, 2012). BMPN can be either used to assess need fulfilment of the three needs or used to assess need satisfaction and need frustration separately for the three needs by three items each. This is an 18-item measure; the scale consists of 6 items per need. Within each scale, three items measure negative effect and three items measure positive effect. Participants were asked to rate how they had felt in the last week, using 1 = Not True at All to 4 = Very True scale. BMPN reliably measures need fulfilment for the three needs – autonomy, competence, and relatedness – at both the between- and within-level of analysis (Neubauer & Voss, 2016).

6.4.5 Data Collection Procedure

Once permission was obtained from the principals to conduct the study at their school, adolescents received consent letters and an information letter about the study for their parents/guardians to sign. They had one week to return these letters whereby the parents/guardians either provided permission to participate or removed their child from the study. On the study date, adolescents signed an informed assent document prior to the survey administration. Each participant completed a 45-minute pen and paper self-report questionnaire in their preferred language. Data was collected in a classroom setting. The

questionnaire was explained to the adolescents and questions could be asked for clarity at any time. Two facilitators were present during the data collection process. One facilitator explained the questionnaire, whilst the other facilitator walked around the room to see if any of the participants needed assistance.

6.4.6 Data Analyses

Data was captured into MS Excel. All data was cleaned, coded, and checked for errors. Through this process, missing data was removed. The nature of the study required the researcher to use descriptive data analysis such as percentages, means and standard deviations, and inferential data analysis, such as an independent t-test to compare users' and non-users' motivation and BPN. Data was analysed using the V23 Statistical Package for Social Science software.

6.4.7 Ethics

This study was approved by the Western Cape Education Department and the University of the Western Cape. Ethical clearance to conduct this study was granted by the Senate Research Committee at the University of the Western Cape (Project number HS17/4/5). No financial or other incentives were offered to the schools, participants, or their families in this research. All the necessary ethical steps were followed to ensure confidentiality, informed consent, and anonymity prior, during and after the study.

6.5 Results

6.5.1 Sample Characteristics

Table 6.1: Demographics

Demographics				
		Total Sample% (n=1201)	Hookah Pipe Users% (n=256)	Hookah Pipe Non-Users% (n=909)
Gender	Male	33.3	42.4	40.9
	Female	66.7	57.6	59.1
Ethnicity	White	1.3	1.7	3.0
	Coloured	57.5	84.7	77.4
	Black African	37.5	12.8	18.6
	Indian	0	0.4	0
	Other	3.8	0.4	1.0
Language	English	25.6	34.4	22.4
	Afrikaans	39.5	54.4	60.7
	IsiXhosa	30.2	10.4	16.2
	Other	4.7	0.8	0.7
Who do you live with	Both Parents	47.1	49.6	50.1
	Mother Only	37.9	29.8	29.9
	Father Only	3.4	4.1	3.2
	Sisters and Brothers Only	2.3	2.5	2.7
	Other family Members	9.2	14.0	14.0
Are your parents	Married	42.4	45.5	46.3
	Divorced	10.6	10.2	7.6
	Separated	17.6	15.7	17.1
	Living together	7.1	6.8	7.0
	Single Never Married	12.9	14.5	13.3
	Single because one parent died	9.4	7.2	8.7

Table 6.1 depicts the sample characteristics and shows that majority of users were female (57.6%), Coloured (84.7%), Afrikaans speaking (54.4%) adolescents living with both their parents (49.6%) who were married (45.5%). Non-users were also predominantly female (59.1%), Coloured (77.4%), Afrikaans speaking (60.7%) adolescents living with both their parents (50.1%) who were married (46.3%). Furthermore, the age of adolescents that participated in this study ranged from age 13–19. Their education level ranged from Grade 5–12. The age of onset for cigarette smoking ranged from age 1–19 with a mean age of 13.57.

Age of onset for hookah smoking also ranged from 1–19, but the mean age was 13.25. This indicates that the mean age for onset of hookah smoking is slightly younger than onset for cigarette smoking.

Table 6.2: Smoking Characteristics: Comparing Hookah Pipe Users and Non-Users

Smoking Characteristics				
		Total Sample % (n=1201)	Hookah Pipe Users% (n=256)	Hookah Pipe Non-Users% (n=909)
Do you smoke cigarettes?	Yes	16.5	39.9	26.8
	No	83.5	60.1	73.2
Have you ever smoked the hookah pipe?	Yes	39.1	100	57.7
	No	60.9	2.0	42.3
Have you smoked hookah pipe in the past month?	Yes	33.3	78.5	11.5
	No	66.7	21.5	88.5
Have you smoked hookah pipe in the past week?	Yes	25.0	55.6	3.5
	No	75.0	44.4	96.5
Have you ever smoked a hookah pipe mixed with cannabis?	Yes	26.7	69.3	33.8
	No	73.3	30.7	66.2
Have you ever smoked a hookah pipe with alcohol inside?	Yes	22.2	23.0	9.1
	No	77.8	77.0	90.9

6.5.2 Smoking Characteristics: Comparing Users and Non-Users

Table 6.2 compares the smoking characteristics of users and non-users. More users smoke cigarettes (39.9%) compared to hookah pipe non-users (26.8%). One hundred percent of users report ever use of hookah pipe and 57.7% of non-users report ever use of the hookah pipe. Users (78.5%) reported smoking in the past month and the last week (55.6%). Users (69.3%) and non-users (33.8%) reported smoking a hookah pipe with cannabis mixed in the tobacco. Twenty-three percent of adolescent users smoked the hookah pipe with alcohol inside and 9.1% of non-users smoked the hookah pipe with alcohol inside. Smoking hookah pipe with cannabis and/or alcohol was more common amongst users.

Table 6.3: Prevalence: Hookah Pipe Users' Data

Smoking Characteristics		Hookah Pipe Users % (n=256)
How often do you smoke?	1–2 times a day	65.3
	3–5 times a day	15.8
	More than 5 times a day	18.9
	1–2 times a week	71.2
	3–4 times a week	28.8
	Once every 3 months	77.3
	Once every 6 months	15.9
	Once a year	6.8
	Only tried once	30.0
	Only tried twice	35.0
	Tried three or more times	35.0
Where do you smoke the hookah pipe? (Please tick <u>ONE</u> box that is most true for you)	Public Spaces	12.9
	Family House	12.5
	Friend House	50.8
	Park	2.1
	Restaurant	0.8
	At home	12.1
	Party	5.8
	Other	2.9
Will you ever stop smoking the hookah pipe?	Yes	73.7
	No	26.3
If yes, at what age will you stop	10–19	44.8
	20–29	38.3
	30–39	9.0
	40–49	2.5
	50–59	5.5

6.5.3 Prevalence: Hookah Pipe Users' Data

Table 6.3 describes the smoking characteristics of the users. They mostly smoked once every three months (77.3%). Smoking 1–2 times per week was also very common (71.2%). Many users smoked 1–2 times per day (65.3%) and some users (18.9%) smoked more than 5 times per day. Smoking once a year was least common amongst users (6.8%). Adolescents also reported experimenting once (30%) or twice (35%). Smoking at a friend's house (50.8%) was the most common place and smoking at a restaurant (0.8%) was the least common place to smoke. Majority of users (73.7%) reported that they will stop smoking the hookah pipe at some point, whilst 26.3% of adolescent users indicated that they will never stop smoking.

Table 6.4: Knowledge About the Hookah Pipe

KNOWLEDGE AND PERCEPTION OF HOOKAH PIPE USE				
		Total Sample % (n=1201)	Hookah Pipe Users% (n=256)	Hookah Pipe Non-Users% (n=909)
Have you heard about the hookah pipe?	True	89.9	95.5	89.2
	False	6.3	2.5	5.2
	Don't Know	3.8	2.1	5.6
The hookah pipe is a problem.	True	61.7	65.2	76.6
	False	9.9	18.9	7.8
	Don't Know	28.4	16.0	15.6
The hookah pipe is harmful.	True	63.6	77.0	79.0
	False	5.2	13.9	6.8
	Don't Know	31.2	9.1	14.3
The water in the hookah pipe filters out the tobacco toxins.	True	41.6	47.3	48.0
	False	10.4	16.3	12.3
	Don't Know	48.1	36.4	39.7
Children can smoke the hookah pipe.	True	29.9	44.7	36.0
	False	39.0	43.4	46.0
	Don't Know	31.2	11.9	18.1
You can get cancer from the smoking the hookah pipe.	True	48.1	64.2	64.1
	False	1.3	10.7	8.1
	Don't Know	43.3	25.1	27.8
Children (aged 10–12) can smoke the hookah pipe	True	23.4	40.2	27.3
	False	37.7	38.9	49.8
	Don't Know	39.0	20.9	22.9
Children (aged 13–19) can smoke the hookah pipe	True	57.5	82.4	56.3
	False	12.5	7.4	21.9
	Don't Know	30.0	10.2	21.9
Smoking the hookah pipe will lead to becoming an addict.	True	61.7	58.1	61.7
	False	14.8	29.0	16.6
	Don't Know	23.5	12.9	21.7
Smoking the hookah pipe is a safer alternative to smoking cigarettes.	True	13.8	33.8	20.8
	False	37.5	47.7	49.5
	Don't Know	48.8	18.6	29.7
Smoking the hookah pipe helps people relax.	True	27.2	51.0	26.2
	False	23.5	28.6	38.6
	Don't Know	49.4	20.3	35.2
The dangers of smoking the hookah pipe are exaggerated.	True	38.0	44.3	40.7
	False	19.0	20.3	18.2
	Don't Know	43.0	35.4	41.1
Sharing the hookah pipe is harmful to one's health.	True	45.0	63.9	62.1
	False	13.8	17.0	12.2
	Don't Know	41.3	19.1	25.7
Hookah pipe smokers can easily quit.	True	31.2	49.6	31.9
	False	22.1	33.1	37.8
	Don't Know	46.8	17.4	30.3

6.5.4 Adolescent Hookah Pipe Users' and Non-Users' Knowledge and Harm Perception

Table 6.4 identifies users' and non-users' knowledge and harm perception of hookah pipe use. More users (95.5%) have heard about the hookah pipe compared to non-users (89.2%). More non-users believed that smoking the hookah pipe is a problem (76.6%) and it is harmful (79.0%) compared to users (65.2%; 77%). Users (47.3%) and non-users (48.2%) had a relatively similar view that the water in the hookah pipe filtered out the tobacco toxins. Although 36.4% of users and 39.7% of non-users were not aware if the water in the hookah pipe filtered out the tobacco toxins or not. In terms of children smoking the hookah pipe, some users (44.7%) agreed that children could smoke the hookah pipe and others disagreed (43.4%). However, more non-users (46.0%) believed that children should not smoke the hookah pipe. Users (64.2%) and non-users (64.1%) believed that one could get cancer from smoking the hookah pipe. A greater portion of non-users (49.8%) believed that children aged 10–12 should not smoke the hookah pipe whereas a greater portion of users (40.2%) believed that children aged 10–12 could smoke the hookah pipe. Users (82.4%) and non-users (56.3%) believed that children (aged 13–19) could smoke the hookah pipe. Users (58.1%) and non-users (61.7%) believed that smoking the hookah pipe would lead to becoming an addict. Although more non-users shared this view compared to users. Twenty-nine percent of users and 16.6% of non-users believed that smoking the hookah pipe would not lead to becoming an addict. Majority of users (47.7%) and non-users (49.5%) did not believe that smoking the hookah pipe was a safer alternative to smoking cigarettes. Most of the users (51.0%) believed that smoking the hookah pipe helped people relax. Non-users either did not believe (26.2%) that smoking the hookah pipe helped one relax or they were unsure (35.2%). Users (44.3%) and non-users (40.7%) believed that the dangers of smoking the hookah pipe were exaggerated. Users (63.9%) and non-users (62.1%) agreed that sharing the hookah pipe was

harmful to one's health. Some users believed that they could quit easily (49.6%), whilst others did not agree (33.1%). Non-users believed that users could not quit easily (37.8%), whereas other non-users believed that users could quit easily (31.9%).

Table 6.5: Basic Psychological Needs

		N	Mean	Std Deviation	Std Mean Error	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
Relatedness	Users	202	3.16	0.74	0.05	-1.49	0.14	0.12 Trivial Effect
	Non-Users	654	3.25	0.72	0.03			
Competence	Users	209	3.26	0.72	0.05	-0.31	0.76	0.02 Trivial Effect
	Non-Users	675	3.29	0.74	0.03			
Autonomy	Users	200	3.18	0.71	0.05	-1.01	0.31	0.08 Trivial Effect
	Non-Users	648	3.24	0.76	0.03			
Need Frustration	Users	189	2.71	0.81	0.06	-1.58	0.12	0.13 Trivial Effect
	Non-Users	601	2.81	0.79	0.03			
Need Satisfaction	Users	196	3.69	0.68	0.05	0.09	0.93	0.01 Trivial Effect
	Non-Users	637	3.68	0.76	0.03			

6.5.5 Basic Psychological Needs

Table 6.5 shows the comparison of users and non-users in terms of their BPN.

Participants were asked to indicate to what extent they agreed or disagreed to statements about their sense of autonomy, competence, and relatedness. The users' and non-users' responses were compared using the independent two sample t-test. There were no significant differences between users and non-users in terms of their sense of relatedness, competence, autonomy, need frustration, and need satisfaction, and effect sizes were trivial. The mean scores indicated that users experience more need satisfaction compared to need frustration. These results indicated that smoking or not smoking the hookah pipe was not indicative of whether adolescents' BPN were satisfied or frustrated since there was no difference between users and non-users.

Table 6.6: Motivation for Hookah Pie Use/Non-Use

Measure	N	Mean	Std. Deviation
Users			
Interest/Enjoyment	527	2.77	0.81
Pressure/Tension	537	2.30	0.76
Perceived Choice	520	3.70	0.51
Non- Users			
Autonomous Motivation	596	3.92	0.98
External Control Motivation	568	3.31	1.05
Amotivation	580	3.36	1.08

6.5.6 Motivation for Hookah Pipe Use/Non-Use

Table 6.6 provides insights into what motivates adolescents to smoke the hookah pipe or not. Within the questionnaire, users had to complete Section D which focused on interest/enjoyment, pressure/tension, and perceived choice, and non-users had to complete Section E which focused on autonomous motivation, external control motivation, and amotivation applied. Users were motivated to use the hookah pipe as a result of perceived choice and least motivated as a result of pressure or tension. Non-users, on the other hand, did not smoke the hookah pipe as a result of autonomous motivation and least motivated not to smoke as a result of external control motivation. Participants indicated in their questionnaire responses that they wanted to take responsibility for their health and that smoking was not aligned to their life goals; therefore, they were motivated not to smoke. Basically, users and non-users reported that they were intrinsically motivated to either smoke or not smoke, and they were least impacted by extrinsic motivation to smoke or not smoke.

The study aimed to address the research question, ‘How do adolescent hookah pipe users and non-users differ in terms of harm perception, motivation, and BPN?’ These results indicated that adolescent users and non-users had similar ideas about the harms of hookah pipe use. Although non-users appeared to be more aware of the hazardous nature of hookah

pipe smoking compared to users. Also, users and non-users need more education about the harms associated with hookah pipe use based on their responses, in particular “I don’t know” (see Table 6.4). Users were intrinsically motivated to smoke and non-users were intrinsically motivated not to smoke. This means that there was no difference in terms of the type of motivation but that their reasoning for use and non-use differed. Users responded that they were motivated to smoke as a result of perceived choice which means that they smoked because they wanted to and felt that it was their own choice to smoke. Non-users indicated that they were motivated not to smoke because they wanted to remain healthy and hookah pipe smoking did not align with their life goals.

6.6 Discussion

This study aimed to compare adolescent hookah pipe users and non-users in terms of harm perception, BPN, and motivation to smoke or not. This study revealed no marked difference between users and non-users since users and non-users were intrinsically motivated to either smoke or not, there were no significant differences in the satisfaction or frustration of their BPN, and they had similar views about harms. Although non-users in some instances reported a greater perception of harm compared to non-users.

Despite being aware of some harms of hookah pipe smoking, adolescents may still be lured towards smoking as a result of lack of knowledge, failure to be cognisant of the knowledge, misconceptions, and ease of accessibility (Kotecha et al., 2016). This could also be why users and non-users believed that the dangers of smoking the hookah pipe were exaggerated. Furthermore, Creamer et al., (2016) found that users’ harm perception of hookah pipe smoking was lower than non-users. This study had a similar finding whereby users viewed hookah smoking as less problematic compared to non-users. Users in this study indicated that smoking the hookah pipe helped them relax, and they believed that they could quit smoking easily. Barnett and Livingston (2017) had a similar finding where their participants had positive hookah cognitions about their current hookah use. However, Siddiqi

(2018) argues that hookah addiction may be stronger than cigarette addiction, so quitting is not as easy as adolescents perceive. Even with infrequent use, users experience craving, withdrawal symptoms, and failed quit attempts due to the chemical properties of the smoke, volume of smoke inhaled, and type of tobacco (Blachman-Braun et al., 2014). Also, some people add other addictive substances in the hookah pipe, such as alcohol and cannabis, which makes it harder to quit (Blachman-Braun et al., 2014). This finding is consistent with this study where some adolescents reported adding cannabis and alcohol to their hookah pipes. Evidently, there is a need for adolescents to receive health education about hookah pipe smoking, addiction, the potential for it to be a gateway substance, addressing misconceptions, and effective ways to relax. By creating awareness and educating adolescents, they will be able to make more informed decisions about whether to smoke the hookah pipe or not.

From a SDT perspective, usually individuals whose BPN are satisfied are more likely to act in beneficial and self-determined ways, whereas those whose basic needs are frustrated may seek to compensate for their lack of fulfilment by engaging in externally motivated and detrimental behaviour (Ryan & Deci, 2000). However, this study found that there were no differences between users' and non-users' BPN (autonomy, competence, and relatedness), needs frustration, or needs satisfaction. This finding was inconsistent with previous studies which found that people with high BPN satisfaction were unlikely to smoke tobacco. However, they also found that satisfaction of BPN did not predict general negative health behaviours (Williams et al., 2006; Visser & Hirsch., 2014). Individuals who reported fulfilment of their psychological needs were more likely to pursue constructive behaviours, but they were not less likely to engage in negative health behaviours (Visser & Hirsch., 2014). This could explain why there were no differences between users and non-users BPN.

BPN are non-independent, meaning they co-occur as motivators. In terms of motivation, users revealed that they were intrinsically motivated and non-users were also intrinsically motivated not to smoke. SDT posits that intrinsic motivation stems from

individual fulfilment of BPN. Non-users indicated that they were intrinsically motivated not to smoke, mainly as a result of staying healthy and attaining life goals. This is good because it indicates that they were not being pressured not to smoke and it was their choice. SDT asserts that when people are autonomous in their decision making, they are more committed to the choices that they make (Deci & Ryan, 2000).

Pashaeypoor et al., (2019) studied the determinants of hookah pipe use and found that users smoke because of feelings of joy and comfort (Pashaeypoor et al., 2019). These positive experiences coupled with users' sense of perceived choice could explain why adolescents were intrinsically motivated to smoke. However, this is a problem because adolescents should not be deriving positive experiences from harmful behaviour. Also, when adolescents are intrinsically motivated to pursue a behaviour, they are more likely to engage in this behaviour more frequently and over a longer term compared to adolescents who are extrinsically motivated or amotivated to pursue the behaviour (Deci & Ryan, 2000). Therefore, there is a need to undo this intrinsic motivation to smoke by creating opportunities for adolescents to have these positive experiences without the use of the hookah pipe. Adolescents would then also need to be intrinsically motivated not to smoke. Intrinsic motivation is influenced by internal drives that inspire people's behaviour, interests, core values, and sense of morality (Deci & Ryan, 2000). SDT argues that motivation exists on a continuum and can change over time (Deci & Ryan, 2008). This means that users' intrinsic motivation to smoke the hookah can be changed and their intrinsic motivation to stop smoking can be inspired. Motivation is impacted by one's environment, goals, desires, and needs. Therefore, practitioners focused on reducing hookah pipe use must consider psychological factors, such as motivation that influences health behaviour.

This study revealed no noteworthy differences between adolescent users and non-users in terms of their harm perception, BPN, or motivation for use or non-use. However, important

conclusions can be drawn to guide interventions, such as the need to provide adolescents with health education and foster users' intrinsic motivation to elicit behaviour change.

6.7 Limitations

This study encountered three limitations. Firstly, the study was only conducted in one province, therefore, the results cannot be generalised for the whole country. Secondly, the questionnaire had clearly marked sections for “users” and “non-users”, and the facilitators explained which sections had to be completed for users (currently smoke at the time of data collection) and non-users (currently smoke) and non-users' (have never smoked or stopped smoking for more than six months), but some adolescents still completed both sections. Both sections were placed in the same questionnaire because it was not known who were users and non-users. Asking adolescents to indicate beforehand by either raising their hand or asking as they entered the venue could have made them uncomfortable and be regarded as unethical, so this could not have been avoided. Thirdly, some adolescents indicated that they smoke the hookah pipe but completed the motivation section for non-users, and vice versa. This could be because user's realised that they did not want to be perceived as a user and adolescents indicating that they do not smoke hookah do in fact smoke, therefore, they completed the user section for the motivation. Fortunately, this was only a small minority. While the study had its limitations, the insights acquired in this study can be used to guide health interventions aimed at reducing hookah pipe use.

6.8 Recommendations for Practice

Since some adolescents are under the impression that the dangers are exaggerated. It is therefore important to rectify this misconception to help adolescents become more aware of the dangers. Education focusing on how smoking can affect adolescents in the short term and the long term should be prioritised. This includes, but is not limited to, health consequences only. Misconceptions should be clarified so that adolescents can make informed decisions and not rely on their peers for information. Education should also be provided about the

influencing roles of cigarettes, cannabis, and alcohol, and how the hookah pipe can be a gateway substance. Lastly, the reality of hookah pipe addiction needs to be emphasised. Since the intervention will be with adolescents, it is important that it is age appropriate and appealing. Health information can be presented by a range of health professionals, depending on their area of expertise. Activities such as drama, art, role plays, debates, games, and group discussions may be useful for providing information and eliciting behaviour change.

To foster adolescents' intrinsic motivation to stop smoking, interventions should focus on exploring goals, decisions, consequences, reasons to use and stop using, and imagining a life without the hookah pipe so that these ideas can be internalised. Interventions that focus on changing attitudes, interests, values, and accomplishing goals allow for individuals to experience an inherent desire to engage in a behaviour (or in this case, not engage in a behaviour) because it elicits the internal drives that inspire people's behaviour. Interventions also need to provide opportunities where BPN can be satisfied and adolescents can enjoy themselves. This can be achieved through sport clubs, art and craft clubs, and other recreation activities that allow adolescents to make choices and experience joy and comfort. In this way, they can still have the positive experiences they had when they smoked, but they will no longer need to smoke to have these experiences. These activities can also help adolescents relax, so they do not need to smoke to relax. It is important that interventions are not driven by external rewards, such as incentives for not smoking, because while these interventions may be successful in the short term, when the intervention or the incentives stop, the "changed behaviour" may discontinue. Interventions providing external rewards may yield quicker results but since the behaviour will most likely not be maintained, it would be more expensive.

6.9 Recommendations for Future Research

A longitudinal study from childhood to adulthood would be interesting because this study revealed that hookah pipe use initiation begins at a very young age and adolescents

indicated that they would potentially stop using later in their lives. A study focusing on what health information adolescents would find valuable and how they would like the information to be presented would be beneficial to guide future interventions. Understanding adolescents' BPN and motivation from a qualitative perspective would be interesting, especially if it can be related to hookah pipe use, as it can provide a deeper understanding.

6.10 Conclusion

Hookah pipe users and non-users had similar ideas about the harms of hookah pipe smoking. Providing health education to users and non-users to increase their knowledge about the harms of hookah pipe smoking would be beneficial. This study revealed that there were no differences between users' and non-users' BPN. Users and non-users experienced more need satisfaction compared to needs frustration. Lastly, users' decision to smoke and non-users' decision not to smoke were both intrinsically motivated. Intervention should therefore focus on making users intrinsically motivated not to smoke. Opportunities should be created where the positive experiences users had when smoking can be achieved through alternative activities and experiences that they would enjoy in an attempt to deter them from smoking the hookah pipe.

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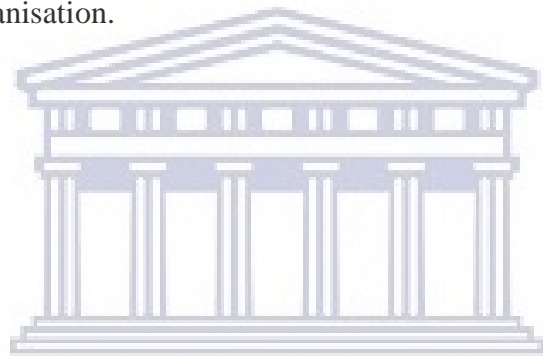
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CHAPTER 7

EXPLORING THE ROLE OF BPN AND MOTIVATION IN ADOLESCENT HOOKAH PIPE USE OR NON-USE

7.1 Introduction

The previous chapter compared hookah pipe users' perception of harm, motivation, and BPN. This chapter builds sequentially on the previous chapter as it strives to explore the role of BPN and motivation in adolescents' decision to either smoke or not smoke the hookah pipe. This chapter addresses Objective 4, which was to compare the motivation and BPN of adolescent hookah pipe users and non-users to understand why adolescents smoke or do not smoke the hookah pipe. This chapter has been submitted to the Journal of Humanistic Psychology. It is still under review.

Adolescent Hookah Pipe Use: A Qualitative Study on the Role of BPN and Motivation

7.2 Abstract

Background: Adolescent hookah pipe use is on the rise despite it being a public health concern. Several studies focus on the external determinants of adolescent hookah pipe use but research focusing on the internal factors motivating adolescents to smoke the hookah pipe is sparse. **Objective:** Drawing on self-determination theory, a contemporary theory of human motivation, this study aimed to explore the BPN and motivation of adolescent hookah pipe users and non-users in an attempt to explore whether satisfaction or frustration of needs contributes to hookah pipe use. **Method:** Thirty adolescents, aged 13–19 years, participated in the qualitative study using one-on-one semi-structured interviews. Each interview was audio-recorded, transcribed, and thematically analysed. **Results:** This study revealed that satisfaction or frustration of BPN, particularly competence and relatedness influences adolescents' decision to smoke or not smoke the hookah pipe. Hookah pipe users experience more needs frustration compared to hookah pipe non-users. Furthermore, hookah pipe users are

more extrinsically motivated to smoke whereas hookah pipe non-users are intrinsically motivated not to smoke. **Conclusions:** This study revealed important conclusions as the idea to focus on the internal factors associated with adolescent hookah pipe use is a relatively new perspective. Interventions should consider motivation and encourage satisfaction of BPN when intervening in adolescent hookah pipe use.

Keywords: Hookah pipe; health risk; adolescents; self-determination theory; BPN; motivation

7.3 Introduction

Hookah pipe use has become a major public health concern over the past two decades (Kader et al., 2019). The hookah pipe is a vessel used to smoke flavoured tobacco (Moreno, 2015). The emerging trend of hookah pipe use has become increasingly popular over the last few years, amongst adolescents (Marshall et al., 2016; Petersen, 2018), with the global prevalence rates varying from 6%–34% in the Middle East to 5%–17% in the USA and 39.6% in the UK (Maziak et al., 2015; World Health Organization, 2015; Jawad & Power, 2016). A study in a poor urban community in Johannesburg, South Africa, found that 20% of high-school students reported daily use, and 60% of the population reported having used it (Combrink et al., 2010).

Adolescents view hookah pipe smoking as a social behaviour that is fun, relaxing, socially acceptable, and harmless (Eshah & Froelicher, 2017). However, the hookah pipe contains condensed carbon monoxide, tar, nicotine, and other heavy materials that may pose health risks such as cancers, respiratory and cardiac problems, mouth ulcers, and periodontal diseases (Bashirian et al., 2019). The health hazards of hookah pipe smoking are even higher than other forms of tobacco consumption because of the method of smoking (sharing mouthpieces, exposure to carbon monoxide, and longer periods of smoking) (Daniels, 2012). Due to the smoking methods, the hookah pipe is also a potential carrier and viral transmitter of COVID-19 because not only is the mouthpiece shared, but multiple users touch the hookah

pipe, which could potentially be infected, and people sit in close proximity to each other, which makes it easier for respiratory droplets to be transferred.

The rise of hookah pipe use can be partly attributed to the lack of recreational activities in communities, peer pressure, addiction, a sense of relaxation, and the perception that hookah pipe smoking is less harmful than cigarette smoking (Combrink et al., 2010; Daniels, 2012; Peer, 2018). There is less insight, however, into the role of motivation guiding this behaviour. Exploring the health risks of hookah pipe use from a psychological perspective is valuable because it allows for an understanding of why adolescents smoke the hookah pipe. When an understanding is developed, it forms a basis for intervention (Bartholomew-Eldredge et al., 2016). According to self-determination theory (SDT) (Deci & Ryan, 2000), there is a motivational continuum ranging from being *intrinsically motivated* (engaging in activities because of the inherent interest and enjoyment of the activity) to *extrinsically motivated* (influenced by external *rewards* and punishments) and, ultimately, being *amotivated* (Ryan et al., 2006). Satisfaction and frustration of basic psychological needs (BPN) results in an individual being more or less intrinsically motivated. The three BPN proposed by SDT are (a) *autonomy* – behaving with a sense of volition, (b) *competence* – a sense of mastery, and (c) *relatedness* – a sense of feeling connected to others (Deci & Ryan, 2000). These might also be relevant for hookah pipe use. For example, when adolescents are autonomous and they take a stand about their choice to smoke the hookah, they are less likely to be influenced by others (Ramji et al., 2019). However, when adolescents do not receive adequate support, they may lack the motivation to stop (Ramji et al., 2019). In general, when these psychological needs are frustrated, negative psychological consequences such as maladjustment, aggression, or low confidence may occur (Kuzucu & Şimşek, 2013). People are also often motivated to pursue maladaptive behaviours, such as smoking, in efforts to satisfy their needs (Li et al., 2019).

In an attempt to understand hookah pipe use from a humanistic perspective, it is important to gain more insight into the contributory role of motivation and BPN, which is the focus of this study.

7.4 Materials and Methods

7.4.1 Study Design

Adolescents residing in the Western Cape, South Africa participated in a qualitative study using one-on-one semi-structured interviews. Interviews were conducted at the participants' school. This study formed part of a larger project which aimed to design an intervention to reduce adolescent hookah pipe use and satisfy BPN. All reporting in this study is in accordance with the COREQ (Consolidated criteria for Reporting Qualitative research) checklist (Tong et al., 2007). The data has been deposited in OSF and it can be accessed here:

<https://osf.io/m472p/quickfiles>

7.4.2 Sample Recruitment

Purposive sampling was employed in this study with 31 participants. Twelve schools participated in the larger project of which four schools were selected to participate in this study. The schools were selected based on setting (rural and urban), school fees (non-fee paying and fee paying), socio-economic status of the community (low and middle), and be available during the data collection period. In order to have a heterogeneous sample, users and non-users who were representative in terms of area, race, age, and gender were identified based on data from a previous quantitative study.

7.4.3 Data Collection

To ensure that the interview schedule was applicable and that the questions were understandable to the participants, two pilot interviews were conducted with Grade 7 learners aged 12 years old. These adolescents were not included in the main study.

In 2018, a brief questionnaire was used to determine participants' demographics. The development of the interview schedule was guided by SDT and the results of the quantitative study that was part of the project. Interviews were conducted in the participants' language of choice, either English or Afrikaans, and lasted between 45–60 minutes. Data collection continued until saturation occurred. All interviews were audio-recorded, and field notes were taken during the interviews. Data was transcribed verbatim. Afrikaans transcriptions were then translated into English by a person proficient in both languages. Accuracy of translations was confirmed by a native Afrikaans speaker who is proficient in both languages. The researchers and participants knew that the transcripts would not be returned to the participants as it would not be possible to access the participants again due to resource constraints. Therefore, thorough clarification of views and experiences occurred during the interview to ensure accuracy.

7.4.4 Data Analysis

SDT was used as a framework for data analysis. Data and field notes were analysed by two researchers. The analysis followed the six phases of thematic analysis outlined by Braun and Clarke (2006) – familiarisation with data, generating initial codes, searching for themes, reviewing themes, defining concepts, and report writing. Final codes and themes were generated from the data after consensus was reached between the three researchers.

7.4.5 Ethical Considerations

Permission to conduct the study was provided by the Western Cape Education Department and the Human Social Sciences Research Ethics Committee at the University of the Western Cape. The study's aim, objectives, and processes were explained to the participants and their parents in a way that they could understand by means of an information letter. Participation was voluntary and withdrawal was permitted at any time. Participant written assent (for participants younger than 18 years), their parents' consent, as well as

consent for participants older than 18 were provided. Participants were informed that the interviews would be audio-recorded. Each audio-recording and transcript received a number so that no names were used in the process. In cases where the questions evoked emotions that needed containment, a registered counsellor was available to offer support, containment, crisis intervention, or an appropriate referral.

7.4.6 Trustworthiness

Trustworthiness was achieved by ensuring that the study was credible, dependable, confirmable, and transferable. To ensure credibility, two researchers were involved in coding, analysing, and interpreting data in order to make decisions. For the findings to be dependable and confirmable, all research steps were transparent and copious records of the research process was kept throughout the study. Transferability was achieved by including thick quotations of participants (Lincoln & Guba, 1985; Korstjens & Moser, 2018).

7.4.7 Reflexivity

Introspective reflexivity was used in this study as it allowed the researchers to recognise the attitudes, experiences, and emotions that could have affected engagement with the participants and the data analysis. Moreover, the bracketing biases and attitudes of the researchers were used (Sorsa et al., 2015). This involved (1) *pre-action bracketing* – where attitudes, emotions, and ideas that were likely to influence the data were identified and dealt with; (2) *in-action bracketing* during the empirical work; and (3) *bracketing on action* – use of new insights in subsequent empirical work.

7.5 Results

7.5.1 Participants

Participants' ages ranged from 13–19 ($M=16$) and their school Grade ranged from 7–12 ($M=10$). The majority of the participants were male, English speaking, and of Coloured (mixed) race. Sixteen participants were non-users and fourteen participants were users.

Table 7.1 compares adolescents' views of their BPN and motivation. Six themes were generated: (1) autonomy, (2) competence, (3) relatedness, (4) intrinsic motivation, (5) extrinsic motivation, and (6) amotivation. Sub-themes were generated from the main themes (Table 7.1).

Table 7.1: Demographic Characteristics of Participants

Demographic Characteristic	N (%)
Gender	
Male	16 (53)
Female	14 (47)
Age Group	
13-14	3 (10)
15-16	20 (67)
17-19	7 (23)
Grade	
7-8	3 (10)
9-10	20 (67)
11-12	7 (23)
Language	
English	18 (60)
Afrikaans	8 (27)
IsiXhosa	4 (13)
Race	
Coloured (mixed race)	25 (83)
Black African	4 (14)
White	1 (3)
Hookah Pipe Use Status	
Users	14 (47)
Non-users	16 (53)

Table 7.2 compares adolescents' views of their BPN and motivation.

Table 7.2: Comparing Adolescents' Views of their BPN and Motivation

Theme	Subtheme	User quotes	Non-user quotes
BPN			
Autonomy	Choices and decision-making	<p>"I feel free, but I cannot make decisions, I must ask my best friend to make sure that I am on the right track" (P8, Age 16, Female, 256).</p> <p>"Parents want to control my life" (P27b, Age 17, Male, 217).</p> <p>"I can't do anything without my mother's permission. I need to let her know before I do it" (P19, Age 15, Male, 119).</p> <p>"Dad helps with decisions" (P20, Age 18, Female, 90).</p> <p>"I cannot really make my own decisions. If my parents are not around, I will make the decision, but I will tell them" (P29, Age 16, Male, 297).</p> <p>"I feel like I have 90% choice – I grew up making my own decisions but if I get stuck, I can ask for guidance" (P20, Age 15, Female, 190).</p> <p>"I make decisions all by myself because my parents do not work and I feel like I cannot communicate with them, so I ask my sister" (P30, Age 15, female, 33-339).</p>	<p>"Mom helps to make decisions" (P16, Age 16, Female, 92).</p> <p>"I discuss all my decisions with my parents" (P16, Age 16, Female, 151).</p> <p>"Parents and uncle help with decisions" (P13, Age 16, Female, 146).</p> <p>"My parents and grandma always tell me what to do" (P28, Age 16, Male, 300).</p> <p>"My grandpa helps with decisions. He is strong and has overcome a lot. He is my role model. I always go to him for guidance" (P22, Age 15, Male, 104-107).</p> <p>"When I need to make decisions, I pray" (P22, Age 15, Male, 284).</p> <p>"I feel free to make important decisions because my mother was never open with me but there are rules at home" (P3, Age 17, Female, 208).</p>
	Sense of freedom	<p>"Sometimes there are barriers or people that like block you from doing what you want to do like parents or whatever, but I feel like I am pretty free. I am free because my mom raised me in a way where I am allowed to make my own decisions" (P6, Age 18, Male, 186-192).</p> <p>"I am not that free, I am under my mother's shelter" (P7, Age 19, Male, 234).</p> <p>"I am 100% free to make important decisions – because of the amount of choices and options nowadays" (P7, Age 19, Male, 239).</p> <p>"I feel free because my parents tell me no, you cannot drink, then I do not listen. I make my own choices. If my parents do not allow, I just go do it" (P18, Age 16, Female, 291).</p>	<p>"I feel free, whatever I want to do, I can, but I know smoking is not for me. So that's one thing I won't do, but also, I don't feel that free because most of my decisions are up to my mommy" (P17, Age 16, Female, 200-201).</p> <p>"I don't feel very free" (P15, Age 16, Male, 146).</p> <p>"I don't feel free because my mom and dad are strict" (P12, Age 16, Female, 219).</p> <p>"Nobody stops me, so yeah, I do feel free, very free" (P5, Age 18, Female, 224).</p> <p>"I feel very free because if I decide to do something, I will do it. I don't ask people" (P22, Age 15, Male, 187).</p>
Competence	Feeling proud	<p>"People feel proud about smoking because most of them like posting things on their social media status" (P7, Age 19, Male, 220).</p> <p>"Feel proud because some users can make circles when they smoke and the amount of smoke" (P7, Age 19, Male, 223).</p> <p>"I feel proud when I come to school and finish my schoolwork" (P18, Age 16, Male, 38).</p> <p>"I do not feel proud about smoking because I know it doesn't make my mother happy that I smoke" (P26, Age 15, female, 191).</p>	<p>"I feel proud about not smoking because there is a lot of people who smoke" (P16, Age 16, Female, 139).</p> <p>"Not smoking makes me feel proud. Like I know I have that comfort that I don't have to worry about smoking or getting in any other kind of trouble – legal or illegal" (P9, Age 16, Female, 184-185).</p> <p>"People are proud that they don't smoke because they know their bodies are clean. If they get tested, nothing will reflect" (P22, Age 15, Male, 174).</p> <p>"I feel proud about being at school, doing well, and making my parents proud with good results" (P13, Age 16, Female, 224).</p> <p>"I feel proud at sport" (P22, Age 15, Male, 218).</p>
	Feeling useless/hopeless	<p>"I feel useless and hopeless when I don't know which direction to go and can't get things right in my life" (P27a, Age 17, Male, 54-156).</p> <p>"I feel useless, like I can't do anything, like I am not good enough" (P18, Age 16, female, 330).</p>	<p>"I feel worthless and helpless when friends don't listen to me" (P22, Age 15, Male, 241).</p> <p>"I never feel useless, hopeless, or lonely" (P4, Age 18, Male, 228).</p> <p>"Sometimes I feel useless and hopeless" (P3, Age 17, Female, 241).</p>

	Mastering difficult tasks	<p>“When tasks are difficult, I feel like giving up and going to sleep” (P18, Age 16, female, 273).</p> <p>“If something is difficult, I will think for long, like I will cry because of frustration, get angry, and burst into tears. I cry and I will try to do it, but if I fail and I will leave it” (P20, Age 15, Female, 209-213).</p> <p>“If something is difficult, I pray and ask the Lord to help me through” (P29, Age 16, Male, 302).</p>	<p>“I struggle but after a] while, I will do it properly” (P17, Age 16, Female, 237).</p> <p>“When I don’t master difficult tasks, I feel disappointed. I would try to do it, and if I don’t see what I want, then I just give up” (P13, Age 16, Female, 250).</p> <p>“If something is difficult, I will do it over and over until I get it right” (P21, Age 15, female, 231).</p> <p>“I mastered a decision not to smoke hookah pipe. I am proud of myself because some children get pressure to smoke hookah” (P1, Age 13, Female, 174-175).</p>
Relatedness	Sense of belonging	<p>“It helped me fit in” (P7, Age 98, Male, 192).</p> <p>“I don’t like if I am alone and I smoke. I don’t enjoy it on my own, so maybe chilling with friends, and like, I can be myself, and we are all on the same level” (P20, Age 15, Female, 142).</p>	<p>“I feel left out when people smoke around me” (P25, Age 16, Female, 199).</p> <p>“People tried to influence me. People smoke to fit in and not be teased (P3, Age 17, female, 112-113).</p>
	Experiences with family/friends	<p>“Brother and dad used to fight and then they physically fight with my mom” (P18, Age 16, female, 451).</p> <p>“I am close to no one. Experience lots of family conflict” (P30, Age 15, Female, 454).</p> <p>“It makes me feel relaxed and I enjoy the smell. I feel happy when I smoke with my friends” (P7, Age 19, Male, 180-182).</p> <p>“I smoke with my best friend and I feel happy” (P8, Age 16, Female, 204).</p> <p>“When I get frustrated or aggressive, I will walk away and smoke. It makes me calmer. I’ll go to my friend and we start talking and we will smoke the hookah pipe to relieve a little stress” (P27a, Age 17, Male, 54-56).</p> <p>“It’s only when I am with my friends that I smoke the hookah pipe so it’s nice to sit together” (P26, Age 15, female, 193-194).</p> <p>“I enjoyed it because I could do it with my friends, we were all excited to smoke because we thought we were cool” (P29, Age 16, Male, 177-180).</p> <p>“I don’t know if I can stop forever because when I am with my friends or other people and they smoke, I will say give a little” (P30, Age 15, female, 108).</p>	<p>“I feel close with parents and close friends because they make me happy” (P16, Age 16, Male, 198).</p> <p>“I feel happy with my family – we have a special bond and we have good times together” (P17, Age 16, Female, 260).</p> <p>“I feel very close to my mother. She raised me as a single parent” (P5 Age 18, Female, 319).</p> <p>“I feel close to family. I feel appreciated and don’t feel lonely. I am able to speak to important people and they will be interested” (P14, Age 15, Male, 220).</p>
	Feeling unappreciated/lonely	<p>“I smoke when I feel lonely, don’t feel appreciated, useless, and helpless. It helps me relax” (P27b, Age 17, Male, 200).</p> <p>Sometimes I feel lonely because it is not every day that my daddy and I can chill together because I know he is stressed at work. He will come home angry and I will talk to him, then he will scold me, then I feel like, not even my dad wants to speak to me” (P20 Age 15, female, 245-248).</p> <p>“I feel lonely – there is no one to talk to about my problems” (P29, Age 16, Male, 389).</p>	<p>“Sometimes I feel undervalued like they don’t really see my value in team sport or schoolwork” (P9, Age 16, female, 240).</p> <p>“I feel lonely when I must make emotional decisions” (P22, Age 15, Male, 321).</p>

		<p>"I am lonely when I am alone at home and I am thinking all the time. I do not think of smoking hookah when I am lonely. I associate smoking the hookah pipe with good times" (P30, Age 15, Female, 423-425).</p>	
MOTIVATION			
Intrinsic Motivation	Choice to smoke/not smoke	<p>"I am not one to follow people, I do it out of my own will. I do it because I want to not because I have to" (P6, Age 18, Male, 214).</p> <p>"The choice to smoke is up to you because there are some things inside you that tells you, that controls you, like your heart" (P7, Age 19, Male, 62).</p> <p>"I do it out of my own free will because I want to, not because someone is forcing me or telling me" (P8, Age 16, Female, 232).</p> <p>"I feel relaxed and it helps me to be calm and it allows me to be myself" (P27b, Age 17, Male, 4).</p> <p>I just do it because I love it, that is why I do it" (P30, Age 15, female, 294).</p>	<p>"I choose not to smoke out of my own free will" (P16, Age 16, Female, 131).</p> <p>"I don't smoke hookah because I feel it isn't right, and I play rugby for the school. Smoking hookah is negative" (P22, Age 18, Male, 115).</p>
	Enjoyment	<p>"I enjoy making circles when I smoke" (P2, Age 14, Male, 277).</p> <p>"I enjoy when I blow out smoke and play with the smoke in my mouth and I can make tricks like circles and hearts (P27b, Age 17, Male, 12).</p> <p>"I enjoy the calming feeling. I take deep breaths and so it calms me" (P23, Age 16, Male, 209).</p>	<p>"I don't like the smell and smoke because I have asthma" (P17, Age 16, Female, 103).</p> <p>"I don't smoke hookah. I don't like it. I tried it but it doesn't feel right" (P28, Age 16, Male, 154).</p>
	Smoking to cope/preventative measure	<p>"It helps me from joining a gang and looking for trouble. It helps me to be calm and to be on our own and relaxed" (P7b, Age 17, Male, 31).</p> <p>"I smoke hookah because it keeps me away from cigarettes" (P20, Age 15, female, 23).</p> <p>"It's better if I smoke as opposed to using cannabis" (P23, Age 16, Male, 57).</p> <p>"If I decide I don't want to smoke then I don't want to, but then I must deal with the stress in a different manner" (P23, Age 16, Male, 106).</p> <p>"Say, for instance, school is stressful, then I want to relax, then I will smoke" (P20, Age 15, female, 130-131).</p> <p>"I smoke because of the stress at home, but it didn't help because when I went back home, there was stress again" (P29, Age 16, Male, 166).</p> <p>"I forget all my problems when I smoke the hookah pipe" (P29, Age 16, Male, 419).</p>	n/a
Extrinsic Motivation	Peer Pressure	<p>"I think the good thing is, the more you smoke the pipe, the more friends you have" (P27a, Age 17, Male, 58-59).</p> <p>"I only do it to keep my friends. All the friends I am with, they all do it. What is the use if I am with them, but I do not do it?" (P27a, Age 17, Male, 79).</p> <p>"I am willing to stop smoking but it will be difficult because of the friends I am around" (P27b, Age 17, Male, 290).</p> <p>"It's probably because of my friends that I started smoking" (P26, Age 15, female, 146).</p>	<p>"I just tell them no, I don't smoke, they try to pressure me, but I don't give in easily" (P16, Age 16, Female, 126).</p> <p>"I tell them no, don't offer me. I told you I don't smoke, so don't offer me" (P12, Age 13, Female, 182).</p> <p>"The choice to smoke is not up to you because your friends influence you to smoke and if you do not have a hookah, you can go to your friend" (P10, Age 13, Male, 48-49).</p> <p>"If you don't smoke, you are considered an idiot by your friends. Friends will turn against you" (P28, Age 16, Male, 95).</p>

		<p>“I started at age 14 because I wanted to be cool and my friends were smoking” (P24, Age 15, Male, 279).</p> <p>“I get bullied to do things, like smoke hookah” (P19, Age 16, Male, 269).</p>	
	Parental Influence	<p>“I think some people smoke just to show their friends, but I just do it because my mom allowed it” (P6, Age 18, Male, 48-50).</p>	<p>“My parents influence because they know the consequences and what is going to happen to me” (P15, Age 16, Male, 134-137).</p> <p>“I don’t smoke. It depends on how your parents raised you and the rules at home” (P25, Age 16, Female, 95).</p> <p>“I just don’t feel the need to smoke because my parents don’t smoke” (P13, Age 16, Female, 160).</p>
	Environmental influence	<p>“We grow up in a sick society and you get used to the idea, you have to be like this” (P27a, Age 17, Male, 94).</p>	<p>“It’s the environment that they live...that is why they decide to smoke – to fit into the environment” (P10, Age 13, Male, 88-89).</p> <p>“I stopped smoking the hookah pipe because I come from an area where I see one thing [hookah] leads to another [cannabis]” (P4, Age 18, Male, 38-39).</p>
	Money	n/a	<p>“I don’t smoke because if I don’t have money and if I craved for it, would I steal for it?” (P15, Age 16, Male, 139).</p> <p>“I don’t smoke because it is a waste of money and if you smoke a lot it will make your chest tight. I save a lot of money” (P21, Age 15, female, 153-155).</p>
	Addiction	<p>“Can stop smoking in 3 months – it’s an occasional thing, you don’t do it every day. If it’s not around, it won’t affect you, like mine broke so I just left it, it was fine. I don’t crave” (P6, Age 18, Male, 66-70).</p> <p>“Hookah users can change because it doesn’t get addictive. You control it, it doesn’t control you” (P7, Age 19, Male, 396).</p> <p>“It’s almost as if I am addicted to it” (P26, Age 15, female, 157).</p>	<p>“I think if I smoke, I won’t get addicted to it” (P13, Age 16, Female, 185).</p>
Amotivation	Indifference	<p>“Smoking the hookah pipe doesn’t help me” (P6, Age 18, Male, 179).</p> <p>“I do not know why I am smoking” (P26, Age 15, female, 42).</p>	<p>“I experimented but it doesn’t satisfy me” (P10, Age 13, Male, 111).</p> <p>“I didn’t see anything good come from smoking, so I did not see the use of smoking” (P5, Age 18, Female, 160).</p>

Six themes were generated: (1) autonomy, (2) competence, (3) relatedness, (4) intrinsic motivation, (5) extrinsic motivation, and (6) amotivation. Sub-themes were generated from the main themes (Table 7.2).

7.5.2 BPN

7.5.2.1 Autonomy

The majority of hookah pipe users relied on their parents to assist with decision-making, while the majority of non-users relied on parents, grandparents, or prayer to help with decision-making. Users felt that their parents wanted to control their lives and there was a sense of dependence. As such, users appeared more cautious or insecure about making decisions. Conversely, hookah pipe users and non-users who made their own decisions indicated that they were not comfortable asking parents for assistance.

Even though users clearly reported that they struggled to make decisions independently, they reported feeling free and able to make choices. When this contradiction was raised, users said they can make day-to-day choices, but they needed support for important decisions. Important decisions differed from person to person, such as remaining in school, attending parties, drinking alcohol, and living arrangements, to name a few. Users made reference to making choices as a form of rebellion and felt that they would do something whether or not their parents approved. Some hookah pipe users as well as non-users felt that they were not free because they lived with their parents. In sum, there is no definitive indication that adolescents' sense of autonomy affects their choice to smoke the hookah pipe or not because of the similarities in their responses.

7.5.2.2 Competence

Some hookah pipe users felt proud about smoking because they were able to do tricks with the smoke, such as making shapes with the smoke, or producing a large amount of smoke. There was the perception that when one posts on social media about smoking the hookah pipe, one is boasting about smoking, so there was a sense of pride associated with the practice. However, one hookah pipe user did not feel proud about smoking because he knew that it did not make his mother happy. Hookah pipe non-users, on the other hand, were proud

that they did not smoke. The pride was associated with not conforming to social trends. Both hookah pipe users and non-users felt proud about performing well at school.

Even though hookah pipe users expressed pride in smoking, they reported a greater sense of feeling useless and hopeless in life when they were unsure about which direction to follow, and they struggled to manage when things did not go according to plan. Some non-users also reported feeling useless and helpless, but their experiences were influenced by friends, whereas users' feelings appeared more internalised where they felt that they were not good enough. Some non-users reported feeling useless or helpless on occasion, while others did not experience this at all. When trying to master difficult tasks, hookah pipe users were more likely to give up as a result of frustration or anger. Hookah pipe non-users, on the other hand, were more likely to persevere or struggle until they completed the task. On the whole, users appear to experience more needs frustration with regards to competence compared to non-users. Hence, their reliance on the hookah pipe for needs satisfaction.

7.5.2.3 Relatedness

Hookah pipe users and non-users reflected on their sense of relatedness in terms of their sense of belonging, their experience with family and friends, and their experience of feeling unappreciated or lonely. Smoking the hookah pipe in a peer group rather than alone provided users with enjoyment and a sense of belonging. While some non-users felt left out when people smoked around them, they opted not to smoke despite peer pressure. Instead, they described positive experiences with their parents and close friends. In contrast, the majority of users experienced family conflict and violence. Smoking the hookah pipe with friends, however, provided positive emotions such as feeling happy, relaxed, and excited. Users and non-users also expressed negative feelings such as feeling lonely and unappreciated, but their experiences were different. Non-users felt this way when they were not acknowledged in team sports, or when they had to make emotional decisions. In contrast,

users experienced these feelings because they generally felt useless, helpless, unable to interact with a parent, isolated, or alone.

It can be concluded that users experienced needs frustration of relatedness to a greater extent compared to non-users, leading to the need to smoke in a group in order to experience a sense of belonging.

7.5.3 Motivation

7.5.3.1 Intrinsic Motivation

Intrinsic motivation was described in terms of choice to smoke or not to smoke, enjoyment, and the belief that hookah smoking served as a coping mechanism or preventative measure. Hookah pipe users believed that smoking the hookah pipe helped them to cope with life stressors because it was a means of relaxation. It also prevented them from joining a gang, smoking cigarettes, or smoking cannabis. Hookah pipe users claimed to enjoy smoking the hookah pipe because of the amount of smoke, the ability to make shapes with the smoke, and the calming effect it had on them. All hookah pipe users reported that they smoked out of their own free will and they did not feel forced to smoke. Similarly, hookah pipe non-users believed that they did not smoke because they chose not to smoke. Their reasons for not smoking included not liking the smell, having asthma, feeling that it was wrong to smoke the hookah pipe, and due to their participation in sport activities.

7.5.3.2 Extrinsic Motivation

Extrinsic motivation included peer pressure, parental influence, environmental influence, money, and addiction. Even though hookah pipe users felt that they were smoking out of their own free will, some thought that peer pressure influenced their decision. Other users smoked to have friends, or because they did not know how to say no to their friends, while a few engaged in smoking to be popular. Despite peer pressure being rife, non-users stood their ground and refused to give in. Parents also played an important role in their

decision to smoke or not smoke. When parents allowed hookah smoking, it encouraged users to smoke. Non-users believed that smoking or not smoking was related to how well parents raised their children. They specifically made reference to rules at home and knowing that their parents – as significant role models – are non-smokers.

There was also the belief that the environment where one lives influences one's motivation to smoke. Many of the adolescents reside in communities where smoking and substance abuse is rife. They spoke about how they witnessed substance abusers smoking the hookah pipe before they started using illegal substances. Hookah pipe users believed that by living in these communities, smoking was inevitable. Hookah pipe non-users acknowledged the influence of the environment, yet they thought it was better not to conform to avoid falling into substance dependence.

Users did not refer to money, but non-users claimed that they were motivated not to use the hookah pipe because it was a waste of money. There was also a fear that they would need to steal if they were unable to satisfy their craving. However, non-users believed that smoking the hookah pipe was not addictive. Some users agreed that hookah pipe smoking was not addictive, but others disagreed and felt that they were addicted.

Extrinsic motivation appears to have a less critical role on hookah pipe non-users as their choice to not smoke is more dependent on their intrinsic motivation.

7.5.3.3 Amotivation

Some hookah pipe users and non-users are indifferent to smoking the hookah pipe. Hookah pipe users did not know why they smoked and believed that it did not help them in any way. Hookah pipe non-users experimented but felt that it did not satisfy them, and they did not see anything good coming from it.

7.6 Discussion

This study aimed to (1) explore whether satisfaction or frustration of BPN contributes to hookah pipe use or non-use, and (2) understand what motivates adolescents to smoke or not smoke the hookah pipe.

In some cases, there are distinct differences between users' and non-users' BPN, and in other cases there are similarities between the two groups. For instance, both users and non-users do not feel autonomous regarding decision-making. SDT regards provision of choice as an important component of satisfaction of autonomy as it is associated with intrinsic motivation (Marbell-Pierre et al., 2019). The majority of adolescents were reliant on elders to guide them in decision-making. Often a decision-maker's main task is to discover the best way to attain a desirable outcome. Knowledgeable or experienced individuals are usually assumed to know the best way to proceed. Therefore, adolescents might seek advice from people whom they consider more knowledgeable (Byrnes, 2002).

However, some adolescents may still engage in risky behaviours, such as smoking the hookah pipe, despite receiving adequate knowledge (Byrnes, 2002). SDT asserts that the manner in which knowledge is shared with adolescents is very important. A controlling, directive, or authoritarian approach would be counterproductive, especially when trying to get adolescents to self-initiate a behaviour instead of simply complying (Moltafet et al., 2018). Essentially, adolescents experience a sense of freedom when they feel in control of a situation. Adolescents also experience a sense of freedom when they are able to experience and pursue a sense of personal curiosity (Ata et al., 2015). In this study, some adolescents appear to experience satisfaction of their need for autonomy whilst others do not. The satisfaction or frustration is not necessarily specific to users or non-users because both groups of adolescents experience satisfaction and frustration of their need for autonomy. Therefore, it appears that participants' sense of autonomy does not necessarily contribute to whether they smoke the hookah pipe or not. The reason for this could be that the choice to smoke the

hookah and having the need of autonomy fulfilled could be impacted by the ability to ask and receive support with decisions, protective or laissez-faire parenting, self-esteem, self-efficacy, peer group presence or absence, and role models, to name a few (Noller & Callan, 2015). This would affect adolescents in general and is not specific to adolescent hookah pipe users or non-users.

Competence, however, appears to have a contributory role as there appears to be distinct differences between the two groups. Many users indicate that they feel proud about smoking the hookah pipe and non-users feel proud about not smoking. When adolescents feel proud, they feel more competent, and as a result, their intrinsic motivation to engage in an activity increases (Józsa et al., 2019). Users tend to give up quicker when they struggle, whereas non-users tend to persevere more and try to accomplish the task. When adolescents feel competent, they perceive that they are capable of successfully performing and completing tasks (Deci & Ryan, 2000). Furthermore, people perceive a greater sense of competence when they feel they are able to attain important health outcomes (Williams et al., 2006).

Adolescents also made reference to feeling useless and hopeless. Users' experiences tend to be more internalised as they feel that they cannot do anything right or that they are not good enough. Non-users' sense of feeling useless and hopeless is related to external influences, such as their friends not listening to them. When adolescents internalise a sense of hopelessness, they may perceive negative thoughts, ideas, events, and experiences in their lives about their future and perceive little control over their life and overcoming obstacles (Eraslan-Capan, 2016). Naturally, this has a negative effect on their experiences of themselves, their sense of competence, and their well-being. This may lead them to engage in activities with their peers that makes them feel better, such as smoking the hookah pipe (Schacter & Juvonen, 2019).

Both users and non-users agree that smoking the hookah pipe allows one to fit into a social group. However, non-users deliberately opt not to conform to the social norms of the

group. This can be attributed to non-users having better relationships with their family compared to users. Users describe an environment ridden with family conflict and violence. Typically, positive and nurturing experiences in the social environment of the adolescent allows for BPN to be met. This can be achieved by supportive parent and family relationships (Kader & Roman, 2016; Schacter & Juvonen, 2019). Similar to competence, users and non-users feel lonely and unappreciated, but users' experiences are more internalised because they feel that they cannot interact with parents or speak to anyone compared to non-users who feel lonely or unappreciated when they are not acknowledged in team sports. Adolescents' sense of relatedness is supported when the important people in their lives are involved, take a sincere interest in them, and are empathetic. When this does not occur, the need for relatedness is frustrated (Sebire et al., 2016). Based on the findings, it appears that adolescents' experience of satisfaction or frustration of relatedness may have a contributory role in adolescent hookah pipe use.

In terms of motivation, users and non-users agree that smoking or not smoking the hookah is a process driven by intrinsic motivation, and they are smoking or not smoking as a result of their own free will. Users regard smoking as enjoyable and a coping mechanism to deal with life's stressors. However, both groups acknowledge external conditions, such as friends, parents, and environmental aspects, which contribute to the motivation for hookah pipe use or non-use. This finding is corroborated by a study by Lakon et al., (2015) on the role of parents and friends in smoking behaviours. These authors found that adolescent friendship groups are a compelling socialisation context in which friendship tie choice and smoking co-evolve, and that parental monitoring was protective for smoking and appeared to decrease adolescent smoking. Gray and colleagues (2016) argue that people's ability to make choices about smoking is constrained by contextual and cognitive factors. They are therefore not intrinsically motivated to smoke but are in fact extrinsically motivated. However, there is limited insight into adolescents' intrinsic motivation to smoke because previous studies have

mainly focused on motivation to stop smoking. This study found that adolescents experience intrinsic and extrinsic motivation to smoke the hookah pipe. In some cases, adolescents are amotivated. This is a relatively new perspective as previous studies found that adolescents mainly smoke as a result of extrinsic motivators (Gray et al., 2016; Cornacchione et al., 2016; Bahelah et al., 2019), but there is a belief that adolescents need to be intrinsically motivated to stop smoking (Curry et al., 1997; Thrul et al., 2016; Tombor et al., 2018).

It is important, therefore, to recognise the role of motivation and BPN in adolescents' motivation to smoke the hookah pipe. This can help practitioners to intervene by providing contexts to satisfy BPN and increase intrinsic motivation not to smoke the hookah pipe. The reduction of this practice will in turn help minimise the health consequences of hookah pipe smoking. This can lead to a healthier adolescent, healthier family, healthier community, and consequently, a healthier population. Improved health means less strain on health systems and the economy, improved productivity, and a better quality of life (Balabanova et al., 2013).

7.7 Limitations and Future Research

One possible limitation of this study was that the participants were exposed to the earlier quantitative study of this project to help them focus on the type of information of interest to the researcher. This exposure could have influenced how the adolescent answered questions during the in-depth interviews. However, since this was part of a project that made use of a sequential exploratory design, this was unavoidable. Future studies could make use of a sequential explanatory design where the quantitative study will build on the findings of the qualitative study. This could present different findings as the quantitative inquiry will be guided by the themes of the qualitative phase. Another area of future research could be to explore hookah pipe non-users that experimented or stopped using in an attempt to understand why or how they stopped smoking.

7.8 Conclusion

This study sought to understand the contributory role of BPN and motivation in adolescent hookah pipe use. It was found that there is an overlap in need satisfaction and needs frustration amongst users and non-users. This is especially true for the autonomy need, which may be influenced by other factors, such as self-esteem, parenting styles, and support systems. Satisfaction or frustration of the needs of competence and relatedness are more likely to influence hookah pipe use. Users appear to experience more needs frustration compared to hookah pipe non-users. The choice to smoke or not to smoke is motivated by intrinsic and extrinsic motivation. In this regard, users are more extrinsically motivated to smoke, while non-users are more intrinsically motivated not to smoke. This research offers a new perspective, as previous research has mostly focused on the extrinsic factors that motivate adolescents to smoke, often overlooking the humanistic experience in substance use.

7.9 References

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CHAPTER 8

THE ROLE OF FAMILY IN ADOLESCENTS' HOOKAH USE AND NON-USE

8.1 Introduction

The previous two chapters assessed hookah pipe use from an internal and individual perspective by studying adolescent perceptions, motivation, and needs. This chapter considers the influence of the adolescents' family context and the role of family members in their decision to either smoke or not smoke the hookah pipe, and how families can either satisfy or hinder adolescents' BPN. This chapter addresses Objective 5, which aims to explore and determine how families influence the decisions to smoke the hookah pipe and how they contribute to the satisfaction of BPN. This chapter has been accepted as a book chapter in the book titled: *Children in Africa: Opportunities and Challenges*.

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Adolescent Hookah Pipe Use in South Africa: A Mixed Methods Study

Exploring the Role of Family

8.2 Abstract

The hookah pipe is a mechanism used to smoke legal and illegal substances. Hookah pipe smoking negatively impacts adolescents' opportunities to prosper because of its negative health consequences, potential for addiction, and risk of being a gateway substance. Hookah pipe use is on the rise and families are known to be influential in adolescents' choices. This chapter is a study of the role played by families in adolescents' hookah pipe smoking in the Western Cape, South Africa. Drawing on Self-determination Theory (SDT), the study collected both quantitative and qualitative data from adolescents in the region. Hookah pipe users reported no differences between

their families' permissiveness and sociability. They also reported no difference in terms of their family conflict and family satisfaction. This finding was contradicted when users explained that they witnessed more family violence, experienced trauma as a result of family members, and they experienced less parental involvement compared to non-users. Hookah pipe users have more family members that use substances compared to hookah pipe non-users. Parents of hookah pipe users are more accepting of the hookah pipe in the home, and the hookah pipe is commonly used as a method for socialising amongst hookah pipe users' family members. Moreover, family behaviour and attitudes contribute to the choice to smoke or not smoke the hookah pipe. There is a need for future research, policy, and intervention strategies to include the family when intervening to reduce adolescent hookah pipe use. A reduction of hookah pipe use may increase the opportunities for adolescents to excel.

Keywords: Adolescent, hookah pipe, tobacco, family, Self-Determination Theory, mixed methods, South Africa

8.3 Introduction

Globally, adolescent hookah pipe use is on the rise and has become an increasing public health concern. Also referred to as shisha, narghile, argileh, hubble-bubble, and Goza (Wright et al., 2016; Bello et al., 2019), the hookah pipe is a device used to smoke legal and illegal substances. It is usually smoked in a group and sessions last for approximately 45–60 minutes. The hookah pipe is prepared by filling the vase at the base of the hookah pipe with water. After the vase is filled with an appropriate amount to ensure airflow, the stem is placed into the vase and tightly sealed. On some occasions, the water is substituted with alcohol. The flavoured tobacco is then packed into the head of the hookah pipe. Sometimes the tobacco is mixed with cannabis and/or other substances. A piece of foil covers the tobacco filled head and small holes are poked into the foil. This is placed on top of the stem. This is followed by connecting a protruding pipe, known as the hose. Lastly, a lit charcoal is placed on top of the foil covered head. At this point, smoking can commence. The hookah pipe is passed from

person to person every few seconds or minutes, depending on how long each person smokes and the number of people in the group (Bhatnagar et al., 2019; Sadeghi et al., 2019).

Whilst adolescents may perceive hookah pipe smoking as harmless (Strong et al., 2019), a method of relaxation (Roohafza et al., 2015), and a way of socialising (Agaku et al., 2018), there are dire health risks, such as respiratory infections, cardiac diseases, and cancers associated with this smoking habit. This makes hookah pipe smoking as harmful as other tobacco smoking methods (Aslam et al., 2014; Bhatnagar et al., 2019). Whilst several efforts have been made to alert adolescents about the dangers of hookah smoking through an array of interventions (Sadeghi et al., 2019), there is a marked increase in hookah pipe use, especially amongst adolescents (Maziak, 2015; Redfield, 2019).

Since the nation transitioned to democracy in 1994, there has been a proliferation of substance use and abuse across the country (Dada et al., 2018). The Western Cape in particular has seen a spike in substance use amongst adolescents in recent years (Gerbi, 2017; Christodoulou, 2019) with the use of the hookah pipe being a common occurrence in low- and middle-income communities (Kruger et al., 2016). Prevalence estimates from the South African Community Epidemiology Network of Drug Use (SACENDU), a national alcohol and drugs sentinel surveillance system that monitor trends in substance abuse based on data from specialist treatment facilities across South Africa, indicate that over 17,000 patients were admitted to treatment centres across South Africa for substance abuse during 2014 (Dada et al., 2018). Of these patients, 20% were adolescents (Dada et al., 2018). SACENDU does not document hookah pipe use, but 2019 data from SACENDU indicates that across all nine provinces, most young people (younger than 20) were treated for the use of cannabis. Within the Western Cape (where this study is located), the youngest patients were treated for the use of cannabis (77%), followed by alcohol (14%) (Dada et al., 2019). Alarmingly, the hookah pipe is often used with cannabis or alcohol, or the hookah pipe is a gateway to

cannabis and/or alcohol use. These substances are all addictive (Berg et al., 2015; Roman et al., 2015). Evidently, hookah pipe use is a major concern and negatively impacts adolescents' opportunities to thrive because of its health consequences, potential for addiction, and risk of being a gateway substance.

This paper explores the perspective that hookah pipe use is an internal process (hence the exploration of BPN) influenced by the contexts in which the person lives (hence the need to assess the family). This study aimed to answer the research question: How does the family influence the adolescent's BPN and choice to smoke the hookah pipe?

8.4 Conceptual Framework

Self-Determination Theory (SDT), a theory of human motivation, recognises that the adolescent's context impacts the choices that he or she makes because the social conditions either satisfy or frustrate their BPN (Ryan & Deci, 2000). The family context is especially important because the family has the ability to satisfy or frustrate BPN through their behaviours and beliefs (Roman & Davids (Eds.), 2016). The needs are autonomy (sense of choice and decision in the regulation of behaviour), competence (sense of efficacy in the adoption of a particular behaviour), and relatedness (sense of belonging and connectedness with others) (Ryan & Deci, 2008). The three needs are important for facilitating adolescents' optimal functioning, personal well-being, and constructive social development (Ryan & Deci, 2000). When needs are not met within the family, adolescents may seek alternative ways to satisfy these needs. In an attempt to satisfy their needs, they may resort to hookah pipe smoking because they may be encouraged by peers who can provide a sense of relatedness; peers may also indicate being impressed when their fellow adolescent is able to make tricks with the smoke. This in turn contributes to a sense of competence, and the adolescent may believe that he or she is smoking because they are choosing to, and therefore, they may feel autonomous.

Of course, not all adolescents may be lured toward hookah pipe smoking to fulfil their needs, but families can either be a risk factor or protective factor for adolescent substance abuse. Substance use may impede the adolescent from taking up opportunities related to school, leadership roles, social engagements, and sports and recreation (Cambron et al., 2018). Since adolescents are impressionable, they are influenced by the attitudes and habits of their family members and witnessing their family members smoke (or not smoke) the hookah pipe (Ramji et al., 2019). For this reason, it is important to examine how adolescents view their family and explore how they perceive their needs to be met within their family context. Motivation for use is also important. Adolescents may be intrinsically (inherent desire), extrinsically, (encouraged by external factors or people) or amotivated to smoke (lack of motivation). This also impacts their choice to smoke (Kader & Roman, 2016). Again, families can influence adolescents' motivations to smoke as a result of their rules, consequences, attitudes, behaviours, permissible norms within the home and family, involvement, and ability to guide and influence adolescents.

Studying adolescent hookah pipe use from a SDT perspective is valuable because it takes into account individual and family factors that impact behaviours, such as hookah pipe use. It is also novel because no known studies have explored hookah pipe use from an SDT lens. This study is specifically interested in the individual's family context. This is important because if the family environment is challenging as a result of family conflict, for example, it may thwart satisfaction of needs of its members. As a result, adolescents may be motivated towards negative behaviours, such as smoking the hookah pipe, because their needs are not met. This study is of particular significance in contemporary times where the world is facing the global pandemic of COVID-19, which negatively impacts the respiratory system. At the time of writing, tobacco use is banned in South Africa, but many people do not view hookah pipe smoking as harmful as cigarette smoking (Kruger et al., 2016). Therefore, hookah pipe

smoking remains popular due to its perceived harmlessness by its users and potentially family members. This chapter aims to understand the role of families in the adolescents' choice to smoke the hookah pipe, and how families satisfy and/or frustrate adolescents' BPN. This research is important because it can guide the development of future interventions which could reduce the burden of hookah pipe smoking in South Africa.

8.5 Methods

An explanatory mixed methodological sequential design was used in this study, which took place in the context of the Western Cape, South Africa.

8.5.1 Research Design

A two-phase design was applied. The quantitative phase occurred first, followed by the qualitative phase (Ivankova et al., 2006; McBride et al., 2019). Integration occurred by the qualitative component building on the quantitative procedure and results (Fetters et al., 2013). In order to understand the role of the family in hookah pipe use, the adolescents' sense of relatedness, family use of the hookah pipe, family cohesion, family conflict, laissez-faire family style, family sociability, and family satisfaction were investigated. This formed the basis of the next phase of inquiry – the qualitative phase. The qualitative stage was necessary in understanding their perceptions of the role of their families in their hookah pipe use. The following section describes the methodological details of each phase.

8.5.2 Phase 1: Quantitative Assessment

8.5.2.1 Participants

A simple random sampling technique was used to recruit schools and participants. Twenty randomly selected schools across eight educational districts were approached; twelve schools in five districts agreed to participate, and 1,279 adolescents were approached, of which 1,201 adolescents agreed to participate. In each school, the principal randomly identified one class per grade who would participate. Each adolescent in those classes

received a consent form. The adolescents who returned the consent form and were between the ages of 13–19 participated in the study. Hookah pipe *users* (adolescents who considered themselves current users, i.e., smoked the hookah pipe within the last six months – occasionally or frequently) and *non-users* (adolescents who do not regard themselves as hookah pipe users because they have either never smoked or have not smoked the hookah pipe within the last six months) were included in the sample. The final sample was representative in terms of rural and urban setting, race, socio-economic status, language, age, and gender. All reporting is in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) checklist (Von Elm et al., 2007).

8.5.2.2 Measures

The data was collected with previously validated instruments that investigated adolescent hookah pipe use and compared adolescent hookah pipe users' and non-users' families in order to understand the role of families in adolescent hookah pipe use. The measures were self-report and available in English, Afrikaans, and IsiXhosa, as these are the three official languages of the Western Cape. The following measures were used to form the final data collection tool. All data and measures can be accessed here:

<https://osf.io/m472p/quickfiles>

Self-constructed measure – Demographics: The researchers designed a 10-item demographics questionnaire focusing on gender, race, age, grade, home language, living arrangements, marital status of parents, and number of employed people in the home to determine the characteristics of the sample. Participants had to respond by marking the most appropriate answer (for example, the question would be “Who do you live with?” And the participants had to select the most applicable answer from the list, which included both parents, mother only, father only, and so on) or write the answer in the space provided (for example, the question would be “How old are you?”).

Self-constructed measure – Family hookah pipe use and acceptability of hookah

pipe use: The researchers constructed a 16-item measure investigating parents' acceptance of hookah pipe use, hookah pipe use in the family, where the hookah pipe is used, and determining if the hookah pipe is used in families as a way of communicating and socialising to determine family members' response to hookah pipe use. For example, "Is the hookah pipe used in your family as a means of socialising in your family? Participants had to indicate "yes", "no" or "don't know".

Family Functioning Scale: Family functioning was assessed using an adapted version of the Family Functioning Scale. This 75-item measure consists of 15 subscales centred on family functioning, system maintenance, and personal growth. For the purpose of this study, we chose only four sub-scales (cohesion, conflict, laissez-faire family style, and family sociability). A total of 20 statements were used. Participants were asked to rate on a 4-point Likert scale how true each statement was for their family (Bloom, 1985; Bloom & Naar, 1994; Li et al., 2014). Reliability of the scale was established in a study conducted by Yousefi (2012). The scale has adequate psychometric properties and discriminate validity. These dimensions have been cross-culturally validated across populations (Yousefi, 2012).

Satisfaction with Life Scale: The Satisfaction with Life Scale is a 5-item scale that was adapted to measure adolescent family life satisfaction. Responses ranged from 1 (strongly disagree) to 5 (strongly agree). This scale has been designed to measure global cognitive judgments of satisfaction (Diener et al., 1985). The scale has been shown to be reliable as it is suited for use with a wide range of age groups and applications in different cultures, nations, and languages (Pavot et al., 1991). The scale has shown to be valid based on the high convergence of self- and peer-reported measures of subjective well-being and life satisfaction, providing strong evidence that subjective well-being is a relatively global and stable phenomenon, not simply a momentary judgment based on fleeting influences (Guhn et

al., 2018). Confirmatory factor analyses reveal a consistent factor structure (Pavot & Diener, 2009).

Balanced Measure of Psychology Needs Scale: The 18-item Balanced Measure of Psychology Needs Scale assessed the degree to which the adolescents experience need satisfaction and need frustration (Sheldon & Hilpert, 2012). The three BPN are autonomy, competence, and relatedness. Responses ranged from 1 (Not True at All) to 5 (Very True). Each BPN had six items of which three items were positively worded (“My choices express what I want”) and three items were negatively worded (“I have to do things that I do not want to”). Reliability of the Balanced Measure of Psychology Needs Scale was established in a study conducted by Neubauer and Voss (2016).

Table 8.1 presents the mean, standard deviation, and McDonald’s omega to estimate factor saturation; the value denotes a less biased alternative to Cronbach’s alpha (Dunn et al., 2014) of the measures Family Functioning Scale, Balanced Measure of Psychology Needs Scale, and Satisfaction with Life Scale. These indices indicate a comprehensive assessment of questionnaire quality (Peters, 2014). All items within a scale had a factor loading of at least 0.30.

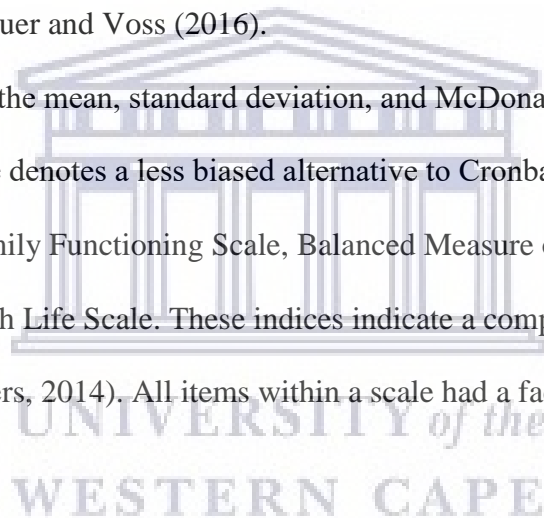


Table 8.1: Means, Standard Deviations, and McDonald's Omegas

Measure	Mean	Standard Deviation	Omega
Family Functioning			
Family Cohesion	3.69	0.76	0.53
Family Conflict	2.67	0.57	0.74
Laissez-Faire Family Style	2.81	0.79	0.64
Family Sociability	3.61	0.72	0.62
Family Satisfaction			
Family Satisfaction	3.61	0.79	0.63
BPN			
Autonomy	3.23	0.74	0.65
Competence	3.28	0.73	0.79
Relatedness	3.22	0.73	0.66

8.5.2.3 Procedure

Having obtained the required permission from both principals and parents, research was carried out in 12 schools from 5 educational districts. The adolescents who formed the research population each completed a coded questionnaire as part of the sequential design where selected adolescents provided the qualitative data once the quantitative data had been collected and analysed. The researcher was aided by two trained fieldworkers who were present at all times to ensure adolescents understood the tool and were easily accessible if adolescents had any questions of clarification. The completed questionnaires were securely stored, and all necessary ethical steps were followed to ensure confidentiality and anonymity.

8.5.2.4 Data Analysis

Data were analysed using SPSS version 23. The nature of the study required descriptive statistics such as percentages, means, and standard deviations, as well as inferential data statistics, such as an independent t test to compare hookah pipe users and non-users on family permissiveness, family sociability, family conflict, family satisfaction, need frustration, and need satisfaction. Effect sizes were measured using Cohens d. Bivariate

analyses (i.e., correlation coefficients), which were used to assess the strength of associations between users and non-users on 10 outcome measures regarding family permissiveness, family sociability, family conflict, family satisfaction, need frustration, and need satisfaction. The qualitative phase was initiated after analysis of the quantitative phase.

8.5.3 Phase 2: Qualitative Assessment

8.5.3.1 Participants

Four of the twelve schools were selected to participate in Phase 2. Schools were selected based on their geographic location and their ability to accommodate the researcher. Using purposive sampling, 30 participants, both hookah and non-hookah pipe users, participated in the depth interviews. The participants were selected so they could be a representative sample in terms of race, age, gender, socio-economic status, setting, hookah pipe users, and hookah pipe non-users. A final total of 14 hookah pipe users and 16 hookah pipe non-users participated. All reporting was in accordance with the COREQ (Consolidated criteria for Reporting Qualitative research) checklist (Tong et al., 2007).

8.5.3.2 Data Collection and Procedures

The researchers designed an interview schedule focusing on prevalence of hookah pipe use, BPN, family experiences, and intervention ideas to reduce hookah pipe use. The interview schedule was guided by components of SDT, the quantitative questionnaire, and the quantitative results. The same interview schedule was used for users and non-users, but it was contextualised based on the group. For example, hookah pipe users were asked “Why do you use the hookah pipe?” and hookah pipe non-users were asked “Why don’t you use the hookah pipe?” Interviews were conducted in English and Afrikaans, as none of the participants opted for isiXhosa. Each interview lasted between 45–60 minutes, and it was audio-recorded. Field notes were kept for all the interviews. After all the data was collected, the data was transcribed verbatim. The Afrikaans data was then translated into English. All ethical

principles were adhered to in terms of confidentiality, informed consent, privacy, and non-maleficence.

8.5.3.3 Data Analysis

The audiotapes of the qualitative interviews were transcribed. The notes along with the transcribed and translated data were analysed using Braun and Clarke's (2006) thematic analysis principles to identify, analyse, and report patterns, which are referred to as themes within the data (Braun & Clarke, 2006). These principles, in brief, are:

1. **Familiarising oneself with the data:** This was done by reading through the data, highlighting important excerpts and writing them on a separate page so that the data became more manageable.
2. **Generating initial codes:** Based on the written data in step one, the researchers identified codes.
3. **Searching for themes:** Using the codes in step two, the researchers clustered the codes into themes.
4. **Reviewing themes:** The themes in step three were reviewed to determine if any of the themes could be clustered together or needed to be split.
5. **Defining concepts:** Once the themes were reviewed, each theme was defined.
6. **Report writing:** The results are reported in this paper.

The researchers strove to reach consensus when reviewing themes, defining themes, and writing the report.

8.5.4 Ethics

Ethical principles were adhered to in both phases of the study. The research study received ethical approval from the research ethics committee of the University of the Western Cape (Project number HS17/4/5) and the Western Cape Education Department (ref: 20180629–3893). The issue of confidentiality and voluntary participation was explained to

the children, parents, and the school principals. Participants knew they could withdraw at any time with no consequences to them or their families. Principals knew that no discrimination could occur towards the participants of the study. A registered counsellor was available if any discomfort was experienced as a result of the research process.

The contiguous approach is used to present the findings as recommended by Fetters et al., 2013 (depicted in Figure 8.1). In this section, the data collection process of the quantitative component was presented, followed by the qualitative component. Similarly, in the next section, the quantitative results will be presented first, followed by the qualitative results. Thereafter, the quantitative and qualitative findings will be described in an integrated way to address the aim of this chapter which is to understand the role of families in adolescent hookah pipe use and satisfaction of BPN.

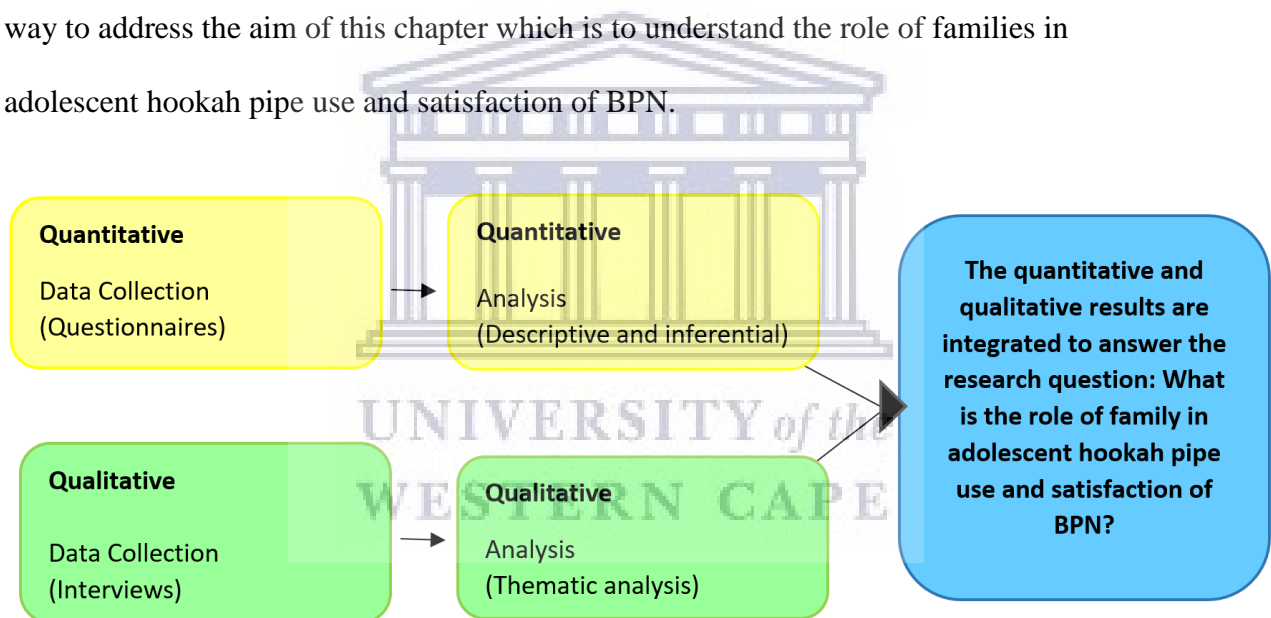


Figure 8.1: The Contiguous Approach to Present the Findings

8.6 Results

8.6.1 Phase 1: Quantitative Results

8.6.1.1 Demographic Details

The majority of the hookah pipe users were female (57.6%) and Afrikaans speaking (54.4%). The majority of the hookah pipe non-users were female (59.1%) and Afrikaans speaking (60.7%). Hookah pipe users mainly lived with both parents (49.6%), followed by

living with only their mothers (29.8%). A similar trend was found amongst hookah pipe non-users. Majority of hookah pipe non-users lived with both parents (50.1), followed by living with only their mothers (29.9%). The majority of the parents of hookah pipe users (45.5%) and non-users (46.3%) were married (refer to Table 8.2).

The adolescents' ages ranged between 13 and 19 years ($M = 16.0$, $SD = 1.44$) and their school grade ranged between 5 and 12 ($M = 9.8$, $SD = 1.28$). Age of onset for cigarette smoking ranged from 1 to 19 years old ($M = 13.6$, $SD = 2.54$), and the age of onset for hookah smoking also ranged from 1 to 19 years old ($M = 13.3$, $SD = 2.76$). The age of onset could also refer to experimentation. Whilst a one-year-old child using cigarettes or hookah may be concerning and odd, the age of onset can be corroborated by a participant in the qualitative phase who made reference to her two-year-old nephew using the hookah pipe as a result of witnessing family members smoke the hookah pipe:

“My nephew, he sees everyone does it; he also wants to smoke and he is only like 2, and then, like, when we not around, maybe he will try and smoke or whatever, yeah, because obviously you see everyone doing it, you think it's right (User, female, 15: P11: 120-123).

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Table 8.2: Demographics

Demographics				
		Total Sample %	Hookah Pipe Users % (n=256)	Hookah Pipe Non-Users % (n=909)
Gender	Male	33.3	42.4	40.9
	Female	66.7	57.6	59.1
Language	English	25.6	34.4	22.4
	Afrikaans	39.5	54.4	60.7
	IsiXhosa	30.2	10.4	16.2
	Other	4.7	0.8	0.7
Who do you live with	Both Parents	47.1	49.6	50.1
	Mother Only	37.9	29.8	29.9
	Father Only	3.4	4.1	3.2
	Sisters and Brothers Only	2.3	2.5	2.7
	Other family Members	9.2	14.0	14.0
Are your parents	Married	42.4	45.5	46.3
	Divorced	10.6	10.2	7.6
	Separated	17.6	15.7	17.1
	Living together	7.1	6.8	7.0
	Single Never Married	12.9	14.5	13.3
	Single because one parent died	9.4	7.2	8.7

8.6.1.2 Substance Use in the Family of Adolescent Hookah Pipe Users and Non-Users

Besides the hookah pipe, alcohol was the most commonly used substance amongst the participants' family members with hookah pipe users having a higher prevalence (54.7%) of alcohol use compared to hookah pipe non-users (42.5%). This was followed by cannabis use in the family of the user (24.4%) and non-user group (13.6%). Family use of Mandrax, heroin, and cocaine is less common amongst users and non-users.

Table 8.3 highlights that hookah pipe use is common amongst hookah pipe users' family as the majority of family members aged 16–17 (69.9%) smoked the hookah pipe. This was closely followed by family members aged 18–25 years old (64.1%). Amongst hookah pipe non-users, their family members that smoked were mostly aged 18–25 (43.2%) followed by 16–17 (41.3%) years old. Evidently, hookah pipe users have more family members that smoke the hookah pipe compared to hookah pipe non-users, and they have more family members that are approximately their age (16–17) that smoke the hookah pipe compared to non-users. Parents of hookah pipe users appeared more accepting of hookah pipe use in the home by family members (45.4%) and non-family members (31.3%) compared to hookah pipe non-users who indicated that 15.3% of parents allowed family members to smoke the hookah pipe at home and only 11.2% of parents allowed non-family members to smoke the hookah pipe at home. The hookah pipe is mostly used outside of the home in both the hookah pipe user group (73.9%) and the hookah pipe non-user group (81.1%). Participants reported that hookah pipe use is used as a means of socialising, talking easier to each other, and a form of communication amongst family members. Although socialising appears to be most common amongst hookah pipe users (49.6%) and hookah pipe non-users (23.6%).

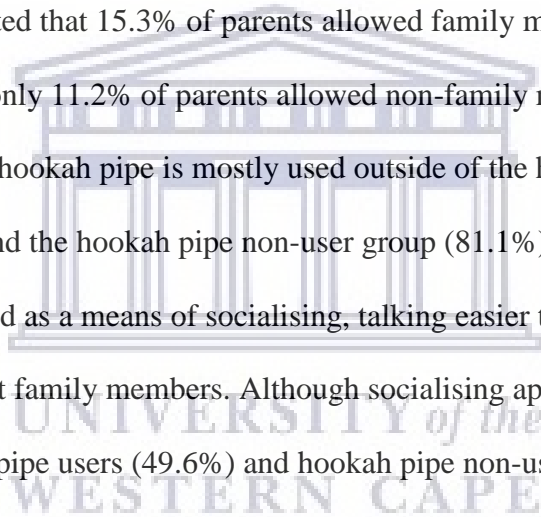


Table 8.3: Substance Use in the Family

Substance use in the family				
		Total Sample %	Hookah Pipe Users % (n=256)	Hookah Pipe Non-Users % (n=909)
Cannabis use in the family	Yes	17.1	24.2	13.6
	No	78.6	72.0	83.4
	I don't know	4.3	3.9	3.0
Mandrax use in the family	Yes	1.7	1.7	1.2
	No	98.3	97.7	98.0
	I don't know	0.0	0.6	0.8
Heroin use in the family	Yes	0.0	1.7	0.6
	No	100	97.1	98.6
	I don't know	0.0	1.1	0.8
Cocaine use in the family	Yes	0.0	2.3	1.1
	No	100	96.0	98.2
	I don't know	0.0	1.7	0.8
Alcohol use in the family	Yes	32.9	54.7	42.5
	No	64.4	44.0	55.2
	I don't know	2.7	1.3	2.3
Does your parents accept the use of the hookah pipe by family members?	Yes	22.1	45.4	15.3
	No	77.9	54.6	84.7
	I don't know	0.0	0.0	0.0
Do your parents allow non-family members to smoke hookah pipe in your home?	Yes	9.2	31.3	11.2
	No	90.8	68.8	88.8
	I don't know	0.0	0.0	0.0
Where is the hookah pipe smoked in your family?	Inside	5.9	8.5	5.5
	Outside	76.5	73.9	81.1
	Both	17.6	17.5	13.5
Are there any children (2–6 years) who smoke the hookah pipe in your family?	Yes	0.0	4.1	3.0
	No	91.7	94.6	87.2
	I don't know	8.3	1.2	9.8

Are there any children (7–10 years) who smoke the hookah pipe in your family?	Yes	2.7	9.1	5.2
	No	87.7	87.6	84.8
	I don't know	9.6	3.3	10.0
Are there any children (11–15 years) who smoke the hookah pipe in your family?	Yes	24.7	50.4	29.2
	No	64.4	45.8	60.1
	I don't know	11.0	3.8	10.7
Are there any children (16–17 years) who smoke the hookah pipe in your family?	Yes	31.0	69.9	41.3
	No	54.9	25.9	48.2
	I don't know	14.1	4.2	10.5
Are there any persons aged 18–25 years who smoke the hookah in your family?	Yes	34.2	64.1	43.2
	No	49.3	31.2	45.3
	I don't know	16.4	4.6	11.5
Are there any persons aged 26–35 years who smoke the hookah in your family?	Yes	20.5	38.3	22.1
	No	57.5	53.8	62.9
	I don't know	21.9	7.9	15.1
Are there any persons older than 36 years who smoke the hookah in your family?	Yes	8.5	18.1	11.3
	No	71.8	71.3	73.2
	I don't know	19.7	10.5	15.5
Is the hookah pipe used in your family as a means of socialising in your family?	Yes	20.8	49.6	23.6
	No	70.8	44.2	64.4
	I don't know	8.3	6.3	12.0
Do family members talk easier with each other when they are smoking the hookah pipe?	Yes	3.1	20.7	10.6
	No	66.2	56.5	67.4
	I don't know	30.8	22.8	22.0
Is the hookah pipe used in your family as a means of communicating with each other?	Yes	4.2	11.3	3.2
	No	86.1	79.9	82.6
	I don't know	9.7	8.8	14.2

8.6.1.3 Comparing Family Factors and BPN of Hookah Pipe Users and Non-Users

Table 8.4 shows that there were no differences between hookah pipe users and non-users in terms of family cohesion, family conflict, family permissiveness, family sociability, family satisfaction, relatedness, competence, autonomy, need frustration, and need satisfaction. All these effects were non-significant (in terms of p values) and trivial (in terms of effect size).

Table 8.4: Family Factors and BPN: Comparing Hookah Pipe Users and Non-Users

		N	Mean	Std. Deviation	Std. Mean Error	t	p	Effect Size Cohen's d
Family Cohesion	Users	215	3.64	0.72	0.05	-1.10	0.27	0.08
	Non-Users	679	3.70	0.77	0.03			
Family Conflict	Users	218	2.71	0.62	0.04	1.09	0.28	0.09
	Non-Users	676	2.66	0.54	0.02			
Family Permissiveness	Users	210	2.79	0.79	0.05	-0.56	0.58	0.04
	Non-Users	650	2.83	0.79	0.03			
Family Sociability	Users	216	3.66	0.70	0.05	1.08	0.28	0.09
	Non-Users	660	3.60	0.73	0.03			
Family Satisfaction	Users	183	3.61	0.80	0.06	0.28	0.78	0.02
	Non-Users	532	3.59	0.80	0.03			
Relatedness	Users	202	3.16	0.74	0.05	-1.49	0.14	0.12
	Non-Users	654	3.25	0.72	0.03			
Competence	Users	209	3.26	0.72	0.05	-0.31	0.76	0.02
	Non-Users	675	3.28	0.74	0.03			
Autonomy	Users	200	3.18	0.71	0.05	-1.01	0.31	0.08
	Non-Users	648	3.24	0.76	0.03			
Need Frustration	Users	189	2.71	0.81	0.06	-1.58	0.12	0.13
	Non-Users	601	2.81	0.79	0.03			
Need Satisfaction	Users	196	3.69	0.68	0.05	0.09	0.93	0.01
	Non-Users	637	3.68	0.76	0.03			

8.6.2 Phase 2: Qualitative Results

8.6.2.1 Demographic Details

Forty-seven percent of adolescents indicated they are hookah pipe users and 63% indicated that they were non-users. Table 8.5 describes the demographic characteristics of the adolescents who participated in the qualitative component.

Table 8.5: Demographics

Demographics				
		Total Sample %	Hookah Pipe Users %	Hookah Pipe Non-Users %
		(n=30)	(n=14)	(n =16)
Hookah Pipe Use Status	Hookah Pipe Users	47		
	Hookah Pipe Non-users	53		
Gender	Male	53	50	56
	Female	47	50	44
Age	13-14	10	7	13
	15-16	67	71	63
	17-19	23	21	25
Grade	7-8	10	14	6
	9-10	67	71	63
	11-12	23	14	31
Language	English	60	50	69
	Afrikaans	27	36	19
	IsiXhosa	13	14	13
Race	Coloured (mixed race)	83	79	88
	Black African	14	14	13
	White	3	7	0

Majority of the participants were hookah pipe non-users (53%), male (53%), aged 15–16 (67%), in Grades 9–10 (67%), English-speaking (60%), and of the Coloured race (83%).

There was an even balance of male (50%) and female (50%) hookah pipe users. Majority of

hookah pipe users were aged 15–16 (71%) in Grades 9–10 (71%), English-speaking (50%), and of the Coloured race (79%). Majority of hookah pipe non-users were male (56%), aged 15–16 (63%), in Grades 9–10 (63%), English-speaking (69%), and of the Coloured race (88%).

The results of the in-depth interviews are presented in Table 8.6 below according to the following themes: (1) The hookah pipe as a gateway, (2) Family Approval/Disapproval, (3) Parents as Role Models, (4) Adolescents' experiences in the family, (5) Using hookah as a means for coping with family challenges, (6) The need for families to foster connectedness, and (7) The need for families to foster autonomy. Each theme is unpacked in the narrative below the Table.



Table 8.6: Comparing Hookah Pipe Users' and Non-Users' Views on The Role of Families in Adolescent Hookah Pipe Use

Theme	User Quotes	Non-user Quotes
The hookah pipe as a gateway	N/A	<p>"I have two family members addicted to drugs. I think it is a result of hookah" (<i>Female, age 16; P12: 166</i>).</p> <p>"The hookah pipe is like the number one problem and in certain families are taking it like the norm. They are thinking that as long as it is not cigarettes or cannabis, but what they do not know is the hookah is the hub that leads to all problems" (<i>Male, age 18; P4: 46-49</i>).</p> <p>"I think that people younger than me that smoke are a disgrace because I see a lot of small children, like primary school smoking. When I look at them, I just think don't their parents know that they smoke. Hookah pipe use might lead them to do other things, such as cannabis" (<i>Female, age 15; P21: 95-97</i>).</p> <p>"If I smoke, my family will tell me it is wrong and explain that it is a gateway" (<i>Male, age 16; P28: 78</i>).</p> <p>"If I smoke, my family will think I do other stuff like cannabis" (<i>Female, age 15; P21:44</i>).</p>
Family Approval/Disapproval	<p>"If my mother says something, I will stop using" (<i>Male, age 14; P2:152</i>).</p> <p>"When I visited my cousins then I will sit with them, and then they will say I must smoke, then I will smoke with them. So, last year December, I asked my daddy to buy me one and he said yes, he will buy it as a Christmas present...so he did" (<i>Female, age 15; P20:101-107</i>).</p> <p>"I told my mother that I wanted a hookah pipe, so she gave me the money to buy one. I felt ecstatic that she said yes" (<i>Female, age 15; P30:98-106</i>).</p> <p>"I smoke with my uncle (age 40). Initially, I thought it was disrespectful, then he said it is fine as long as I don't drink or smoke cigarettes in front of him" (<i>Female, 15; P30: 135-136</i>).</p> <p>"I am allowed to smoke in my daddy's room because he said that it is fine because he likes the smell that he gets at night. The room smells nice, and in the yard" (<i>Female, age 15; P20:149-153</i>).</p> <p>"Sometimes I smoke with my uncle, but we do not smoke in front of my grandma, it's disrespectful and my grandma does not like it" (<i>Male, age 16; P23: 225-230</i>).</p>	<p>"If I smoke, my mother will hit me, and my grandma will want nothing to do with me. My grandma told me already when I was small that I must not smoke" (<i>Male, age 15; P22:32</i>).</p> <p>"My parents/family will think it's a bad thing because our neighbour smokes hookah pipe. Every time when the baby is in the house and our neighbours smoke, the baby gets a sore throat, so my mommy said it is dangerous to smoke" (<i>Female, age 13; P1::22-24</i>).</p> <p>"I experimented and my family found out, so I got grounded and my allowance was taken away, so I stopped" (<i>Female, age 18; P5:160</i>).</p> <p>"I experimented but when I thought of the days my parents told me I should not, it made me stop" (<i>Male, age 13; P10:125</i>).</p>
Family as Role Models	<p>"My mom's boyfriend and my uncle smokes, they are a bad influence because there is a baby in the house, and they smoke around the baby. My mom tells them not to, but they do not listen to her" (<i>Male, age 16; P19: 103-109</i>).</p> <p>"I grew up watching them smoke. Since I have an understanding of what it is like since I was a small child, I think it had an impact, like to see everyone doing it. Then you get to an age where you think it is appropriate for you to also do it. You tell yourself, let me try what everyone else has been trying" (<i>Female, age 15; P11:145-147</i>).</p> <p>"If it is used in the house, you will get tempted to smoke" (<i>Male, age 20; P11:140</i>).</p>	<p>"It is a bad reputation when adults smoke because children are looking up to them. Children will also try smoking the hookah pipe when they are older or when they are the same age as the adults" (<i>Female, age 15; P21: 103-104</i>).</p> <p>"I do not smoke the hookah pipe because I am trying to follow in my daddy's footsteps not to smoke because it is a bad thing" (<i>Female, age 16; P16: 108-110</i>).</p> <p>"I just don't feel the need to smoke because my parents don't smoke" (<i>Female, age 17; P13:160</i>).</p> <p>"It is a bad example to children when adults smoke because they are looking up to them. When they are older or the same age as the adults, they will smoke too" (<i>Female, age 15; P21:103-104</i>).</p>

	<p>“Everyone in the family smokes, it is normal. That is why they told me they are disappointed, but they cannot stop me” (Female, age 16; P11:361-362).</p>	
Adolescents experiences in the family	<p>“My mom and stepdad argue a lot. My stepdad argues with me. I do not feel part of the family. I feel that I am not good enough. My grandfather drinks a lot of alcohol and gets into physical fights” (Male, age 16; P29:421-422).</p> <p>“I feel lonely sometimes because it’s not every day that me and my daddy can chill together because I know he is stressed at work and stuff. Then he will come home angry or I will talk to him, then he will shout at me, then I do not know why, then I feel like, not even my daddy wants to talk to me” (Female, age 15; P20 245-248).</p> <p>“I grew up without a father” (Male, age 14; P2:455).</p> <p>“My biological mother is on drugs (methamphetamine and heroin). She left when I was 5. My dad also has a drug problem” (Female, age 15; P20:289-290).</p> <p>“My mother and father used to fight. I was raised with it. My father hit my mother and my mother hit us. My mom died in a car accident” (Male, age 16; P3:333).</p> <p>“My father and uncle that lives with us use dagga, methamphetamine, and Mandrax. They drink a lot” (Female, age 15; P30:455).</p>	<p>“I feel close to mom, dad, brother, grandma, and best friend. I feel happy with these people because we have a special bond and we have a good time together” (Female, age 16; P17:265-269).</p> <p>“My grandmother and mother do not <i>get along</i>. I feel my mom and sister have a better relationship because they bond longer. There is lot of family conflict. The conflict affects us” (Female, age 17; P3:323-325).</p> <p>“My father is a pastor. I have a strict family. We are close and connected” (Female, age 16; P25:487).</p> <p>“My parents got divorced when I was 5, but they are back together now. They argue a lot” (Male, age 18; P4:278).</p> <p>“My brother uses cannabis and cigarettes outside the house” (Female, age 15; P21:298)</p>
Using hookah as a means for coping with family challenges	<p>“I started when I was age 14 when my mom died. My friends introduced me to the hookah pipe. It calms me” (Male, age 16; P23: 152-153).</p> <p>“I smoke the hookah pipe to calm down when my brother punches and smacks me” (Female, age 16; P18: 188).</p>	<p>“Sometimes it’s just the stress. People want to blow off steam, then they smoke” (Male, age 15; P22:168).</p>
The need for families to foster connectedness	<p>“When I am spending time with my family, I do not think of smoking” (Female, age 15; P30: 502).</p> <p>“Parents need to initiate. They will notice that the behaviour of the child changes. Things in the house is [sic] not the same as it was in the past, and as children, we mostly live past each other. There is no bond to share things with each other (Male, age 17; P27: 327).</p> <p>“Have a strong bond between smoker and people; they feel close to so that they can share success stories” (Male, age 18; P6: 336).</p> <p>“To feel more connected to the family, they should go out more and the family should be there for the adolescents” (Male, age 16; P19:450).</p> <p>“Parents must be more involved. They must advise us and encourage our goals” (Male, age 15; P24: 355).</p>	<p>“They must be more connected. They should spend time with family and have family time or watch motives or eat ice cream together” (Female, age 13; P1:308-309).</p> <p>“Parents must be more involved in the activities we do” (Female, age 13; P1:318).</p> <p>“There must be strong bonds so that adolescents can rely on their family” (Male, age 15; P22:402).</p> <p>“Show the people that you want to be close and connected, and they must be able to know that you want them around” (Female, age 15; P21:344).</p>
The need for families to foster autonomy	<p>My mother wants to control the friends I choose, and my father wants to control my life. It feels like people just want to control my life. I feel forced. I must do as my father says, otherwise he will become aggressive (Male, age 17; P27: 327).</p> <p>“Adolescents want freedom from parents, and they must want to make their parents proud” (Female, age 16; P8:482)</p>	<p>“Parents and society must know that we are adolescents. They must give us space to do things – we must have space to make mistakes, take responsibility, and learn (Female, age 16; P9:295-296).</p> <p>“Parents must be open to letting their children do new things” (Male, age 18; P4:381)</p> <p>“Parents must not put too much pressure on their children” (Male, age 15; P22:354).</p>

8.6.2.2 Theme 1: The Hookah Pipe as a Gateway

Hookah pipe non-users believed that the hookah pipe is a gateway to other substances and substance dependence is due to early onset of hookah use. Older non-users are concerned about younger children that smoke the hookah pipe because they believe that their parents are unaware of their hookah pipe use and that families do not recognise the hookah pipe as a gateway substance. Families often perceive hookah pipe use as less harmful in comparison to cigarettes and cannabis. In contrast, families who recognise hookah pipe smoking as a gateway are more likely to believe that the adolescent is smoking other substances such as cannabis as well. Hookah pipe users do not share these views.

8.6.2.3 Theme 2: Family Approval/Disapproval

Hookah pipe users' family members appear more approving of the behaviour compared to hookah pipe non-users' family members. This is evidenced by parents of hookah pipe users gifting their children the hookah pipe or providing money to purchase it. Older family members' express approval by allowing the adolescents either to smoke the hookah pipe with them or in their personal spaces, such as the father's bedroom. Hookah pipe non-users, on the other hand, clearly indicate that their family disapproves of the behaviour. They are aware of the consequences should they smoke. Hookah pipe non-users' family members explicitly told them not to smoke and this forms part of the decision-making process of not smoking. Essentially, the decision to smoke or not is influenced by family members' approval or disapproval of hookah pipe use.

8.6.2.4 Theme 3: Family as Role Models

Hookah pipe users and non-users agree that adults who smoke the hookah pipe are not setting good examples for them. Since hookah pipe users experience family members smoking in front of them, they have a sense of inevitability that they would smoke too because they believe that this is a behaviour they are supposed to or can engage in. As a result

of parents' smoking behaviours, adolescent users and their family feel that family members that smoke cannot advise them not to.

Conversely, hookah pipe non-users feel that they do not want to smoke because their parents do not smoke. Adolescent hookah pipe non-users view adults who smoke as negative influences because they believe that younger children will do as the adult does. This may not be the view of the hookah pipe user, but it is their reality as is evident in their comments about how their family influences their use (refer to Table 8.5).

8.6.2.5 Theme 4: Adolescents' Experiences in the Family

Hookah pipe users reported witnessing violence, being a subject of abuse, and having family members that were substance abusers. Hookah pipe users experienced strained relationships with parents in terms of absent fathers, fathers that were physically present but not available to interact with their children, and substance dependent mothers. Adolescent hookah pipe users indicated feeling lonely and not a part of the family.

Adolescent non-users also identified negative experiences in the family, but the extent is different. For example, hookah pipe non-users witness family conflict, whereas hookah pipe users experience domestic violence; hookah pipe non-users reported cannabis use outside the home, whereas hookah pipe users expressed abandonment as a result of maternal substance abuse. Hookah pipe non-users revealed some positive experiences in the home, such as being happy, close, connected, having good times, and experiencing special bonds amongst family members, while hookah pipe users make no reference to positive experiences in the family.

8.6.2.6 Theme 5: Using Hookah as A Means for Coping with Family Challenges

Hookah pipe users and non-users agree that smoking the hookah pipe is a method for stress relief. Hookah pipe users explain that smoking the hookah pipe relieves stress and helps them become calm after a negative or challenging experience such as death, abuse, or conflict.

8.6.2.7 Theme 6: The Need for Families to Foster Connectedness

Hookah pipe users and non-users agreed that there is a need for families to foster a sense of connectedness. A hookah pipe user indicated that she does not think of smoking the hookah pipe when she is spending time with her family. Another participant explained how the need for a bonded family is neglected as family members live past each other, therefore parents need to be aware of their children, especially their behaviours. Adolescent hookah pipe users indicated that they would like to share success stories with their family members. They would also like to go on outings, and they want to feel that they can depend on their family members. Parental involvement is important for adolescent hookah pipe users because they would appreciate advice and encouragement.

Adolescent hookah pipe non-users also required an improved sense of connectedness. They would appreciate quality time, parental involvement, and a sense that they can rely on their family. In order for families to be close and connected, non-users recommended that all family members, including adolescents, must show that closeness and connectedness is desired.

8.6.2.8 Theme 7: The Need for Families to Foster Autonomy

Autonomy is desired by hookah pipe users and non-users. A hookah pipe user expressed how his parents want to control his life and his choice of friends. Users desire freedom because they do not feel free. It was expressed that users fear their parents' aggression; therefore, they always need to do as they are told. Users believe that if they are granted freedom, they will want to make their parents proud.

Hookah pipe non-users would also like to experience more autonomy. They would appreciate less pressure, opportunities to experiment, provision and acceptance of mistakes, opportunities to take responsibility, and to learn from experiences and mistakes.

Evidently, families play an important role in adolescents' choice to smoke the hookah pipe and satisfaction of needs. In many cases, family members are role models to adolescents, so their substance use influences adolescents' substance use. Not only do hookah pipe users' family members smoke more hookah pipe than non-users, they are more prone to use other substances, such as alcohol and cannabis. This, coupled with hookah pipe users being more approving of the behaviour and/or smoking with family members, exacerbates the likelihood that hookah pipe users will either start smoking or continue smoking because it is to some extent condoned. Non-users explicitly indicated that their families disapprove and told them not to smoke. While users' families may have shared the sentiment, the behaviour is not congruent. Since smoking the hookah pipe is a social activity, it is not uncommon that hookah pipe users believe that it allows for socialising, talking easier to each other, and a form of communication amongst family members. This may be especially true in families where trauma and conflict are apparent.

Whilst there was no difference in terms of the family variables between users and non-users, users described a family environment that was plagued by violence, being a subject of abuse, substance abuse, poor parental involvement, a sense of loneliness, and trauma, whereas non-users described a home environment with conflict and substance abuse, but they were also able to identify positive experiences in the family. To cope with family challenges, the hookah pipe is used by adolescents as a form of stress relief.

Again, no differences were reported between users' and non-users' needs, but they described frustration of autonomy and relatedness. They desired the satisfaction of autonomy within their families. Users felt controlled by their families. The control was fear of their parents' wrath which would resort to violence. Non-users felt that they did not have freedom because of their responsibilities at home or due to their parents' overprotective nature. Users and non-users indicated that they wanted to use the freedom positively. For example, users want to make their parents proud and non-users want to learn to take responsibility and learn

from their mistakes. Users and non-users explained that they would like the family to provide a context where their need for relatedness could be satisfied. More parental involvement, guidance, and family bonding activities are desired.

8.7 Discussion

The focus of this chapter was twofold: (1) to understand the role of the family in adolescent hookah pipe use, and (2) to understand how the family satisfies or frustrates the BPN of users and non-users. The reason for exploring how the family satisfies or frustrates the BPN of users and non-users is important because when needs are frustrated, adolescents are more likely to smoke the hookah pipe. This has been described by the adolescent users in the study. This study also revealed that the family has an important role in adolescents' decision to smoke the hookah pipe. Hookah pipe use, cannabis, and alcohol is more prevalent amongst users' families compared to non-users. The hookah pipe smokers in users' families are mostly adolescents. Users' parents are also more accepting of hookah pipe use. Users report that smoking the hookah pipe with family members allows for better communication. They also report that violence, substance abuse, and trauma is apparent in their family environments. Non-users describe a different family environment where they indicate that the hookah pipe users in their families are mostly young adults. Their family members are disapproving of the behaviour, and they have explicitly indicated their stance on hookah pipe use to the adolescents. They believe that hookah pipe use is a gateway to other substances; many non-users acquired this view from their family members.

Adolescents are in a unique phase of development where they are trying to become independent, but they still require the guidance of their family. This phase is different to younger phases where children are a lot more reliant on their families to guide their decisions and provide contexts to satisfy their needs. This phase is also different to adulthood, where individuals are able to make decisions more confidently and they are regarded as more independent (Redfield, 2019). Adults are also less accountable to others for their actions

compared to adolescents. Moreover, experimentation commonly occurs during adolescence and if it is not curbed at this stage, adolescents may be encouraged to pursue more hazardous behaviours, such as using other licit or illicit substances (Strong et al., 2019). For these reasons, this study is focused on adolescents.

Adolescents described how family experiences, behaviours, and attitudes shaped their choice to smoke or not smoke. This was mostly influenced by (1) substance use in the family, (2) approval or disapproval of hookah pipe use, and (3) experiences in the family.

Family substance use was more prevalent amongst hookah pipe users than non-users. This finding is consistent with studies focusing on adolescent substance use which claims that parental or familial substance abuse is a risk factor for adolescent substance use because adolescents may observe substance use, acquire favourable attitudes toward substance use, and begin using substances themselves (Brown, 2013; Krohn et al., 2016; Thullen et al., 2016). Agaku et al., (2018) indicated that the influence of siblings who smoke the hookah pipe in the household significantly increases the risk of hookah smoking, especially of younger siblings. Bahr and colleagues (2005) highlight that it is particularly concerning when adolescents' role models abuse substances because adolescents are likely to listen to and give priority to individuals they admire. This was a common finding in this study too – adolescents identified their role models (parents, aunts, uncles, siblings, and cousins) who smoke the hookah pipe and expressed how it influences their decision to smoke. There is a fear that if they do not smoke, they will not fit in with the group. Hookah pipe use in the family encourages adolescents to smoke the hookah pipe but when family members abuse other substances as well, it may negatively affect the adolescents because the likelihood of neglect, abuse, bullying, feelings of stress, and emotional difficulties are increased (McLaughlin et al., 2016). Adolescents in the current study identified experiences like this and indicated that this leads to maladaptive coping strategies, such as hookah pipe use. Smoking the hookah pipe

provided a sense of stress relief, but it also provided an opportunity to be away from the family environment.

While family members' behaviour influences adolescent hookah pipe use, their attitudes towards hookah pipe smoking is also important. When adolescents believed that their parents would not enforce consequences for hookah pipe use, they were more eager to smoke. Similarly, when family members approved of the behaviour by allowing family members to smoke inside the house, gifting hookah pipes or giving money, this gave users the impression that family members did not object to their hookah pipe use, so they continued smoking. Hookah pipe non-users, on the other hand, knew that their parents disapproved of the behaviour because they enforced consequences, provided ultimatums, educated them, and instructed them not to smoke. Usually when there is an assumption that parents will be disapproving of the behaviour, there is more motivation to either stop or not use the hookah pipe compared to when parents signify approval of the behaviour. This view is supported by Calvanese et al., (2015) who found that parents' disapproval of smoking is a stronger determinant of adolescents' smoking intention compared to peer normative behaviour. Non-users describe a better relationship with their family compared to users. A high quality parent-child relationship and good communication has been found to minimise the chances of adolescent hookah smoking (Scalici & Schulz, 2014). Parents who engage children in antismoking conversations and behaviours have significantly lower rates of smoking onset (Eugen et al., 2015). If parents hold the view that the hookah pipe is a gateway substance, adolescents are less likely to use the hookah pipe because they may hold a similar view. This was also evidenced in this study.

In many cases, adolescent users report that the negative effects of smoking the hookah pipe is outweighed by the positive experiences. The hookah pipe is considered a social instrument that assists with socialising and communicating (Agaku et al., 2018); it also serves as a coping mechanism. Adolescents in the current study did not explicitly indicate that the

positive experiences outweighed the negative experiences. Although, they alluded to the benefits of smoking, such as improved communication, stress relief, and experiencing a connection with the smoking group. They explicitly indicated that hookah pipe smoking is a coping mechanism to deal with family challenges. These findings align with SDT, which states that when needs are not satisfied in the family context, unhealthy behaviours start to develop (Kader & Roman, 2016). In order for the family environment to satisfy adolescents' needs, parents should allow open discussion, make joint decisions, show empathy, consider the adolescents' perspectives, support their initiatives, and dedicate time, attention, resources and energy to the adolescents. It is also important for family members to be emotionally present (Allen et al., 2019). Structure within the family context is very important – there should be clear and consistent expectations and rules, skilful discipline, predictable consequences, and good rationales for why rules are important. Parents should act as authority figures (Allen et al., 2019). When these conditions are set, adolescents will be intrinsically motivated to pursue their interest while at the same time realise that sometimes they must make choices that are not always fun but that will have a more favourable outcome (such as not smoking the hookah pipe). When the conditions are not met because the family context does not allow the satisfaction of needs, adolescents may need to seek alternative ways to satisfy their needs, such as smoking the hookah pipe (Kader & Roman, 2016; Allen et al., 2019).

Hookah pipe non-users described feeling more satisfied with their families compared to hookah pipe users. Satisfaction was described as a good relationship and sense of happiness. SDT describes relatedness as a catalyst for adaptive adolescent development (Hutman et al., 2012). If adolescents felt more connected to their family by spending more time together, communicating more, advising, engaging in interacting activities and supporting each other, they would be encouraged to reduce hookah pipe use. When the family is considered more supportive, adolescents are more open to accepting challenges. It is

important for adolescents to experience a sense of belonging, acceptance, and connection, as it contributes to good health, well-being, life satisfaction, good coping abilities, self-esteem, and self-efficacy (Jetten et al., 2017). Not belonging frustrates relatedness needs. This may result in health risks and negative behaviours, such as joining peer groups with negative influences, impeding the adolescents' opportunities to excel (O'Brien & Bowles, 2013). Conversely, when their need for relatedness is satisfied, and they experience the important people in their lives as supportive, genuine, invested, and understanding, they feel safe and secure. This allows them to engage in activities that are interesting and meaningful to them and avoid negative behaviours (Ryan, 1995; Hutman et al., 2012). There was no difference in the results of users and non-users in terms of their need for relatedness. Users and non-users indicated that there is a need for families to provide a sense of belonging and support. However, when describing their family experiences, non-users could identify some experiences of when their family was able to satisfy their need for relatedness, while users could not. Users and non-users indicated that their need for relatedness could be satisfied if their parents were more involved, if families would share stories and spend time together, and if they knew that they could rely on their families for guidance and support.

With reference to autonomy, users and non-users felt that they needed to feel more autonomous. They indicated that they need space and do not want to feel controlled. SDT emphasises the importance of autonomy and parental autonomy support (Deci & Ryan, 2000; Ryan & Deci, 2008). Parents should strive for parental autonomy support which involves supporting adolescents' initiatives, encouraging opportunities, and allowing open discussion, especially about challenges encountered by the adolescent. The opposite of autonomy support is parental control. Controlling parenting pressures children with rigid demands, coercive rewards, harsh punishment, or surveillance. Controlling parenting frustrates the need for autonomy. In turn, adolescents seek alternative ways to satisfy this need in an attempt to feel free and make decisions. Therefore, the choice to smoke the hookah pipe is not unusual (Allen

et al., 2019). There was no difference in the results of users and non-users in terms of their need for autonomy. Users and non-users indicated that there is a need for families to foster their sense of autonomy so that they can learn from their mistakes and take responsibility.

While adolescents did not explicitly indicate that they smoke the hookah pipe to satisfy needs, they did indicate that they smoke the hookah pipe as a means to cope with life stressors, in particular, family challenges. Non-users recognise that the hookah pipe is used to relieve stress but that is not how they cope. This study revealed that the family does contribute to adolescents' decision to smoke the hookah pipe and the family has an important role in satisfying the BPN of adolescents. Due to the novice nature of this research, literature to corroborate or refute these findings could not be located. No known studies have focused on adolescent hookah pipe use from a family and SDT perspective. Therefore, the findings of this study are important as it could be a steppingstone in understanding the role of families in adolescent hookah pipe use. Adolescents do not live in isolation; they are always affected by the behaviours and attitudes of their family members. Therefore, understanding how the family influences their decision to smoke is very important. If families become aware of their influence in hookah pipe use, they would be able to guard their attitudes and behaviour better in an attempt to deter adolescents from smoking the hookah pipe. Moreover, if families can provide contexts where needs are satisfied, adolescents may not need to resort to hookah pipe smoking as a coping mechanism.

8.8 Limitations and Future Research

The quantitative findings contradict the qualitative findings where there are no noteworthy differences between users and non-users in terms family permissiveness, family sociability, family conflict, and family satisfaction, but there are clear differences between users and non-users in the qualitative findings. This could be due to adolescents not being comfortable answering personal questions related to their family, or they did not adhere to the instruction which indicated that they must reflect on the past six months. They could have

responded thinking about the present, and it could have been that many users felt content with their family and satisfied with their needs at that specific point in time. This is one of the limitations with cross-sectional research. Alternatively, due to the sensitive nature of discussing one's family, it is likely that some participants wanted their families to be seen in a favourable light by providing socially acceptable answers, even though confidentiality and anonymity was ensured. Further research is needed to assess the difference between family permissiveness, family sociability, family conflict, and family satisfaction. It would be worthwhile investigating each of these variables separately, but more extensively, to determine specific differences between users and non-users. This challenge was not apparent in the qualitative inquiry because the researchers made use of one-on-one interviews which allowed adolescents to experience a better sense of privacy and confidentiality, and probing techniques were utilised. For this reason, it is likely that differences between users and non-users could be identified as part of the qualitative results and not the quantitative results. Moreover, this study only considered adolescents' views of the role of family in hookah pipe use, including information from family members would have provided alternative perspectives and different insights. Future studies could focus on incorporating the views of parents in the study.

8.9 Recommendations for Practice and Policy

There is a need for policy to make reference to the family environment and family use of substances, especially in the presence of children. Stricter policies should be put in place about selling hookah pipe products to adolescents and younger children so that they cannot access these products with ease and/or be tempted to smoke it. With regards to practice, families need to be made aware by the media and practitioners about their role in adolescent hookah pipe use and their role in satisfying adolescents' BPN. Structures need to exist in communities that can assist with stress relief such as counselling centres, sport and recreation activities, and workshops for children and parents, so that there are other means of stress

relief. These activities will also allow for the fulfilment of needs as they can choose to go, feel competent when they are successful in the activity, and feel a close connection with fellow members.

8.10 Conclusion

Family substance use, families' attitudes, and experiences in families plays an important role in adolescent hookah pipe use, the challenges adolescents encounter, and the way they respond to challenges and opportunities. Whilst family permissiveness, family sociability, family conflict, and family satisfaction does not show to be associated with the choice to smoke the hookah pipe or not, findings such as parents as role models, family members' approval or disapproval of use, and family members' substance use has a contributory role in adolescents' choice to smoke or not smoke the hookah pipe. Again, there was no differences in the satisfaction or frustration of BPN between hookah pipe users and non-users. However, the need for families to foster satisfaction of relatedness and autonomy was clearly stated by adolescents in the qualitative segment of this research. This could be achieved by families being made aware about their role in adolescent hookah pipe use and their role in satisfying adolescents' BPN. When needs are satisfied, adolescents may be more eager to explore new opportunities. It is intended that the findings of this study coupled with the recommendations could add value when intervening to reduce adolescent hookah pipe use and children in Africa can avoid the challenge of substance dependence.

8.11 References

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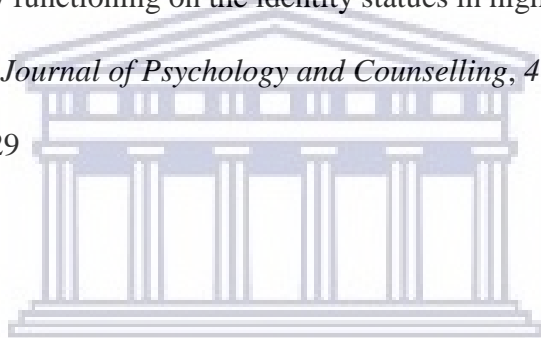
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UNIVERSITY of the
WESTERN CAPE

CHAPTER 9

AN INTERVENTION TO REDUCE ADOLESCENT HOOKAH PIPE USE AND SATISFY BPN

9.1 Introduction

The previous chapters reviewed global literature about determinants of adolescent hookah pipe use and existing interventions. Thereafter, adolescents harm perception, BPN and motivation was studied to assess how this contributes to adolescents' decision to smoke or not. The role of family in adolescent hookah pipe use was also studied. The culmination of findings from the previous chapters resulted in a framework to intervene in adolescent hookah pipe use and satisfy their BPN. This framework was presented to an expert panel comprising of academics, practitioners, policy makers and civil society. This chapter presents the intervention and the process that the researchers followed that led to the development of the interventions. This chapter addresses Objective 6 and 7, which aims to describe the need for an intervention to reduce hookah pipe use and design a programme to reduce adolescent hookah pipe use and satisfy their BPN. This chapter has been published in *Cogent Psychology*.

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An Intervention to Reduce Adolescent Hookah Pipe Use and Satisfy BPN:

A Modified Delphi Approach

9.2 Abstract

Background: Hookah pipe use is a public health concern and threat to adolescents' health. Self-Determination Theory asserts that satisfaction of BPN (BPN) will contribute to adolescents developing optimally. **Purpose:** The purpose of this study was

to design an intervention to reduce adolescent hookah pipe use and satisfy their BPN.

Methods: A modified Delphi approach was implemented using a two-phased approach. Phase 1 included reviews and empirical research that formed part of the needs analysis. Phase 2 was the development of the intervention in collaboration with stakeholders from academia, policy and practice (n = 25). The stakeholders formed the sample for this study. Phase 1 informed phase 2. Phase 2 was implemented through a 4-hour workshop with the stakeholders. The workshop was audio recorded, transcribed verbatim and thematically analysed. **Principal Results:** The results indicated that a holistic four-pronged approach focusing on (1) the hookah pipe user, (2) the family, (3) after school recreation activities and (4) the teacher and community was needed as a model to intervene in adolescent hookah pipe use and satisfy their BPN. The intervention was described using the RE-AIM framework which considers reach, efficacy, adoption, implementation and maintenance of the intervention. An intervention has been co-created by the researchers and the stakeholders. **Conclusions:** This intervention is valuable because it can support the healthy development of adolescents by reducing hookah pipe use, ease the pressure on health systems, raise awareness and potentially serve as a preventative measure for younger children who may want to experiment. Furthermore, it provides opportunities for families, school and community structures to encourage satisfaction of BPN.

Keywords:

Adolescent; Hookah Pipe; Tobacco; Self-Determination Theory; BPN; Family Environment; Physical/Social Environment; Delphi

9.3 Introduction and Review of Literature

Hookah pipe use is a major public health concern that affects adolescents' physical and mental health. The hookah pipe is a mechanism used for tobacco consumption (Currie & Bray, 2019). Smoking the hookah pipe is hazardous as it contains toxic substances that are linked to lung and heart disease, increased lung inflammation, bronchitis, emphysema, elevated heart rate and blood pressure, periodontal disease, addiction, decreased exercise capacity as well as cancer (Bashirian et al., 2019). Hookah pipe smoking exposes adolescents to nicotine, which is addictive and dangerous because it causes a rapid release of adrenaline

from the cortex of adrenal glands. This release causes concerning symptoms such as shortness of breath as well as increased blood pressure, heart rate and blood sugar levels. Symptoms of nicotine toxicity could also cause nausea, sweating, diarrhoea, difficulty breathing and abdominal pain (Moghaddam et al., 2019). However, hookah pipe smoking remains popular amongst adolescents because of the flavoured tobacco, social acceptability, lack of hookah pipe specific policy and regulations, promotion using the Internet and social media to advertise the products and perceived harmlessness (Pashaeypoor et al., 2019). Lopez et al. (2017) assert that now is the time to advocate for interventions designed specifically to prevent and control hookah pipe smoking since adolescent hookah pipe use is spreading rapidly globally.

There has been an increase in intervention studies focused on reducing hookah pipe use globally in the last decade but a systematic review by Kader et al. (2019) revealed that there were limited quality interventions in terms of reach, efficacy, adoption, implementation and maintenance and only a small number of interventions that were effective in reducing hookah pipe use. This view was supported by reviews done by Maziak et al. (2015) and Jawad et al. (2016) who found that few studies showed promising results in favour of hookah pipe cessation. However, these interventions did show promise for prevention, altering perceptions of harm, increased knowledge and self-efficacy. These interventions are important as they form the foundation of future interventions by highlighting important design and content issues that should be considered. The three reviews found minimal studies focusing specifically on adolescents and only one study in Africa (Egypt).

Peer (2018) argues that current strategies are inadequate to curb the rise of tobacco use in Africa because of the weaker smoke-free policies, lower rates of tobacco taxation, and fewer restrictions on tobacco advertising compared with high-income countries. Since the rise of tobacco use is common amongst males and females, tax adjustments, smoking rules and price hikes of tobacco could deter them from smoking (Kipkorir et al., 2019). Income status is

an important consideration for tobacco smoking since the majority of the world's smokers (81%), are in low-and middle-income countries (Cambron et al., 2018). This is evident in Kenya where, Kipkorir et al. (2019) highlights that approximately 6000 Kenyans die of tobacco-related diseases, while more than 220 000 children continue to smoke each day. The majority of this population is living in low-income households. Smoking can be attributed to increased poverty and social ills, adjusting or coping with serious illnesses, diagnoses of depression and anxiety disorders as well as smoking-specific work and family contexts (Cambron et al., 2018). Despite these challenges, countries such as Mauritius, Uganda and South Africa (SA) have accomplished significantly more in their efforts to curb tobacco use but there is still a need to urgently strengthen efforts to implement effective tobacco control policies (Peer, 2018).

Tobacco use in Africa extends beyond cigarette smoking but little emphasis is given to other tobacco products, such as the hookah pipe, even though hookah smoking is prevalent in many African Countries (Omotehinwa et al., 2018). SA is of particular concern as Reddy et al. (2015) reported that, in SA, 20.1% of adults are hookah pipe smokers, almost two-thirds of university students in the Western Cape reported having ever smoked a hookah pipe and 21% of school learners were found to be current hookah smokers, with 6.8% having initiated smoking before the age of 10 years old (Kruger et al., 2016). So, a need exists for an intervention to reduce adolescent hookah pipe use in resource- constrained countries such as SA.

Real-life problems, such as adolescent hookah pipe use are—by definition— are complex; otherwise, they would already have been solved without the need to involve researchers. It follows, then, that a multi-theory approach is required (Bartholomew-Eldredge et al., 2016) in order to further understand and solve real-life problems. This is also why intervention studies do not necessarily lead to improvements in a single theory (Prestwich et al., 2015). From this perspective, applying theory to real-life problems can be likened to

completing a jigsaw puzzle with various theories fitting together to provide an explanation or answer to a planning question (Peters & Crutzen, 2017). The argument that one theory—for example, the SDT—cannot explain all the possible variances in behaviour or behaviour change is, therefore, no reason to discard the theory altogether (Kok & Ruiter, 2014). Not being able to explain all variance in behaviour could only be held against a “Theory of Everything”, and there are good reasons why such a theory is undesirable (Peters & Crutzen, 2017). Therefore, when trying to understand a problem and planning interventions it is important to follow the core processes (Ruiter et al., 2018). These core processes include the systematic process of asking a question, brainstorming possible answers, looking for empirical evidence and theoretical support, conducting new research, and coming to a final list of answers to the question (Ruiter et al., 2018). This process allows for an understanding of the problem, selecting methods of change, creating aims and objectives as well as designing and implementing evaluable interventions (Ruiter et al., 2018). This study and intervention focus was particularly interested in the understanding the motivation and BPN of adolescents who smoke the hookah pipe in an attempt to reduce adolescent hookah pipe use. In order to understand these variances of adolescent hookah pipe use, Self-Determination Theory (SDT) was deemed the most appropriate theory to understand and intervene in adolescent hookah pipe use.

SDT posits that one needs to have an understanding of adolescents’ needs fulfilment and needs frustration because it is the pursuit of need satisfaction that motivates one to pursue or not pursue a behaviour, in this case, hookah pipe use (Deci & Ryan, 2000). Since motivation exists on a continuum, one can be intrinsically motivated (behaviour is executed as a result of enjoyment, interest and inherent satisfaction for the action itself), extrinsically motivated (behaviours that are controlled by external rewards and peer pressure) or amotivated (lack of motivation) when engaging in behaviours that will satisfy the needs (Ryan & Deci, 2017). SDT proposes that there are three BPN which are necessary to fulfil in

order to thrive and develop optimally. These needs are essential for everyone, including adolescents but the goals for satisfaction differ, for example, an adult may satisfy the need for competence through their career but some adolescents may satisfy this need through sport (Deci & Ryan, 2000). The three psychological needs are autonomy (experienced sense of freedom and volition), competence (experienced sense of mastering) and relatedness (experienced sense of attachment and belonging). Contexts such as the family, school and peer environment can either allow or hinder satisfaction of these needs. When needs are satisfied, one will experience health and wellbeing and when needs are frustrated, physical or psychological distress and ill-being will manifest (Williams et al., 2000). In order to adequately intervene in adolescent hookah pipe use, it is important to understand their motivation for smoking and gain insight into how the needs are satisfied when smoking. This would allow practitioners to seek alternative ways of satisfying that need without smoking the hookah pipe (Moore & Hardy, 2019).

Since the aim of the paper was to describe the intervention, the authors have focused on how SDT is used in the development of this intervention and not have a theoretical debate on its own. SDT connects to adolescent hookah pipe use because it allows for the internal exploration of why adolescents smoke the hookah pipe that extends beyond the common reasons that are recognized as determinants of adolescents' hookah pipe use such as sweet smell, escape boredom, relaxation, etc. (Pashaeypoor et al., 2019). SDT is interested in the psychological motivators of the behaviour. It is hypothesized that adolescents are motivated to smoke the hookah pipe in an attempt to satisfy their BPN. Smoking the hookah pipe allows adolescents to experience autonomy by believing that they are choosing to smoke, competence because they may experience a sense of mastery when they are able to perform tricks with the smoke and relatedness by experiencing social connections when they are spending time with their friends while smoking. Moreover, the school, community and family environment, which is regarded as important in SDT, has an influencing role in adolescent

hookah pipe use as it may condone or condemn the behaviour and satisfy or thwart need satisfaction (Ryan & Deci, 2017). When needs are not satisfied in these contexts, adolescent may seek needs fulfilment elsewhere, for example, through hookah pipe smoking. These factors are typically not considered when intervening in hookah pipe use because the focus is mainly on providing education programmes about the harms of smoking and/or adapting tobacco smoking cessation interventions to address hookah pipe use (Kader et al., 2019). This is not sufficient because smoking the hookah pipe a different experience compared to cigarette smoking because of its social element (Siddiqi, 2018). Therefore, the desire to intervene from an SDT perspective is novel.

In an attempt to design an intervention that reduces hookah pipe use and satisfies BPN, literature and adolescents were consulted as a first phase. Thereafter, in Phase 2, a planning group including stakeholders from the academic, policy and practice landscape with vast knowledge and experience was established. It was deemed valuable to gain input from an expert panel regarding the subject matter in order to incorporate first-hand experiences, be cognisant about existing strategies to address the problem and to gain the necessary critique to improve the initial ideas. The planning group was expected to provide insights about the design, content and process of the intervention. Including the planning group in the development of the intervention allowed for a collaborative approach to co-create the intervention. The benefit of co-creation allows for maximising the acceptability, feasibility and quality of the intervention within various contexts because these stakeholders either have first-hand knowledge and experience with the target population, the implementation context, frontline practitioners and resources. As such, they were not able to comment on what will be effective and adequate, but also identify which elements will not work. Having this knowledge allows challenges and risks to be mitigated at the design phase already (Hawkins et al., 2017). Co-creation also stimulates an element of “buy in” to the intervention and creates a sense of ownership and commitment amongst those involved in its development as

well as effective collaboration between frontline practitioners, researchers, government and civil society in order to reduce adolescent hookah pipe use and support with satisfying their BPN through harnessing the expertise of key stakeholders (Hawkins et al., 2017).

Since adolescent hookah pipe use is a public health concern, it was intended that the intervention should have a public health impact. The RE-AIM framework is a planning and evaluation model that has been used in an array of contexts to address programmatic innovations for improving public health. The RE-AIM framework focuses on addressing reach, efficacy, adoption, implementation and maintenance of interventions. This framework allows for flexibility to address different public health concerns in a practical manner understandable by practitioners and policymakers (Harden et al., 2018). Therefore, this intervention was described using the RE-AIM framework which extends beyond the efficacy paradigm to effectiveness and assesses the degree of reach, adoption, implementation and maintenance of effects (Kessler & Glasgow, 2011). The RE-AIM framework was used in order to describe an intervention that was feasible, scalable and replicable. In this paper, we present the process, intervention and insights from the stakeholders in order to satisfy the aim of designing an intervention to reduce hookah pipe use and satisfy BPN.

This paper is deemed necessary and innovative because it addresses a health hazard in a way that has not been done before. Traditional tobacco cessation interventions and existing hookah pipe interventions provide brief interventions focusing only on the user (Kader et al., 2019).

This study is interested in the different factors and environments influencing adolescent hookah pipe use. Furthermore, it studies hookah pipe use from an SDT needs perspective because the experience of needs satisfaction and needs frustration serves as a motivating factor to pursue behaviours (or not pursue behaviours) such as hookah pipe use. This chapter incorporates ideas from literature, adolescents and stakeholders with expert knowledge and experience through the modified Delphi approach methodology.

A comprehensive background emphasising the importance of intervening in adolescent hookah pipe use from an SDT perspective has been provided. This is followed by describing the methodology of how the intervention was developed and how stakeholders were consulted. Thereafter, the intervention and the feedback from the stakeholders are presented. Lastly, this chapter provides a discussion about the intervention and highlights the limitations and recommendations for future studies.

9.4 Methods

9.4.1 Research Paradigm

Traditional Delphi designs utilise a group communication process focused on reaching consensus through rounds of questionnaires which are presented to expert panels (Avella, 2016). Modified Delphi's, on the other hand, do not consult experts to generate ideas by means of questionnaires. Instead, the researcher (a) collects the initial answers through local and international sources by means of reviews, self-administered questionnaires and interviews, (b) summarises the findings and then (c) presents it to the expert panel for input (Avella, 2016). This study employed a modified Delphi method which included a combination of systematic reviews, self-administered questionnaires, in-depth interviews and a physical meeting of experts to discuss the results. The meeting served as a consensus method that allowed experts to generate ideas based on their expertise about the intervention to reduce to adolescent hookah pipe use and satisfy BPN. This study, therefore, used a two-phase model, whereby, Phase 1 focused on collecting data prior to the workshop in order to answer the initial questions and Phase 2 focused on the co-production of the intervention. This process is depicted in Figure 9.1. This study forms part of a larger project which aims to design an intervention to reduce hookah pipe use and satisfy BPN, therefore, Phase 1 will be briefly discussed and emphasis will be placed on Phase 2—the consensus workshop.

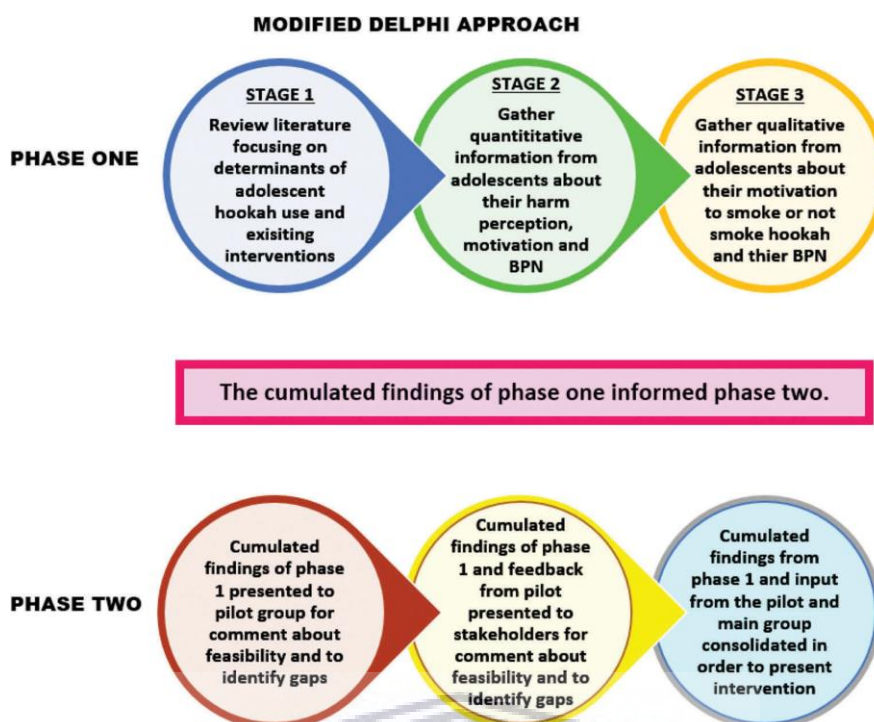


Figure 9.1: Modified Delphi Approach

9.4.2 Phase One: Evidence Review, Self-Administered Questionnaires and In-Depth Interviews

The core processes framework was used to assimilate the evidence, theories and research in this intervention to understand the problem and intervention development. First, questions were posed and the possible answers were attained in stage one (systematic reviews), then empirical evidence and theoretical support were established in the form of conducting research in stage 2 and 3 whilst using SDT as a theoretical framework. Currently, this study is focused on conducting new research, and coming to a final list of answers to the intervention design by using a Delphi Approach where co-creation occurred with stakeholders (Phase 2). This process is depicted in Figure 9.1.

The findings of each stage in Phase 1 were consolidated and a summary of the results were presented to the expert panel in Phase 2 by means of an MS PowerPoint Presentation.

Table 9.1 identifies three stages in Phase 1 and provides detail about the aim, method and results of each stage.

Table 9.1: The Stages of the Problem Identification

Stage	Aim	Method	Results
Stage 1 <i>Systematic review:</i> Determinants	Understand why adolescents smoke the hookah pipe	<ul style="list-style-type: none"> • 12 databases with 22 search variations related to determinants and hookah pipe • 3 levels of review (title, abstract and full text) • Full text was appraised to assess quality for inclusion • Data Extraction • Data was analysed using narrative synthesis 	<ul style="list-style-type: none"> • Total of 25 studies included • Participants in studies: Preadolescents and adolescents aged 10-19 • Study samples were on average 46% female • 96% of the population was school students • Determinants included peer/friends, individual, school and family factors as well as other factors such as taste, smell and seeing advertisements of hookah
Stage 1 <i>Systematic review:</i> Interventions	Determine existing interventions and their properties using the RE-AIM Framework	<ul style="list-style-type: none"> • 12 databases with 26 search variations related to interventions and hookah pipe • 3 levels of review (title, abstract and full text) • Full text was appraised to assess quality for inclusion • Data Extraction using RE-AIM (Reach, Efficacy, Adoption, Implementation and Maintenance) Framework • Data was analysed using narrative synthesis 	<ul style="list-style-type: none"> • 10 studies included in review • 60% Asia, 30% North America and 10% Europe • Details about the RE-AIM stages and full article based on this stage can be accessed using the following link: http://www.samj.org.za/index.php/samj/article/view/12618/8867
Stage 2 <i>Quantitative</i>	Investigate adolescent hookah pipe use and compare users and non-users knowledge of hookah, BPN, motivation for use or non-use and the role of family in hookah use and non-use	<ul style="list-style-type: none"> • Simple Random Sampling • 1201 participants – 12 schools • The following measures were used: demographics self-constructed questionnaire, family hookah pipe use and acceptability of hookah pipe use self-constructed questionnaire, family functioning scale, balanced measure of psychology needs scale and satisfaction with family scale • Data analysed using SPSS 	<ul style="list-style-type: none"> • 21% Users and 76% non-users • The majority of hookah pipe users were female (57.6%), coloured (84.7%), Afrikaans speaking (54.4%) adolescents living with both their parents (49.6 %) who were married (45.5%). • Age ranged from age 13-19 and education level ranged from grade 5 – 12 • Age of onset for hookah smoking also ranged from 1-19 but the mean age was 13.25 • Hookah pipe users and non-users have relatively similar views related to harm • No significant differences between users and non-users' satisfaction or frustration of needs. However, users and non-users revealed that their decision to smoke or not smoke is a result of perceived choice and autonomous motivation respectively. • Family substance use, families' attitudes and experiences in families

			plays an important role in adolescent hookah pipe use. Whilst family permissiveness, family sociability, family conflict and family satisfaction does not show to have a significant impact on the choice to smoke the hookah pipe or not. However, parents as role models, family members' approval or disapproval of use and family members' substance use seems to encourage use or non-use
Stage 3 Qualitative	Comparing hookah pipe users and non-users experience of BPN, motivation to smoke or not to smoke, the role of family in hookah use and non-use and intervention ideas.	<ul style="list-style-type: none"> • Purposive sampling • 30 participants – 4 schools • Interview schedule • One on One interviews • Audio-recorded and transcribed • Analysed using Braun and Clarkes 6 stages of thematic analysis 	<ul style="list-style-type: none"> • 30 adolescents aged 13-19 • The study revealed that satisfaction or frustration of autonomy does not impact the choice to smoke or not smoke the hookah pipe. However, this study revealed that frustration of competence and relatedness is common amongst hookah pipe users and plays an important role in the choice to smoke or not • Adolescents are intrinsically and extrinsically motivated to smoke or not smoke • Family behaviour and attitudes contribute to the choice to smoke or not smoke the hookah pipe.

The findings of each stage in phase one was consolidated and a summary of the results were presented to the expert panel in Phase 2 by means of a MS PowerPoint Presentation.

9.4.3 Phase Two: Co-Creation of the Intervention

9.4.3.1 Participants

Okoli and Pawlowski (2004) describe the need to have an expert panel that represents different lenses. Therefore, academics, practitioners, local and provincial government officials, non-profit organisations (NPO's), faith-based organisations (FBO's) and research organisations were approached to be a part of the expert panel. Participants were required to have experience and knowledge about hookah pipe use, substance use, adolescents, intervention development or self-determination theory. Participants were purposively recruited on the basis of their knowledge and experience via the researchers' professional network and via the mailing list of SACENDU (South African Community Epidemiology Network on Drug Use). Thirty-five people were invited to participate in the pilot workshop hosted 14 October 2019 of which 15 confirmed attendance, and 10 people attended the

workshop. Five people emailed apologies due to unforeseen circumstances 1–2 days before the workshop. Seventy-Eight people were invited to participate in the main workshop, hosted 13 November 2019 of which 20 confirmed attendance, and 15 people attended the workshop. Five people emailed apologies due to work or family emergencies 1–2 days before the workshop. Participants started responding immediately after the invitation was sent and the last email was sent on the RSVP date.

9.4.3.2 Procedures

Emails were sent to prospective experts in the field of substance abuse, Self-Determination Theorists and intervention developers one month before the workshop. A reminder was sent two weeks before for the RSVP date and 1 day before the RSVP date. Participants had to respond to the email to confirm attendance. A 4-hour workshop was hosted from 09h00 to 13h00. Prior to the workshop, participants provided written consent and completed a demographics form. The workshop followed the following format: introduction, activity exploring participants' ideas of truths, myths and question marks about the hookah pipe, presentation about Phase 1's results, overview of the intervention, tea break, group discussions about the intervention and findings of the research, feedback to the plenary and questions, answers and comments about the intervention and the workshop. The focus of the workshop was to (a) provide feedback to participants about the Phase 1 (b) present suggested intervention themes, aims and activities and (c) discuss additional input from the expert panel.

9.4.3.3 Pilot Workshop

A three-pronged intervention was presented for input, critique and scrutiny. During the pilot workshop, it was discovered that the overview of the three-prong intervention should not be done immediately after the presentation of the results because it was too much information provided at once. Groups were assigned after tea for the group discussion. This left the group confused about what had to be done in the group discussions, so the overview of the

intervention and the purpose of the group discussions had to be explained again. For the pilot, there were two groups (one focusing on the three prongs and one focusing on the RE-AIM properties of the intervention). It was identified that three prongs (individual prong, family prong and aftercare prong) were not sufficient and an additional prong should be added encompassing teacher, community and social media intervention. This became the fourth prong.

9.4.3.4 Main Workshop

The tea break occurred after the results presentation. After the tea break, participants were placed into groups, the overview of the intervention and the purpose of the group discussions were explained and then the group discussions occurred. As suggested in the pilot workshop, the fourth prong was added to the intervention. The participants were divided into four groups (one group focused on prong 1, one group focused on prong 2, another group focused on prongs 3 and 4 and one group focusing on the RE-AIM properties of the intervention). Each group provided feedback and the plenary could provide input. An overview of the intervention and the group feedback will be discussed in the results section of this paper.

9.4.3.5 Data Analysis

The full duration of the workshop was audio recorded and transcribed verbatim. During the group discussions, the groups made notes on large pieces of paper that they used to present. During the presentations, the researcher (ZK) made detailed notes to ensure accurate reflections of the groups' ideas. The transcriptions, participant's notes and the researcher's notes were thematically analysed using Braun and Clarkes' (2006) six-step approach to thematic analysis which included (1) becoming familiar with the data, (2) assigning preliminary codes to describe data, (3) searching for patterns and themes from the codes, (4) reviewing themes, (5) defining and naming themes and (6) generating a report.

9.4.3.6 Ethics

The University of the Western Cape's ethics review board provided ethics approval. Confidentiality was maintained at all times. When emailing participants, they were BCC'd therefore they had no knowledge of who else was recruited or their response. Similarly, their anonymity was protected. Informed consent was obtained prior to the workshop and they knew that their participation was voluntary so they could withdraw at any point. In the event of uncomfortability or distress, a Registered Counsellor was available for debriefing.

9.5 Results

The participants were asked to comment on the preliminary results of the larger study (Phase 1— Stage 1, 2 and 3) as well as the proposed layout of the intervention. Participants received a handout of the intervention and they were asked to scrutinise and critique the intervention.

9.5.1 Participants

Ten people participated in the pilot workshop (refer to Table 9.2). Sixty percent of the participants were female. The majority of the participants (90%) were of coloured race (also referred to as mixed race). The participant's age ranged from 25 to 67 years old. Their education levels ranged from completing high school (Grade 12) to PhD. The participants were from academia (50%), faith-based organisations (30%) and NPO's (20%). The number of work experience years ranged from 2 to 45 years. Experience in substance use ranged from 1 to 12 years, experience working with adolescents ranged from 0 to 26 years, experience in intervention development ranged from 0 to 12 years and experience in SDT ranged from 0 to 14 years. All participants were from the Western Cape, South Africa.

Fifteen people participated in the main workshop (refer to Table 9.3). The majority of the participants were female (60%). Eighty percent of the participants were of coloured race (also referred to as mixed race). The participant's ages ranged from 27 to 58 years old. All

participants indicated having tertiary education ranging from a diploma to a master's degree. The participants were representatives from academia (13.3%), research organisations (6.7%), provincial government (46.7%), local government (6.7%) and non-profit organisations (26.6%). Participants varied in terms of total years of work experience, they reported between 0 and 35 years' work experience. Their experience in substance abuse management ranged from 0 to 35 years, their experience working with adolescents ranged from 0 to 35 years, their experience in intervention development ranged from 0 to 35 years and their experience in SDT ranged from 0 to 30 years. All participants were from the Western Cape, South Africa.

Table 9.2: Demographic Details of Pilot Workshop Participants

No	Gender	Age	Race	Highest level of education	Sector	No of years' work experience	No of years' experience			
							Substance use/ Hookah Pipe	Adolescents	Interventions: Plan, develop, implement, M&E	SDT
1	Female	57	Coloured	PhD Human Ecology	Academia	36	1	1	1	1
2	Female	41	Coloured	Masters in Occupational Therapy	Academic	18	2	10	8	8
3	Female	25	Coloured	MA Research Psychology	Academic	2	1	3	0	0
4	Male	67	Coloured	NQF 4 – Grade 12	FBO	10	1	0	0	0
5	Female	50	Coloured	PhD Psychology	Academia	26	6	26	12	14
6	Male	31	Coloured	B.Psychology	NGO	10	5	10	5	5
7	Male	44	Black	B.Social Work	NGO	8	2	2	0	0
8	Female	66	Coloured	B.Cur Nursing	FBO	45	12	12	12	0
9	Male	53	Coloured	Church Ministry Certificate	FBO	6	6	6	0	0
10	Female	50	Coloured	PhD Psychology	Academia	26	10	23	0	0

Table 9.3: Demographic Details of Main Workshop Participants

No	Gender	Age	Race	Highest level of education	Sector	No of years' work experience	No of years' experience			
							Substance use/Hookah Pipe	Adolescents	Interventions: Plan, develop, implement, M&E	SDT
1	Female	53	Coloured	MSc	NGO	30	20	30	0	0
2	Male	58	Coloured	Master's in Public Administration	NGO	35	35	35	35	30
3	Female	28	Black	PGDip Child and Family Studies	Academia	0	0	0	0	0
4	Male	33	Black	BA (Health Science and Social Science)	Provincial Government	1	1	0	0	0
5	Male	31	Coloured	B.Psychology	Academia	10	10	10	10	3
6	Female	27	Coloured	PGDip Child and Family Studies	NGO	2	2	2	2	0
7	Female	31	Coloured	B.Social Work	NGO	3	3	3	0	0
8	Male	32	Coloured	B.Social Work	Provincial Government	7	7	7	7	7
9	Male	29	Coloured	B.Social Work	Provincial Government	3	2	0	2	0
10	Female	39	Coloured	BA Psychology	Local Government	3	3	1.5	3	3
11	Male	30	Coloured	Masters Sport, Recreation and Exercise Science	Research Organisation	11	2	10	5	5
12	Female	36	Coloured	MA Child and Family Studies	Provincial Government	8	0	5	0	5
13	Female	32	Black	B.Social Work	Provincial Government	5	0	0	0	0
14	Female	35	Coloured	B.Social Work	Provincial Government: Street Children	6	6	13	6	10
15	Female	49	Coloured	Diploma: Social Work	Provincial Government	22	22	22	22	0

9.5.2 Programme Outcome Considerations (Prongs)

The intervention comprised of four prongs as depicted in Figure 9.2. The four prongs were established by consolidating the results from Phase 1, consulting with expert stakeholders in Phase 2 and considering the theoretical underpinning of SDT. The results from both phases of the study indicated that the intervention should not only focus on the adolescents and that there is a need for the family be included in the intervention because families can deter hookah pipe use and contribute to needs satisfaction or frustration. SDT emphasises that the environment, such as school and community is integral in encouraging or discouraging behaviours and can contribute to need satisfaction and frustration. Having an afterschool and weekend programme allows for needs to be satisfied because adolescents can choose to which activities interest them (autonomy), they can experience a sense of accomplishment when doing well in their selected activity (competence) and they can experience a bond with their peers at the afterschool and weekend programme (relatedness). This will not only encourage need satisfaction but it will also keep adolescents occupied so that they will not be bored or feel the need to resort to hookah pipe smoking. The participants' feedback of each prong will be presented below each table (prong). This is followed by Table 9.8 which describes the intervention format and logistics according to the RE-AIM Framework.

THE FOUR PRONGED APPROACH

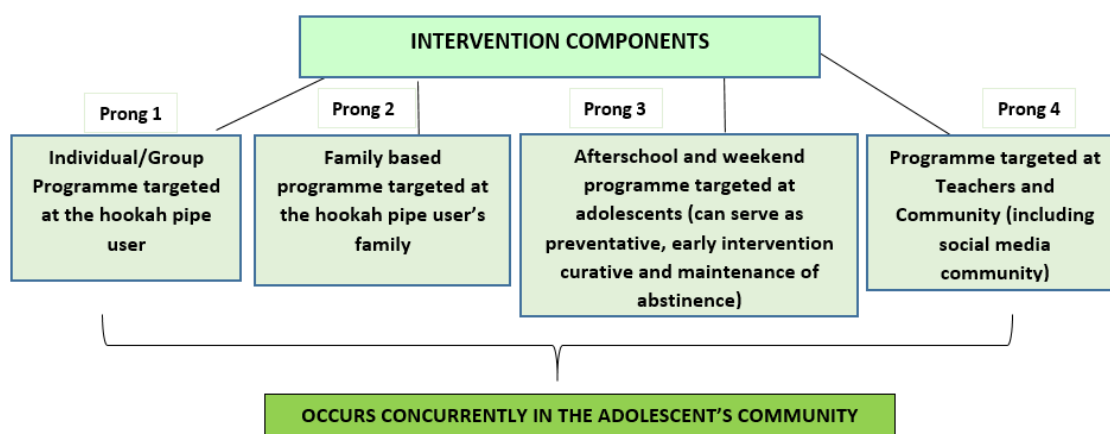


Figure 9.2: The Four Pronged Approach

Each prong will be described below in Tables 4- 7. The participants' feedback of each prong will be presented below each table (prong)

9.5.3 Prong One: Individual/Group Prong

Table 9.4: Individual/Group Prong

Session Number	Module	Aim	Activities
1	Who am I as an adolescent and what is the role of my family	<ul style="list-style-type: none"> Adolescents understand their phase of development and why they behave or feel the way they do Adolescents understand how their family impacts their development and choices 	<ul style="list-style-type: none"> Ice breakers Discussion Life skills Psycho-education
2	Perceptions about hookah use	<ul style="list-style-type: none"> Modify perceptions and encourage a reduction in hookah pipe use 	<ul style="list-style-type: none"> Games Role Plays Debates
3	Harm, gateway and addiction	<ul style="list-style-type: none"> Adolescents have improved knowledge about the harms of hookah pipe use and they understand how and why it is a gateway substance. Adolescents have improved knowledge about addiction and how they can become addicted to using the hookah pipe. 	<ul style="list-style-type: none"> PPT presentation, quiz and prizes Invite past users to talk
4	Hookah, cigarette, alcohol and cannabis use	<ul style="list-style-type: none"> Adolescents will have improved knowledge about hookah, cigarette, alcohol and cannabis use. An acknowledgement of use and concerns will lead to a reduction of use Enhance social skills needed to avoid substance use 	<ul style="list-style-type: none"> Develop a magazine Radio shows Diary of cravings/triggers
5	Decision making	<ul style="list-style-type: none"> Adolescents will have improved decision making skills specifically about hookah pipe use or non-use Improve self-efficacy 	<ul style="list-style-type: none"> Vision Board Pros and Cons Motivational Interviewing
6	Understanding and fostering motivation	<ul style="list-style-type: none"> Adolescents' will have improved knowledge about the types of motivation and identify what motivates them to engage in hookah pipe use 	<ul style="list-style-type: none"> Reflection Role Plays Discussions
7	Understanding and fostering autonomy	<ul style="list-style-type: none"> Adolescents will have an improved understanding about autonomy and how it is satisfied or frustrated 	<ul style="list-style-type: none"> Psychoeducation Therapy Choice Jar

8	Understanding and fostering competence	<ul style="list-style-type: none"> • Adolescents will have an improved understanding about competence and how it is satisfied or frustrated 	<ul style="list-style-type: none"> • Dream Box • Life skills • Games
9	Understanding and fostering relatedness	<ul style="list-style-type: none"> • Adolescents will have an improved understanding about relatedness and how it is satisfied or frustrated 	<ul style="list-style-type: none"> • Trust and relatability activities • Therapy
10	Relaxation and coping mechanisms	<ul style="list-style-type: none"> • Adolescents will be better equipped to manage challenging situations by exploring relaxation techniques and improved coping mechanisms 	<ul style="list-style-type: none"> • Mindfulness • Pamphlet design • Therapy

9.5.3.1 The Need to Consider Non-School Going Children

Participants agreed with the modules and the aims. However, they indicated that the activities were appropriate for children who attended school but the intervention activities may not be appropriate for adolescents who do not attend school (such as street children). It was suggested that the activities must be more practical and creative so the content could be remembered easily and everyone can participate in the intervention. Including everyone in the intervention would allow for improved mood, purpose, self-concept and coping/social skills hereby serving as a motivating factor to avoid hookah pipe use. Coholic and Eyes (2016) emphasize the importance inclusion and of creative interventions for vulnerable children, including but not limited to children that are not able to attend school due to social ills, mental health challenges and child welfare challenges. They also identify the merits of strengths-based and arts-based mindfulness group methods as a manner of engagement, help and support.

“Non-school going children, their cognitive ability may not be on par with their biological age. Consider more picture based therapeutic activities and also role playing and drama therapy”

9.5.3.2 Cravings and Relapse

There was also a recommendation to add a session about managing cravings and planning for relapse. This was deemed important because cravings and relapse are common in substance abuse management. It is therefore important to explore triggers, obstacles and plan

ways to overcome them by developing skills such as assertion, decision making, conflict management and so forth. This view was consistent with Chatterjee et al (2019) who asserts that identifying what may cause cravings and relapse is important as each person has different individual, environmental and emotional influencing factors. Understanding what may trigger cravings and relapse allows adolescents to manage and prevent it.

“Adolescents must be aware that a craving lasts a couple of seconds and it is what they do in these couple of seconds that is crucial. If they do not divert their attention, they will use”

9.5.4 Prong Two: Family Prong

Table 9.5: Family Prong

Session Number	Module	Aim	Activities
1	Understanding adolescence and the role of family in adolescent hookah pipe use	<ul style="list-style-type: none"> Families have improved understanding of the phase of development and why adolescents or feel the way they do Family understand how they impact adolescents development and choices 	<ul style="list-style-type: none"> Role Plays Workshops Psycho-education Group Support
2	Perceptions, harm, gateway and addiction of hookah pipe	<ul style="list-style-type: none"> Modify perceptions and encourage a reduction in adolescent hookah pipe use 	<ul style="list-style-type: none"> Games Myths and Truth Activity Discussions
3	Hookah, alcohol and cannabis use in the family	<ul style="list-style-type: none"> A reduction of hookah, alcohol and cannabis use in the family, particularly in the presence of adolescents 	<ul style="list-style-type: none"> Therapy Reflection Pamphlets Referrals
4	Hookah as a means of socialisation/alternatives to socialising	<ul style="list-style-type: none"> A reduction of hookah pipe use in the family as a means of socialising Families identify alternative ways of socialising with the absence of substances 	<ul style="list-style-type: none"> Socialising experiences Games Discussions
5	Accepting hookah in the family	<ul style="list-style-type: none"> Families are less accepting of the hookah pipe 	<ul style="list-style-type: none"> Arts and Craft Consequence Charts
6	Understanding and fostering motivation	<ul style="list-style-type: none"> Families will have improved knowledge about the types of motivation and identify what motivates them and their adolescents to engage in hookah pipe use 	<ul style="list-style-type: none"> Presentation, reflection and discussion Practice strategies
7	Understanding and fostering autonomy	<ul style="list-style-type: none"> Families will have an improved understanding about autonomy and how it is satisfied or frustrated 	<ul style="list-style-type: none"> Role Paly Reflection Discussion
8	Understanding and fostering competence	<ul style="list-style-type: none"> Families will have an improved understanding about competence and how it is satisfied or frustrated 	<ul style="list-style-type: none"> Games Discussion Parenting skills training
9	Understanding and fostering relatedness	<ul style="list-style-type: none"> Families will have an improved understanding about relatedness and how it is satisfied or frustrated 	<ul style="list-style-type: none"> Trust and relatability exercises
10	Family Day focused on bonding and fostering relatedness	<ul style="list-style-type: none"> Adolescents and family members attend a family day where they will learn more about each other, bond, learn communication strategies and experience a sense of relatedness 	<ul style="list-style-type: none"> Picnic Creative activities or games together

9.5.4.1 Family Assessment, Complexities of Families and Family Environment After the Programme

Participants indicated that it is necessary to conduct a family assessment which explores roles in the family, parenting styles, attachment styles, assessing family functioning either in session one or prior to the commencement of sessions. Also, families should have a clear understanding about how their actions and attitudes influence adolescents' behaviour and choices. Assessing the family is important because it may provide insight into the challenges the adolescents face and it could provide new perspectives about how to intervene with the adolescent effectively. Gaining information about the family is also helpful in ascertaining the type of support the adolescent will have during and after the intervention. Brown (2013) identifies the value of including families in interventions aimed at adolescents because they can have an impact not only on problem behaviours and adolescents needs, but also influence substance use. However, flexibility is important when including families because of their commitments, childcare constraints, willingness and attitudes toward their adolescent's behaviour or the intervention.

“By understanding families, we can establish rapport. This can be achieved by using family mapping activities”.

When implementing the family prong, practitioners must be aware that family may differ from person to person and family does not necessarily refer to the nuclear family.

“There is a lot of guilt, trauma that the children face and are exposed to. A lot of them are withdrawn. Also with regards to family, it may not be the biological family”.

Participants indicated that the environment must change, once an adolescent completes the hookah cessation programme, he/she cannot be exposed to the same triggers as before in the family environment otherwise the adolescent would inevitably relapse. Families should be cognisant about the challenges adolescents may encounter as a result of adjusting from a

being hookah pipe user to a non-user. Families should support adolescents effectively by encouraging abstinence and striving for positive engagement. This will allow for open communication should the adolescents experience triggers, have cravings or consider relapse. Gibbons (2019) asserts that it is important that adolescents receive continuous support so that they can continue to refrain from smoking the hookah pipe, they do not start or continue using other substances, they experience personal growth particularly through having their BPN met, they enhance self-reliance and they experience appropriate social functioning within their environment.

“Parents cannot smoke in front of the children or allow other family members to smoke in the home. The adolescents need role models, especially the boys”.

9.5.4.2 Denial, Avoidance and Practical Strategies (Added Intervention Components)

When discussing perceptions, harm, gateway and addiction of hookah pipe, participants thought it was important to explore avoidance and denial. Furthermore, participants indicated that all sessions must have practical strategies which family members can practice between sessions. Denial is a common characteristic among families of adolescents who use substances. Often the hookah pipe is not considered a substance by families as it is perceived as harmless. Therefore, when parents believe that their child is experimenting with alcohol and other drugs they are more likely to intervene to ward off future substance use. This is concerning considering that hookah pipe use is a gateway to other substances therefore it requires the necessary attention from family members, especially parents (Curtis et al., 2019). Implementing practical strategies between sessions such as rules and consequences, monitoring activities and open communication about hookah pipe smoking and other substances is important to reduce adolescent hookah pipe use (Curtis et al., 2019).

“Parental skills must flow out of the SDT sessions. There should be tips that parents can apply at home”.

9.5.5 Prong Three: Afterschool and Weekend Prong

Table 9.6: Afterschool and Weekend Prong

Module	Aim	Activities
Afterschool and weekend programme to keep adolescents occupied and foster BPN	<ul style="list-style-type: none"> • Reduce hookah pipe use and foster satisfaction of BPN through fun, interesting and engaging activities 	<ul style="list-style-type: none"> • Sport • Arts and craft • Chess, darts • Chill Lounge • Movies • Woodwork • Sewing • Volunteering

9.5.5.1 Inclusion of Younger Children

There is a need to include younger children into this component of the programme because the previous phase of this study indicated that children are smoking the hookah pipe from a very young age. Participants also provided anecdotal accounts of witnessing children younger than 10 years old smoking the hookah pipe. This finding is confirmed by Combrink et al (2010) who found children younger than 10 years old were smoking the hooking pipe as a result of boredom and a lack of recreational opportunities.

“Include young children, like grade 2. Start discussing the awareness and consequences of the problem. Make it known that it is a danger. So at age 13 they are well aware of the consequences”.

9.5.5.2 Opportunity to Relax

Besides the mentioned activities, participants felt that a space is needed where adolescents can simply relax. Often the reason for use is to relax therefore, the intervention place should create an environment which is stress free and allows the adolescents to simply relax or be calm after a challenging day. Having an opportunity to relax is very important as smoking the hookah pipe is considered a source of stress relief by adolescents (Pashaeypoor et al., 2019). Therefore, if adolescents are provided an opportunity to relax and have fun, this could replace their need to smoke as a source of stress relief.

“The after school activities must be fun, educational and provide an opportunity to relax. This is important to prevent the use of the hookah pipe”.

9.5.5.3 Creation of Opportunities Related to Sport and Recreation

For the participants that are interested in structured activities such as chess, create opportunities for competitions with other clubs. Local competitions can be created in preparation for larger competitions, this will not only divert the desire to smoke, it will also contribute to the satisfaction of needs as one chooses which activity to participate in, one feels competent when one is chosen to play or wins a competition and one experiences a sense of relatedness with fellow team members. When the common interest is no longer hookah pipe smoking but an activity, adolescents may be deterred from smoking and focus on their new hobby. Common interests plays a pivotal role in the internal connection of a group. The common interest allows for the group to experience a sense of cohesion and for meaningful friendships to form from these opportunities (Xiao, Li & Zhou, 2018).

“Competitions can be created and an environment can be created not to go smoking the hookah pipe. Their days will be filled with school, after school activities and on weekends they can look forward to competitions”.

9.5.6 Prong Four: Teachers, Community and Social Media Prong

Table 9.7: Teachers, Community and Social Media Prong

Module	Aim	Activities
Teachers workshop focusing on risks, reasons for hookah pipe use and BPN.	<ul style="list-style-type: none"> Teachers will have improved understanding about hookah pipe use, BPN, motivation and development. This will enable teachers to support and advise adolescents appropriately 	<ul style="list-style-type: none"> Workshop Icebreakers Games Discussion Case Studies
Community awareness and education about the hookah pipe and BPN	<ul style="list-style-type: none"> Encourage a reduction and create a sense of disapproval towards the hookah pipe in the community and in homes 	<ul style="list-style-type: none"> Community Walk Speeches Community Event
Social media campaigns	<ul style="list-style-type: none"> Reduce adolescent hookah pipe use and increase awareness of BPN Distribute accurate and desensationalised information 	<ul style="list-style-type: none"> Memes/Animations Hashtags Videos Filters and borders Chain messages

9.5.6.1 Banning Hookah Pipes

Participants felt that this prong should focus on banning hookah pipes in schools and in the community. Hookah pipe smoking should be banned in public spaces such as schools and in the community because it encourages more adolescents to smoke and it is a health and safety hazard. This view is consistent with other countries such as the Costa Rico, Israel, Turkey and Ukraine who have banned hookah pipe smoking in public spaces (Jawad et al., 2015). Furthermore, policies related to tobacco control have been enforced in many countries; such as smoke-free environment, restrictions on sales of tobacco products to minors, ban on the advertising and increasing taxes of tobacco products (Ali Al-Bakri, 2015).

“Communities must be taken to task through community awareness campaigns. Hookah in public spaces should be fined. We also challenge the communities to get involved and also start banning it from their community. We need to tighten our laws and when you have broken the law, it should be taken seriously”.

9.5.6.2 Partnering with Government

They also indicated that there is a need to partner with Government departments such as Department of Social Development, Department of Health, Department of Education and the Department of Communications who can ensure that accurate information is distributed. Partnering with government is an effective way to actively participate in the shaping of policy and its implementation. Intervention studies have shown that partnering with government allows for a mutually dependent and mutually beneficial relationship that allows for improved service delivery and greater reach (Jose et al., 2017).

“The Department of Communication should put out accurate information and parents and adolescents will know that this is a reliable source. This notion of hookah pipe use being less harmful is not true so the correct information must be provided to avoid miscommunication and skewed perceptions”.

9.5.6.3 Portrayal of Hookah Pipe Use

The participants identified the media as a cause for concern especially when smoking the hookah pipe is considered cool or prestigious. Media has a powerful role in how the hookah pipe can be perceived by adolescents. When the hookah pipe is portrayed as fun, a stress reliever and/or a social activity, adolescents are lured towards it. Similarly, if the hookah pipe is portrayed as dangerous or harmful, more people would guard against it. It is important that when media is considered, one must recognise what type of media adolescents are exposed to. For this reason, there is a need to raise awareness not only through traditional mediums such as the television, billboards and radios but also social media, Netflix and other mediums that could reach adolescents (Barker et al., 2019).

“Adolescents are constantly exposed to hookah pipe use and their accompanying substances. It is concerning when the person on TV that is smoking the hookah pipe is wearing a suit and appears successful because it will be assumed that in order to be successful, you must smoke the hookah pipe or this is how successful people relax. We must be mindful about what plays on our television. Same applies with the use of billboards. We must use it to raise awareness”.

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9.5.7 Intervention Format and Logistics

Table 9.8: Intervention Format and Logistics (RE-AIM)

Reach	<ul style="list-style-type: none"> Recruited via. word of mouth, advertisements, social media, schools, community programmes, substance abuse facilities, religious institutions and hospitals. Any adolescents aged 13-19 who currently use the hookah and have at least one family member who will commit to attending the family component of the programme will be included. Adolescents who are involved in gangs, use of any substance besides hookah, alcohol, cannabis or cigarettes and/or severe medical or psychological condition that does not allow the individual to interact with the other adolescents' or understand consent procedures will be excluded Participants and their family must complete at least 80% of sessions or they will not successfully complete the programme When adolescents' and their family members attend the intervention, it is expected that younger siblings and other family members benefit indirectly
Efficacy	<ul style="list-style-type: none"> The programme will have monitoring and evaluation processes in place to ensure that the intended objectives will be achieved. A Pre and Post design will be used.
Adoption	<ul style="list-style-type: none"> The intervention is intended to occur either at a school or a community hall/centre that is safe and accessible for most of the participants and their family. Consultations will be held with community leaders and school management. Train community members as community officers to implement the programme. The intervention is developed in conjunction with adolescents and a host of experts and community leaders
Implementation	<ul style="list-style-type: none"> Resources will include PowerPoint presentation, role plays, pamphlets, sport equipment, arts and craft materials, books, computers, play stations, diaries, stationary, sewing machines, couches and vehicles Registered Counsellors, Social Workers, Teachers, Media and communication officers, child and youth care workers, social auxiliary workers, nurses, clinical psychologists, trained community officers, volunteers, community people who has a specific skill such as woodwork, sewing, business skills etc. will conduct the sessions. Everyone working in the programme will receive training so that they have a thorough understanding of adolescent hookah pipe use and BPN Sessions will occur weekly for 10 weeks. Thereafter they may still attend afterschool activities and community interventions
Maintenance	<ul style="list-style-type: none"> Telephonic calls for the first 4 months fortnightly thereafter monthly, school visits, interviews and questionnaires. Home visits could occur when there is a challenge with telephonic contact. A database will contain information about the participant which will make tracking progress easier.

Participants approved of the RE-AIM framework but included seven points to consider (1) consider accessing adolescents through fitness clubs and allow fitness instructors or sport science students to facilitate some of the afterschool and weekend activities (2) add a membership element to the intervention to entice the participants. In other words, make it cool to attend (3) clarify to what extent of gang involvement will be allowed into the intervention and consider referrals for the excluded participants (4) host the intervention where adolescents would like to be, for example a community centre or a gym (5) consider implementing the intervention using apps and websites and have WhatsApp and face to face support groups (6)

implementers should not only have knowledge and skills, they should be able to lead, facilitate group activities, be comfortable with public speaking, be relatable, be approachable, be open minded and empathic and (7) regular participant feedback which assesses not only their progress but recommendations to improve the intervention too.

Furthermore, two important gaps were identified in the intervention design (1) how to motivate adolescents and their families to attend the sessions and continue attending the sessions and (2) there should be another element after the 10-week intervention as a form of maintaining of abstinence. Failure to have this phase may result in relapse.

9.5.7.1 Participants General Sense of the Intervention

Overall, the stakeholder panel found the intervention valuable and feasible. They indicated the intervention was holistic and that is important because the adolescent does not live in isolation, he or she is impacted by the school, family and home environment. Inclusion of a support phase after the 10-week programme to encourage continued abstinence must be considered.

“I think that this was very insightful and amazing what you invested so far. Our communities need this”.

9.6 Discussion

This study aimed to design an intervention to reduce adolescent hookah pipe use and satisfy BPN in collaboration with those working and contributing to the field of substance abuse with specific interest in adolescents, the hookah pipe and SDT. Overall, the panel was in favour of the layout of the intervention and the four-pronged approach because of the holistic nature. The intervention provides support, education, counselling and practical skills that can facilitate a reduction in adolescent hookah pipe use and contribute the satisfaction of their BPN. However, the panel made seven noteworthy suggestions to enhance the

intervention. The feasibility and acceptability of these enhancements will be discussed in this section.

1. **Adding a session about managing cravings and relapse prevention for the**

adolescents: This is a good proposition because cravings are associated with relapse (Livingstone-Banks et al., 2019). Cues or temptations can provoke cravings and highlight individual differences in how users respond to cues therefore an element of reflection and journaling can occur in order to identify the cues, manage the craving and prevent relapse. Activities could focus on exercising, changing location, taking part in a distracting activity or employing a “buddy system” where a friend from the group can support during the cravings or thoughts of relapse (Livingstone-Banks et al., 2019). It may not be necessary to add a session to the programme as this topic can be covered in session ten in prong one which focuses on relaxation and coping mechanisms. An aim can be added to make reference to cravings and relapse.

2. **Adding a session about avoidance and denial for family members:**

Family members may adapt to protect and accommodate the user. Often this adaption involves denial to avoid addressing the issue (Gruber & Taylor, 2016). As a result, family rules and boundaries are reduced in intensity. This denial and avoidance allows for the masking of the dependency behaviour (Gruber & Taylor, 2016). Therefore, it is necessary to address family members’ feelings and behaviours related to denial and avoidance of their adolescent hookah pipe users. For these reasons, it would be essential to add another session to prong two which will focus on families’ denial and avoidance. The session can extend beyond the adolescent hookah pipe use and discuss denial and avoidance of one’s own hookah use or other family members use.

Activities could include reflective worksheets and discussions.

3. **Family assessment using family mapping:** The Family Map Inventory is used to assess family strengths and needs. It allows for an assessment of the family and

parenting context. It also facilitates a process to talk about important family topics that influence adolescents' healthy development. The process often happens during a home visit (Kyzer et al., 2016). Since the nature of the programme is not a family functioning programme which allows for extensive family therapy or home visits, including this assessment may not be appropriate. However, the idea of an assessment before the commencement of sessions has merit as it can provide valuable insight before working with the adolescents and the families. This could tie in with the recommendation participants had about changing the environment where the adolescents will be after the intervention. The insights of the assessment could be incorporated in the existing intervention to encourage an environment that would support adolescents after the intervention. If further family intervention is needed, adolescents and families can be referred.

4. **Including younger children:** It would be beneficial for younger children to have adequate knowledge about hookah pipe smoking and have the skills to decline when offered to experiment as studies have found children younger than 10 years old using the hookah pipe (Roman et al., 2017). However, it may not be suitable to include children younger than 10 years old in this particular intervention as their developmental levels are different to that of an adolescent. This means that the way they learn, their interests and attention span is significantly different to adolescents (Pulkkinen, 2017). An adapted programme would need to be developed that would cater specifically to younger children at risk of hookah pipe smoking.
5. **Sport and recreation competitions:** Sport and recreation is important for adolescent's health, socialisation and civic engagement (Bejar, 2019). SDT recognises the positive impact of sport on adolescents' satisfaction of BPN. For most adolescents, sports and recreation activities create opportunities for successfully competing tasks and adapting to the demands of the environment, having meaningful input into

decisions and acting in accordance with one's interests and values and an opportunity to feel valued, connected and important to others. The more autonomous, competent, and related individuals feel, the more likely they are to be self-determined and intrinsic in their motivation (Bejar, 2019). Since competitions are more intense than playing recreationally, Amorose, Anderson-Butcher and Cooper (2009) investigated changes in athletes' need satisfaction and well-being throughout a competitive season and found that increases in athletes' need satisfaction corresponded to improved well-being. The motivation and satisfaction of needs can be channelled to engage more in these sport and recreation behaviours and less in hookah pipe smoking therefore, the addition of competitions will be added in this intervention to enhance the outcomes of prong 3.

6. **Partnering with Government:** Collaboration with government departments were noted as this would add a valuable aspect to the intervention especially partnering with the Department of Communications who is able to educate via various channels. They can also influence how the hookah pipe is portrayed within various mediums of communication. Collaboration provides a constructive way to share responsibility, deliver more salient decision making processes which incorporate the needs of those affected and widen the reach (Howarth & Morse-Jones, 2019). Partnering should not only include government departments but also non-governmental organisations, research organisations, faith based organisations and community leaders (Howarth & Morse-Jones, 2019). Therefore, this recommendation is noted and will be utilised for the success of this intervention. A memorandum of understanding would need to be established in order to define the roles and responsibilities of the various stakeholders.
7. **Using apps and websites as a mode for the intervention:** The number of adolescents participating in on-line activities are increasing with the rapid rise of the internet age worldwide (Liu et al., 2016). Therefore, the idea of having a digital

intervention is promising. However, this may not be feasible in the SA context because of the high poverty rates (Posel & Rogan, 2016). Lack of access to the Internet and exorbitant data charges would affect many adolescents and their families access to the intervention. Even if adolescents have access for short periods, they may not be able to have access to all the sessions or even the full session. Manduna (2016) refers to these experiences as digital poverty that result from broadened socio-economic and political gaps. Although, a large number of middle to high income adolescents and their families may have access. Initially, it may not be appropriate to digitise the intervention but information, podcasts, activities and videos could be uploaded on an app and website as an extension to the four ponged intervention for adolescents and families who have access or prefer a digital intervention.

The other minor suggestions to enhance the intervention appear feasible and can therefore be incorporated into the intervention. The minor suggestions include providing a space to relax, banning hookah pipes by educating community members through community awareness activities, having intervention practitioners who are relatable and able to intrigue adolescents and families, having a support group via WhatsApp and face to face, hosting the intervention at a place where adolescents (and families) enjoy, adding a membership element as well as monitor and evaluate adolescents, families and programmes success and challenges.

The main contribution our study can offer is an intervention to reduce adolescent hookah pipe and at the same time strive to provide contexts where their BPN can be satisfied. The intervention is unique as it offers a holistic approach to intervening in hookah pipe use by including the adolescent, their family, their teachers and their community. This study was also the first known study to intervene in hookah pipe use from an SDT perspective. SDT mainly focuses on the individual but it recognises the important impact the environment has. This is why SDT is the most suited theoretical underpinning for this intervention as it allows the focus of the intervention to be on the adolescent hookah pipe user but also considers the

school, family and community context because these contexts are where adolescent's needs are either satisfied or frustrated. Since family members, teachers and community members are involved in the intervention, by default, they also benefit from the intervention by becoming more aware of the dangers of hookah pipe smoking and the need to foster satisfaction of needs within the context they coexist with the adolescent. They also learn important strategies on how to encourage a reduction in hookah pipe use and how to satisfy needs. These new ideas can be implemented within their own contexts hereby increasing the reach of the intervention. This intervention can be applicable to resource constrained communities because the resources and intricacies are minimal, especially if implementers collaborate with Government and other organisations that are focused on improving health and promoting social development. The range of implementers can include volunteers, para-professionals and professionals in order to reduce personnel costs. In higher income contexts, the resources may differ (for example, in low socioeconomic contexts, a recreational community hall can be used for the intervention whereas in high socioeconomic contexts, a gym dedicated to this intervention could be bought or hired). Irrespective of the socioeconomic contexts the layout and content of the intervention should remain. The manner of implementation would be context specific as cultural, religious, gender, political, community and other dynamics must be considered. As a result of its flexibility, this intervention can be a contribution or stepping stone to practitioners, policy makers, researchers and teachers who endeavour to reduce hookah pipe use and satisfy BPN.

9.7 Limitations

This study did not explicitly create an “after care programme” which would support adolescents after the intervention. It was implied that adolescents can participate in prong 4 and this will serve as a safety net and “after care programme”. However, the programme staff conducting the four pronged intervention could formally partner with community stakeholders to ensure that the adolescent receive the necessary continuity of care and support. Another

limitation of this study was that only one theory was considered to understand a part of the problem. Using a different theory would have yielded different or additional insights but the authors agree that SDT was valuable in providing an understanding of BPN, motivation and the importance of ensuring that the adolescent's context provide opportunities to thrive or be hindered. Lastly, even though the inputs from the adolescents were considered based on their responses in the qualitative and quantitative components of the larger project, the intervention was not presented to them to determine if it would attract them. Although, this could still occur.

9.8 Future Research

Future research should focus on obtaining perspectives from families and teachers. The intervention could be presented to adolescents and they could provide feedback indicating whether this intervention would attract adolescents and whether they would find the activities and messages interesting and valuable. The four pronged intervention could be done as a randomised controlled study to determine the impact the intervention may or may not have as well as the intended and unintended benefits and outcomes of the intervention. This intervention could be implemented in a number of different contexts and/or countries and the results could be compared in terms of effectiveness and challenges. Future research could extend on this study by designing an aftercare programme would cater to adolescents and families who require added support after the four pronged intervention.

9.9 Conclusion

This study has presented the design of an intervention to reduce adolescent hookah pipe use and satisfy BPN. It highlighted the value of not only intervening with the adolescent hookah pipe user but including their parents, teacher and community members as well. Moreover, it has provided guidance on how to recruit adolescents for the intervention and how to encourage cooperation from the community to adopt the intervention. The importance of measuring the impact and effectiveness of the intervention is also articulated by

emphasising the need for monitoring and evaluation. This chapter has provided a comprehensive design of the intervention. The next step would be to obtain feedback from a group of adolescents to gain their input. Community leaders and stakeholders should be consulted because they have important information about existing interventions, the target population and the setting where the intervention is expected to be delivered. It is vital for the intervention to fit the implementation context. Community members need to “buy in” to the intervention in order to support and have a sense of ownership. The intervention must be able to meet the specific needs of the community and target audience without changing the focus of the intervention aims. Once the intervention has been considered favourable, manuals for implementation should be written and the intervention should be piloted to test for feasibility. After challenges have been identified and rectified, the intervention should be replicated in a host of communities to determine adaptations for various contexts and increase reach. Monitoring and evaluation strategies should be employed throughout the process.

9.10 References

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CHAPTER 10

DISCUSSION, RECOMMENDATIONS AND CONCLUSION

10.1 Introduction

Adolescent hookah pipe use is a concern that affects adolescents, families, and the broader community due to the health risks associated with the behaviour, perceived harmlessness, its ability to serve as a gateway substance, and possible addiction (Bashirian et al., 2019). The findings of this study contributed to the development of an intervention to potentially reduce hookah pipe use while concurrently satisfying the BPN of adolescents. The design of this intervention was deemed necessary by researchers, practitioners, adolescents, and community-based organisations (CBOs) because of (a) an increase in adolescent hookah pipe use; (b) the dangers of hookah pipe use; (c) limited interventions specifically aimed at reducing adolescent hookah pipe use globally, and the complete lack thereof in South Africa; and (d) the potential that developing an intervention for hookah pipe use may require a multifaceted approach. In order to intervene effectively in adolescent hookah pipe use, it was important to understand the behaviour as well as the motivating factors.

Self-determination theory, a theory of motivation, postulates that human beings require satisfaction of three BPN, namely, autonomy, competence, and relatedness. These needs are essential for well-being, optimal growth, and development. The individual's context contributes to the satisfaction or frustration of needs through people's actions, ideologies, feedback, and attitudes (Deci & Ryan, 2000). Since the research indicated that adolescents have some knowledge about the harms (Cornacchione et al., 2016; Wang et al., 2018; Bashirian et al., 2019), the author assumed that adolescents smoke the hookah pipe because they either have a positive experience that outweighs the risks, or the hookah pipe is used as a substitute to meet a need that is frustrated. For this reason, attention was given to understanding the motivation and BPN of adolescents who smoke the hookah pipe and

adolescents who do not, in order to (1) understand and compare their experiences and thereby determine what motivates adolescents to smoke or not smoke, and (2) establish how smoking the hookah pipe contributes to satisfying their BPN.

This study hypothesised that:

H1: *The BPN of hookah pipe users are more satisfied than non-users.* This study revealed that this is not true, and it appeared that non-users' BPN were more satisfied than hookah pipe users. Hookah pipe users sought alternative behaviours, such as smoking the hookah pipe, to satisfy their BPN.

H2: *Hookah pipe users view hookah use as the least harmful substance compared to alcohol, cigarettes, and cannabis.* This hypothesis was believed to be true as hookah pipe users perceived hookah pipe smoking to be less harmful, less addictive, and a safer alternative to smoking cigarettes.

H3: *Hookah pipe users do not consider smoking a problem and do not think that an intervention is necessary.* This is partially true, but majority of hookah pipe users view hookah pipe smoking as a problem and identify that an intervention is needed.

The aim of the current study was to design an intervention to reduce adolescent hookah pipe use and satisfy their BPN. The objectives of the study were to:

- 1) Review determinants of adolescent hookah pipe use (Chapter 4);
- 2) Review interventions aimed at reducing hookah pipe use (Chapter 5);
- 3) Assess the prevalence of adolescent hookah pipe use in the Western Cape, SA (Chapter 6);
- 4) Compare (a) harm perception, (b) motivation for hookah use/non-use, and (c) BPN of adolescent hookah pipe users and non-users (Chapters 6 and 7);
- 5) Explore and determine how families influence the decision to smoke the hookah pipe and how they contribute to the satisfaction of BPN (Chapter 8);
- 6) Explore and describe the need for an intervention to reduce hookah pipe use (Chapter 9);

7) Design a programme to reduce hookah pipe use and satisfy their BPN (Chapter 9).

These objectives have been achieved and were discussed in the preceding chapters (Chapters 4–9).

This chapter provides an overview of the findings and illustrates the implementation of intervention mapping in line with the four-pronged intervention and the theoretical framework (SDT and the developmental perspective). Lastly, the implications, limitations, and recommendations are presented.

10.2 Discussion of Overall Findings

The findings in Phase 1 and 2 evolved into a holistic and systemic intervention involving the adolescent, their family, their teachers, and the community. Phase 1 focused on identifying the need for an intervention to reduce adolescent hookah pipe use. Phase 1, through its three stages of inquiry, revealed that an intervention was needed, and that the following factors had to be considered when designing the intervention: (a) adolescent hookah pipe use was determined by an interplay of family factors, peer/friends factors, individual factors, school factors, the actual hookah pipe mechanism, advertisements, and knowledge of hookah pipe lounges or bars; therefore (b) existing interventions only focused on the hookah pipe user, so it was challenging for the family, school, and community to support the user adequately. Existing interventions were mainly supportive, educational, or counselling sessions, but little information was provided about the adoption of the intervention and maintenance of the results; (c) users and non-users had similar views in terms of the dangers of smoking the hookah pipe, while a few were aware of some dangers, education was still needed in order to understand the risks involved in hookah pipe smoking; (d) hookah pipe users were conflicted whether they were intrinsically or extrinsically motivated to smoke. This was evidenced by the contradicting results in the quantitative and qualitative stages; (e) hookah pipe non-users were intrinsically motivated not to smoke; (f) hookah pipe users' experienced that their needs for competence and relatedness were frustrated; as a result, they

were drawn to smoking the hookah pipe; (g) hookah pipe users described a family environment that did not effectively allow for satisfaction of needs (in particular, the need for autonomy and relatedness) and geared adolescents toward hookah pipe smoking because of family members' substance use, parental approval of hookah pipe smoking, violence in the home, lack of parental involvement, and smoking as a coping mechanism to deal with traumatic experiences within the family. Phase 1 provided some good insights into what type of intervention was needed to intervene in adolescent hookah pipe use and satisfy their BPN from a global and South African perspective. Phase 2 focused on the development of the intervention. This was achieved by presenting the problem and the findings of Phase 1 to stakeholders in order to co-create an intervention that would be relevant and feasible to adolescents in the South African context. The stakeholders had knowledge and experience in terms of South African populations and contexts, licit and illicit substance use, SDT, understanding and working with adolescents, and/or intervention development. Phase 2 revealed that a holistic four-pronged approach focusing on (1) the hookah pipe user, (2) the family, (3) after school recreation activities, and (4) the teacher and community was needed to intervene in adolescent hookah pipe use and satisfy their BPN. The intervention was described using the RE-AIM framework which considers **R**each, **E**fficacy, **A**doption, **I**mplementation, and **M**aintenance of the intervention.

The development of this intervention involved two critical steps, namely, *needs assessment* and *intervention development*. The intervention was designed based on three of the six principles of intervention mapping, which includes (a) needs assessment, (b) programme outcomes and objectives, and (c) programme design. Since the study primarily focuses on the design of the intervention, only the first three principles were used. The latter three principles of intervention mapping focuses on programme implementation and evaluation. Intervention mapping was considered best suited for this intervention because it takes into account theory and evidence, detailing how change is likely to occur, as well as the

ecological perspective which focuses on the individual, family, and community influences that impact behaviour (Bartholomew-Eldredge et al., 2016).

To the authors knowledge, only one study looked at hookah pipe use from an intervention mapping perspective. Although Dadipoor et al., (2019) only used the first step to explain the determinants of hookah consumption among women in Southern Iran by means of a qualitative inquiry. The information presented about the application of intervention mapping to hookah pipe use was limited, therefore comparisons could not be drawn between the current study and the study of Dadipoor et al., (2019). In 2012, Dalum and colleagues developed an adolescent smoking cessation intervention using the intervention mapping approach. The study presented general information about smoking and did not make specific reference to hookah or cigarettes, etc. This study used similar strategies to identify the need. They used literature searches focussing on identifying individual and environmental factors related to smoking cessation; they identified examples of effective intervention studies, and they did a qualitative study among adolescents who had tried to quit smoking. Based on this needs assessment, they established goals for the intervention. They also selected a theoretical framework for their intervention to be grounded in. Thereafter, the intervention was designed. They acquired existing Danish intervention materials addressing adolescent smoking cessation. A group of five (5) stakeholders evaluated the interventions to determine if it would address any of their intervention goals and meet the theoretical considerations. When existing materials did not meet the requirements, new materials were produced to meet the objectives. The process of Dalum et al., (2012) is similar in some respect to the needs assessment, but it is completely different to the intervention development process of this study. With regards to the needs assessment, this study only explored the determinants, existing interventions, and adolescents' experience of quitting. Whilst this study covers the basis in terms of literature searches, it was more interested in the adolescents' understanding and experiences that influence their decision to smoke (or not smoke) the hookah pipe. For this reason, their

motivation for use (or non-use), BPN, and family context was studied. With regards to designing the intervention, Jawad et al., (2016) identified (a) a lack of hookah pipe interventions, especially in Africa; (b) the ineffectiveness of interventions to reduce hookah pipe use; and (c) how hookah pipe interventions were mainly adapted from smoking cessation interventions. Therefore, it was the intention of this study to design an intervention to reduce hookah pipe use based on the needs assessment and not adapt existing interventions in order to meet the aim.

This study also focused on understanding what motivates adolescents to smoke or not smoke the hookah pipe because this would ultimately guide how to intervene. For this reason, SDT was employed as a theoretical framework. SDT posits that contexts, such as family, have the potential to either satisfy or frustrate BPN. Also, people are motivated to pursue behaviours in an attempt to satisfy their BPN. When BPN are frustrated, adolescents may be motivated to pursue maladaptive behaviours, such as hookah pipe smoking, to meet their BPN (Deci & Ryan, 2008). This was evident in this study, where adolescents who felt that their needs of competence and relatedness were frustrated, smoked the hookah pipe. In addition, adolescents whose need for autonomy and relatedness were not satisfied in the family context smoked the hookah pipe. No known studies have focused on hookah pipe use from a SDT perspective globally or in South Africa. Therefore, it is difficult to ascertain whether this finding is similar or different in other contexts. Usually, emphasis is placed more on external determinants of hookah pipe smoking, such as peers, availability, culture, and so on, as opposed to internal factors, such as BPN.

However, interventions focusing on tobacco cessation (cigarettes) from a SDT perspective emerged in 1999. The study group hypothesised that the degree to which adolescents experienced an appeal to not smoke as autonomy supportive would affect their autonomous motivation for not smoking and, in turn, their behaviour of either refraining from smoking or smoking less. Essentially, the study revealed that when adolescents felt that they

had a choice of whether they wanted to smoke or not, they had more autonomous motivation for not smoking. As a result, this predicted a decrease in their self-reports of smoking (Williams et al., 1999). This finding could explain why hookah pipe non-users in this study were intrinsically motivated not to smoke. Williams et al., (1999) did not place as much emphasis on competence and relatedness. This study elaborates on adolescents' BPN as it studies the role of all three needs in hookah pipe use.

In 2006, Williams and colleagues designed a randomised control trial where the control group received the Public Health Service booklet, a photocopy of the results of their cholesterol tests, and a list of active smoking cessation programmes (phone numbers and costs) in their community and surrounds. Participants in the intervention condition were given the same recommendations and materials, but they also received sessions with a counsellor 4 times a week for 6 months, including medical consultations. Counsellors encouraged an autonomous decision about whether or not to make a quit attempt. Participants were asked to reflect on how smoking either helped or hindered their attainment of their goals. After the counsellors summarised and acknowledged reactions from the participants, counsellors asked the participants whether or not they wanted to stop smoking. If not, they were asked to return in 1 to 2 months to discuss smoking further. If they wanted to stop, counsellors supported their perceived competence for quitting by establishing a cessation plan. This clinical trial demonstrated that an intervention based on SDT facilitated the internalisation of autonomous motivation and perceived competence, and that the internalisation of these motivations, in turn, resulted in increased use of cessation medications and 6-month prolonged abstinence from tobacco. However, this intervention did not focus on relatedness. In 2011, Williams and colleagues designed an intervention to facilitate maintenance of tobacco abstinence of which the Williams et al., (2006) intervention formed the basis. Williams et al., (2011) identified that to assist with longer term abstinence, extended needs support, which extends the 6-month SDT-based intervention to 12 months, is needed. It was further recommended that medication

for participants that are struggling to stop may assist in reducing their cigarette use by half. In 2012, Patrick and Williams added a recommendation whereby Motivation Interviewing (MI) and SDT should be included in the intervention by bringing together the strengths of both approaches. MI is a client-centred counselling style for eliciting behaviour change and is commonly used in cessation interventions. The idea for the intervention was to include a discussion between the participants and their physician about their smoking behaviour. The idea of an intensive intervention with a counselling and medical element is on par with the four-pronged intervention. The idea of fostering autonomy and competence is also similar to the four-pronged intervention. However, the study by Williams et al., (2006), and the extensions by Williams et al., (2011) and Patrick and Williams (2012), made no mention of relatedness. Considering relatedness, especially in hookah pipe use, is crucial because this study has revealed that when adolescents are not able to satisfy their need for relatedness, they smoke, and when the family context is not able to satisfy their need for relatedness, they smoke. For this reason, the intervention designed in this study, namely, the four-pronged approach, provides opportunities for all needs to be met at the individual, school, family, and community level.

Moreover, since the study was focused on adolescents, it was important to understand their developmental phase. In terms of the developmental phase, adolescents are in a phase where they want to belong, especially with the peer group; they want to experiment, and they want to be perceived as trendy and rebellious. Adolescents are also trying to gain independence from their parents, but they still need guidance (Koutoukidis et al., 2016). It is not uncommon that smoking the hookah pipe is intriguing for adolescents, but if the school, family, and community does not provide adequate guidance, adolescents may not be discouraged from smoking the hookah pipe or it may become a gateway substance to other licit or illicit substances (Nyarko & Masson, 2019). The application of the theory to the intervention design is described later in Table 10.2.

Due to the lack of studies focusing on intervening in hookah pipe use at a local level, it is difficult to compare and contrast the current findings. However, this study could be the basis for intervening in adolescent hookah pipe use not only in South Africa, but across the continent. In terms of international practices, it appears that the way the intervention has been designed is on par with how health interventions are designed in other countries, such as Ireland, America, and Australia (Dalum et al., 2012; Colquhoun et al., 2017). The content of the intervention is aligned with other SDT smoking cessation interventions (Williams et al., 1999; Williams et al., 2006; Williams et al., 2011); however, this intervention covers more aspects of adolescent hookah pipe use because it does not only focus on the individual and considers all three BPN. The current intervention allows for more frequent contact with the adolescent and makes provision to keep the adolescent occupied by encouraging attendance of activities after school where BPN can be met. This intervention also factors in a supportive component by including family, teachers, and community members. To date, interventions aimed at reducing hookah pipe use are not as effective as desired (Jawad et al., 2016). The idea to intervene holistically is novel; as such, it could be what is needed in order to achieve better results since various and important role-players would be involved in the intervention to reduce adolescent hookah pipe use. Encouraging the support of family, teachers, and community members will be valuable because they can support cessation, establish boundaries, and contribute to need satisfaction. This intervention is not only focused on reducing adolescent hookah pipe use, it also strives to provide opportunities for adolescents' BPN to be met. Since adolescents smoke when their needs are frustrated, intervening by providing opportunities for needs to be satisfied would be beneficial – because by this token, it would be assumed that if adolescents' BPN are met, they would be less likely to smoke the hookah pipe.

Holistic intervention for behaviour change has merit because it emphasises the role of the environmental and policy contexts of behaviour while incorporating social and

psychological influences. This allows for multiple levels of influence, which provides guidance for the development of more comprehensive interventions and more favourable outcomes (Sallis et al., 2015). The design of the intervention offers not only a practical component to intervention research and practice, i.e. in the development of a programme, but a theoretical component as well. While the intervention is aimed at reducing adolescents' hookah pipe use and satisfying their BPN, it includes intervention for families, teachers, and communities. This means that the intervention is able to reach more people through its direct and indirect reach. It allows for flexibility to accommodate various cultures and contexts. This intervention design can be valuable to academics, practitioners, and policy makers due its unique nature.

This section discussed how the overall findings relate to existing cessation intervention designs. The next section describes how the current intervention design can be understood in terms of its theoretical grounding.

10.3 Theoretical Grounding of the Four-Pronged Approach in Relation to Intervention Mapping, SDT, and the Adolescent Developmental Stage

Intervention mapping forms the basis of designing health promotion evidenced-based programmes (Bartholomew-Eldredge et al., 2016). The four-pronged approach to reduce adolescent hookah pipe use and satisfy BPN was designed using the three stages of intervention mapping which allowed for a needs assessment, incorporating theory, selecting objectives and outcomes, generating programme themes, and selecting activities. Table 10.1 below describes how the intervention mapping approach was applied in this study in order to develop the intervention. Table 10.2 further below illustrates how the intervention can be implemented by using the four-pronged intervention.

Table 10.1: Application of the Intervention Mapping Approach

Step	Tasks	Application of tasks
Step 1 Logic model of the problem	<ul style="list-style-type: none"> • Establish and work with a planning group • Conduct needs assessment • Describe the context for the intervention • State programme goals 	<ul style="list-style-type: none"> • A working group was established by emailing stakeholders to ascertain if they would be interested in attending a workshop to provide input on the intervention. • A needs assessment was conducted through systematic reviews and the qualitative, quantitative, and mixed methods research to determine adolescents' perception of harm, their motivation to smoke, their BPN, the role of the family, and identify if they think that an intervention to reduce hookah pipe use is needed. • The research was done in the adolescents' community. This allowed for the researcher to view the contexts where the intervention would be implemented. The adolescents described their community and research was done to understand the context. This investigation allowed for insight into the population, setting, and community. • The aforementioned activities culminated in the goal to design an intervention to reduce adolescent hookah pipe use and satisfy their BPN.
Step 2 Programme outcome and objectives	<ul style="list-style-type: none"> • Select determinants • Construct change objectives • State expected outcomes 	<ul style="list-style-type: none"> • Determinants of the behaviour was established through a systematic review identifying determinants of adolescent hookah pipe use. • Qualitative, quantitative, and mixed methods research also allowed for understanding why adolescents smoke the hookah pipe and what their BPN are. • Objectives and outcomes were created based on the findings of Phase 1 and Phase 2 of this research.
Step 3 Programme design	<ul style="list-style-type: none"> • Choosing theory • Generating themes • Selecting activities 	<ul style="list-style-type: none"> • Based on the findings of the research, SDT was best suited to understand the BPN of adolescents and their motivations for smoking the hookah pipe. Since this research was focused on a particular group, i.e. adolescents, it was deemed appropriate to understand their developmental stage in order to understand their behaviour. • Themes and activities were created based on the findings of Phase 1 and Phase 2 of this research.

Table 10.2: How the Intervention Can Be Implemented by Using the Four-Pronged Intervention

Step 1						
Goal						
An intervention to reduce adolescent hookah pipe use and satisfy their BPN						
Step 2			Step 3			
No.	Session Objective	Session Outcome	Session Theme	Theory: SDT	Theory: Developmental Perspective	Activities
1. HOOKAH PIPE USER PRONG						
1	<ul style="list-style-type: none"> Adolescents understand their phase of development and why they behave or feel the way they do Adolescents understand how their family impacts their development and choices 	Adolescents have insight; for this reason, they do not make impulsive decisions or act impulsively because they are able to recognise how their stage of develop and families impact their choices	Who am I as an adolescent and what is the role of my family	Adolescents understand that each person has needs and each person's needs are satisfied differently. They understand how the family can frustrate or satisfy their needs. They also understand that pursuit of need satisfaction motivates one's behaviour	In this theme, the phase of adolescent development is explained with specific emphasis on physical, cognitive, personality, emotional, social, and moral development. The way the family impacts the difference facets of development is also described	<ul style="list-style-type: none"> Ice breakers Discussion Life skills Psycho-education
2	<ul style="list-style-type: none"> Modify perceptions and encourage a reduction in hookah pipe use 	Adolescents have a greater understanding of the risks associated with hookah pipe use due to exploring and refuting myths associated with hookah pipe use	Perceptions about hookah use	Adolescents understand they have a choice and that they do not need to believe the myths their peers tell them to experience relatedness	Adolescents' reliance on peer acceptance and seeking information about the hookah pipe from peers	<ul style="list-style-type: none"> Games Role Plays Debates
3	<ul style="list-style-type: none"> Adolescents have improved knowledge about the harms of hookah pipe use, and they understand how and why it is a gateway substance. Adolescents have improved knowledge about addiction and how they can become addicted to using the hookah pipe. 	Adolescents have increased knowledge about the harms and risks associated with the hookah pipe, so they are more conscious when making the decision to smoke or while smoking. This consciousness creates a reluctance to smoke as the awareness of the risks is present.	Harm, gateway, and addiction	Adolescents become aware that increased knowledge can create a sense of competence because they will be able to effectively master the task of providing sensible and accurate information to their peers, and they are able to make informed choices.	Information is provided to adolescents in a way that they can understand, so their cognitive ability is considered during examples, content, and activities	<ul style="list-style-type: none"> PPT presentation, quiz and prizes Invite past users to talk

4	<ul style="list-style-type: none"> Adolescents will have improved knowledge about hookah, cigarette, alcohol, and cannabis use. An acknowledgement of use and concerns will lead to a reduction of use Enhance social skills needed to avoid substance use 	Adolescents understand how one substance may lead to other. They will also understand the risks of using substances concurrently. They will be more conscious of the risks, which will deter them from use. The learnt social skills will allow them to refuse the hookah pipe and/or other substances	Hookah, cigarette, alcohol and cannabis use	Adolescents understand how their choice will lead to consequences and may affect their growth, development and well-being	In order to present the content, adolescents cognitive, personality, emotional, social and moral development will be considered so that the information is relevant, provides understanding and allows for imparting skills and tools that can be implemented whilst factoring in that they are still adolescents and have temptations to experiment	<ul style="list-style-type: none"> Develop a magazine Radio shows Diary of cravings/triggers Role Plays Drama Sessions
5	<ul style="list-style-type: none"> Adolescents will have improved decision-making skills, specifically about hookah pipe use or non-use Improve self-efficacy 	Adolescents can make informed decisions. They will also be able to execute the decision not to smoke and commit to this decision	Decision-making	Adolescents understand the importance of making autonomous decisions and the role of intrinsic, extrinsic, and amotivation	Adolescents are aware of the way in which their social, emotional, personality, physical and moral development contributes to their decision-making	<ul style="list-style-type: none"> Vision Board Pros and Cons Motivational Interviewing
6	<ul style="list-style-type: none"> Adolescents will have improved knowledge about the types of motivation and identify what motivates them to engage in hookah pipe use 	Adolescents can recognise their type of motivation and can work towards being intrinsically motivated to stop smoking.	Understanding and fostering motivation	Adolescents understand the continuum of motivation and can recognise which behaviours are intrinsic, extrinsic, and amotivated	Adolescents understand motivation in a way that is cognitively comprehensible for adolescents	<ul style="list-style-type: none"> Reflection Role Plays Discussions
7	<ul style="list-style-type: none"> Adolescents will have an improved understanding about autonomy and how it is satisfied or frustrated 	Adolescents understand what satisfies their need for autonomy and how it can be satisfied by themselves and others	Understanding and fostering autonomy	Adolescents understand their need for autonomy and how it can be frustrated and satisfied	Adolescents understand how their sense of autonomy is dependent or in relation to their phase of development	<ul style="list-style-type: none"> Psychoeducation Therapy Choice Jar
8	<ul style="list-style-type: none"> Adolescents will have an improved understanding about competence and how it is satisfied or frustrated 	Adolescents understand what satisfies their need for competence and how it can be satisfied by themselves and others	Understanding and fostering competence	Adolescents understand their need for competence and how it can be frustrated and satisfied	Adolescents understand how their sense of competence is dependent or in relation to their phase of development	<ul style="list-style-type: none"> Dream Box Life skills Games
9	<ul style="list-style-type: none"> Adolescents will have an improved understanding about 	Adolescents understand what satisfies their need for relatedness and how it can be	Understanding and fostering relatedness	Adolescents understand their need for relatedness	Adolescents understand how their sense of relatedness is dependent	<ul style="list-style-type: none"> Trust and relatability activities Therapy

	relatedness and how it is satisfied or frustrated	satisfied by themselves and others		and how it can be frustrated and satisfied	or in relation to their phase of development	
10	<ul style="list-style-type: none"> Adolescents will be better equipped to manage challenging situations by exploring relaxation techniques and improved coping mechanisms 	Adolescents have effective coping mechanisms and understand what helps them relax so that they are not drawn towards the hookah pipe for a sense of relief or relaxation	Relaxation and coping mechanisms	Relaxation and coping mechanisms can be achieved by satisfying needs and pursuing behaviours that are intrinsically interesting	Age appropriate relaxation and coping mechanisms are described	<ul style="list-style-type: none"> Mindfulness Pamphlet design Therapy
2. FAMILY PRONG						
1	<ul style="list-style-type: none"> Families have improved understanding of the phase of development and why adolescents feel the way they do Families understand how they impact adolescents' development and choices 	Families understand adolescents' developmental stage and have more insight into their erratic or rebellious behaviour. Families understand that they are role models for the adolescents and their behaviours impact adolescents' choices.	Understanding adolescence and the role of family in adolescent hookah pipe use	Families understand that each person has needs and each person's needs are satisfied differently. They understand how the family can frustrate or satisfy their needs. They also understand that pursuit of need satisfaction motivates one's behaviour	In this theme, the phase of adolescent development is explained with specific emphasis on physical, cognitive, personality, emotional, social, and moral development. The way the family impacts the different facets of development is also described	<ul style="list-style-type: none"> Role Plays Workshops Psycho-education Group Support
2	<ul style="list-style-type: none"> Modify perceptions and encourage a reduction in adolescent hookah pipe use 	Families have a greater understanding of the risks associated with hookah pipe use as a result of exploring and refuting myths associated with hookah pipe use	Perceptions, harm, gateway and addiction of hookah pipe	Families understand they have a choice and that they do not need to believe the myths their peers tell. They are informed how adolescents seek information from peers and believe this information in order to experience relatedness	Families understand adolescents' reliance on peer acceptance and seeking information about the hookah pipe from peers	<ul style="list-style-type: none"> Games Myths and Truth Activity Discussions
3	<ul style="list-style-type: none"> A reduction of hookah, alcohol and cannabis use in the family, particularly in the presence of adolescents 	Families are aware that their substance use influences adolescents' choice to use substances. They also understand that substances can be tempting for adolescents	Hookah, alcohol and cannabis use in the family	Families become aware that increased knowledge can create a sense of competence because they will be able to effectively master the task of providing sensible and accurate information to their	Information is provided to families in a way that adolescents can understand so that they can relay the information in a way that is comprehensible for adolescents	<ul style="list-style-type: none"> Therapy Reflection Pamphlets Referrals

				adolescents, and they are able to make informed choices and support their adolescents to make informed decisions		
4	<ul style="list-style-type: none"> • A reduction of hookah pipe use in the family as a means of socialising • Families identify alternative ways of socialising with the absence of substances 	Families socialise without substances	Hookah as a means of socialisation/alternatives to socialising	Families understand the importance of socialising and the elements thereof. Families are able to explore what provides a sense of relatedness without the use of substances	Families learn that adolescents are still developing, and they are influenced by the thoughts, actions, and words of family members	<ul style="list-style-type: none"> • Socialising experiences • Games • Discussions
5	<ul style="list-style-type: none"> • A recognition of the problem and need for intervention 	Families are not defensive, avoidant, or in denial about the problem, so they recognise the need for intervention	Avoidance and denial	Families understand how lack of awareness and the choices we make can be detrimental for their own and their adolescents well-being	Families learn how adolescents adopt these attitudes and beliefs related to avoidance and denial, and how it enables maladaptive behaviours	<ul style="list-style-type: none"> • Reflections • Videos and illustrations • Discussions
6	<ul style="list-style-type: none"> • Families are less accepting of the hookah pipe 	Families understand the risks associated with hookah pipe, so they ban their adolescents from smoking; they do not give adolescents a hookah pipe as a gift, and they do not accept anyone smoking the hookah pipe in or around their home	Accepting hookah in the family	Families understand alternative ways to experience relatedness without the use of the hookah pipe	Families understand how the acceptance of hookah pipe by the family encourages adolescents' positive cognitions about the hookah pipe	<ul style="list-style-type: none"> • Arts and Craft • Consequence Charts
7	<ul style="list-style-type: none"> • Families will have improved knowledge about the types of motivation and identify what motivates them and their adolescents to engage in hookah pipe use 	Families can recognise their type of motivation and can work towards being intrinsically motivated to pursue their interests. Families can encourage and explore adolescents' experiences of motivation through conversation	Understanding and fostering motivation	Families understand the continuum of motivation and can recognise their intrinsic, extrinsic, and amotivated behaviours. They are able to converse with their adolescents about motivation	Families understand motivation in a way that is cognitively comprehensible for adolescents	<ul style="list-style-type: none"> • Presentation, reflection and discussion • Practice strategies
8	<ul style="list-style-type: none"> • Families will have an improved understanding about autonomy and how it is satisfied or frustrated 	Families understand what satisfies their need for autonomy and how it can be satisfied by themselves and others. They also understand	Understanding and fostering autonomy	Families understand their need for autonomy and how it can be frustrated and satisfied as well as adolescents' need for	Families understand how adolescents' sense of autonomy is dependent or in relation to their phase of development	<ul style="list-style-type: none"> • Role Paly • Reflection • Discussion

		how to foster a sense of autonomy for their adolescents		autonomy and how it can be satisfied		
9	<ul style="list-style-type: none"> Families will have an improved understanding about competence and how it is satisfied or frustrated 	Families understand what satisfies their need for competence and how it can be satisfied by themselves and others. They also understand how to foster a sense of competence for their adolescents	Understanding and fostering competence	Families understand their need for competence and how it can be frustrated and satisfied as well as adolescents' need for competence and how it can be satisfied	Families understand how adolescents' sense of competence is dependent or in relation to their phase of development	<ul style="list-style-type: none"> Games Discussion Parenting skills training
10	<ul style="list-style-type: none"> Families will have an improved understanding about relatedness and how it is satisfied or frustrated 	Families understand what satisfies their need for relatedness and how it can be satisfied by themselves and others. They also understand how to foster a sense of relatedness for their adolescents	Understanding and fostering relatedness	Families understand their need for relatedness and how it can be frustrated and satisfied as well as adolescents' need for relatedness and how it can be satisfied	Families understand how adolescents' sense of relatedness is dependent or in relation to their phase of development	<ul style="list-style-type: none"> Trust and relatability exercises
11	<ul style="list-style-type: none"> Adolescents and family members attend a family day where they will learn more about each other, bond, learn communication strategies, and experience a sense of relatedness 	Adolescents and family members implement what they have been taught in the previous 10 weeks	Family Day focused on bonding and fostering relatedness	Families and adolescents experience a context where autonomy, competence and relatedness are encouraged	The family day comprises activities that are developmentally appropriate for adolescents and families; families are thus able to witness the type of activities that their adolescents enjoy, so they can encourage these activities and discourage hookah pipe use	<ul style="list-style-type: none"> Picnic Creative activities or games together
3. AFTERSCHOOL AND WEEKEND PRONG						
	<ul style="list-style-type: none"> Reduce hookah pipe use and foster satisfaction of BPN through fun, interesting, and engaging activities 	Adolescents choose to participate in activities that they are interested in; they participate in activities that allows them to feel competence, and they surround themselves with people who provide a sense of relatedness	Afterschool and weekend programmes to keep adolescents occupied and foster BPN	Adolescents understand how everyone's needs and motivation is different; therefore, their choice of activities and how they derive a sense of competence is different. They will also understand why all people are not attracted	Adolescents are aware that activities are designed and chosen based on their developmental phase. They also understand that different people have diverse interests, depending on where they are developmentally, and	<ul style="list-style-type: none"> Sport Arts and craft Chess, darts and other games Chill Lounge Movies Woodwork Sewing Volunteering

				to the same type of people	that this is not something to feel ashamed of	
4. TEACHERS, COMMUNITY AND SOCIAL MEDIA PRONG						
Teachers	<ul style="list-style-type: none"> Teachers will have an improved understanding about hookah pipe use, BPN, motivation, and development. This will enable teachers to support and advise adolescents appropriately 	Teachers understand hookah pipe use, motivation, BPN, and how to foster the needs so that they can teach their classes and implement the workshop material with their students who are smoking or considering smoking the hookah pipe. They can also create an environment in the class that allows for satisfaction of needs.	A teachers' workshop focusing on risks, reasons for hookah pipe use, and BPN.	Understanding needs and motivation is incorporated in the teachers' workshop	Understanding adolescent development is incorporated in the teachers' workshop	<ul style="list-style-type: none"> Workshop Icebreakers Games Discussion Case Studies
Community	<ul style="list-style-type: none"> Encourage a reduction and create a sense of disapproval towards the hookah pipe in the community and in homes 	Communities are aware of the risks associated with hookah pipe use; they understand motivation, needs, and how it needs to be fostered. They can ban hookah pipe use in the community, and community members can inform each other or the school about the adolescents who are smoking the hookah pipe in an attempt to reduce adolescents' hookah pipe use. Communities can create structures and activities that can encourage satisfaction of needs. The activities can serve as alternatives for hookah pipe use	Community awareness and education about the hookah pipe and BPN	Understanding needs and motivation is incorporated in the awareness campaigns	Understanding adolescent development is incorporated in the awareness campaigns	<ul style="list-style-type: none"> Community Walk Speeches Community Event
Social Media	<ul style="list-style-type: none"> Reduce adolescent hookah pipe use and increase awareness of BPN Distribute accurate and desensationalised information 	The reach will be increased because social media reaches many adolescents globally, so they will receive adequate and appropriate information about the hookah pipe and needs satisfaction	Social media campaigns	Understanding needs and motivation is incorporated in the social media campaigns	Understanding adolescent development is incorporated in the social media campaigns	<ul style="list-style-type: none"> Memes/Animations Hashtags Videos Filters and borders Chain messages

10.4 Implications for Practice

Since this intervention is targeted at adolescent hookah pipe use, it was essential to consider adolescent development at all stages of the study from conceptualisation to the design of the intervention. Factors such as relationship with peers, the ability to understand content, how the content should be communicated and the opportunity to express emotions had to be factored into the design of the intervention. Moreover, adolescents have different interests, personalities and interpersonal skills (Milevsky, 2015), therefore, an array of activities to cater to these needs are imperative to keep the adolescent motivated to attend the intervention. Adolescence can be difficult for adolescents as they experience physical changes, raging hormones and trying to find their niche or identity. This can create feelings of irritability, being overwhelmed, confused, conflicted and scared (Wang et al., 2018). Therefore, it is important that the emotional needs of adolescents are considered in practice. Adolescents are developing ideas of social and moral behaviours so they may participate in activities, such as hookah pipe smoking, that conflict with their ideas of morality but they are also cognisant about their social status, peer approval and desire to belong to a circle of friends (Wang et al., 2018). This conflict should be addressed so that adolescents can make responsible and informed choices. In an attempt to support adolescents to stop smoking the hookah pipe, an intervention focusing on the family, school, and community has been identified because each one of these contexts together with the people within these contexts have a critical role in the reduction of hookah pipe use and satisfaction of BPN.

A holistic approach including the family, school, and community is necessary because adolescents co-exist with people in their environment. This research has identified the scarcity of effective hookah pipe interventions and the lack of research focusing on interventions and determinants in South Africa. This means that there is a need to build research around hookah pipe use in South Africa with a specific focus on intervention implementation.

South Africa is a country that is rich in diversity in terms of race, religion, culture, and context. It is impossible for intervention and research to be generalisable for all South Africans. Therefore, interventions should be flexible so that they can be adapted to be applicable for the target population. There are several inequalities in South Africa; the gap between the wealthy and the poor is huge. Many people in South Africa are surviving on the bare minimum; this impacts education levels, access to resources, and mental health. For this reason, counselling is important, and it needs to be made available at schools and in communities so that effective coping mechanisms can be taught. This is important so that the hookah pipe is not used as a means to relax and/or cope with life's stressors. There is a need to create experiences and opportunities where adolescents can feel competent and have a sense of relatedness. In an attempt not to exclude anyone as a result of literacy levels, there is a need to conduct sessions in a practical, fun, and engaging manner. This is especially true for the interventions that are content heavy, such as discussing the harms of hookah pipe use. Activities and design must be appropriate for school-going and non-school going adolescents. Perhaps schools can have interventions for school-going children and FBOs and CBOs can have interventions in the day for non-school-going adolescents. Policy makers can make it mandatory for non-school-going children to attend sessions during the day.

On the other hand, there are people in South Africa who have access to resources that also smoke the hookah pipe, and they need to be considered too. Therefore, interventions can be adapted to suit these contexts. The need for e-health and e-interventions emerged particularly in the discussion with the stakeholders during the workshop. This component has to be developed, especially since we are living in a technological era, and adolescents are dependent on the Internet and their mobile devices. The President of South Africa has emphasised the need for computer literacy and skills, as this is the way of the future. While face-to-face interventions will always have merit, there is a need to evolve and provide interventions digitally. These interventions are especially suited to reach adolescents and

families who are not physically able to attend sessions, and adolescents and families who have social anxiety. The e-intervention could have interactive sessions, such as hookah quizzes; identifying the different parts of the hookah pipe, and the potential harm of each part; children can digitally colour in the hookah pipe, having a “stop” icon over it to make them aware that it is hazardous; there can be a question and answer component for adolescents to clarify; and when the urge strikes to smoke, they can speak to someone online who can deter them and provide an alternative or a coping mechanism to deal with the urge.

Practitioners need to be aware that attending programmes require commitment and retaining people can be difficult. Therefore, strategies to prevent drop out, motivating people to attend, and encouraging people to recommend the programme to their peers is vital. This requires constant effort on the part of practitioners. Follow-up post-intervention is equally important, otherwise relapse will occur. In order to have an effective intervention, the intervention must be delivered well. Therefore, adequate and appropriate training is needed for health practitioners, teachers, principals, and people facilitating life skills activities in communities.

From a family perspective, families need to take more responsibility for their adolescents with regard to hookah pipe use. When parents are at work, suitable supervision should be arranged. This study revealed that adolescents with more pocket money are more likely to smoke the hookah pipe, so the expenditure of pocket money should be monitored, and adolescents should be taught to be accountable for it. Families should also act and provide consequences after experimentation of the hookah pipe occurs in an attempt to curb it and/or prevent it from becoming a potential gateway substance. Families also need to be educated that the hookah pipe is not a safer alternative to cigarette smoking. Families as role models should be emphasised as their attitude and behaviours play a large role in encouraging or discouraging hookah pipe use. In order not to deter family members from attending, practitioners should pay careful attention to the pitch of the intervention. The intervention

must factor in the varying levels of literacy within the target group. Flexibility of interventions can make provision for this. Families should at all times feel free to engage and the environment should be perceived as a safe place to ask questions and obtain clarity. There is a need for policy to regulate hookah pipe use, especially in the presence of children.

From a school perspective, teachers must understand how their smoking behaviour and attitudes toward the hookah pipe impacts learners' behaviour and attitude. Schools should have a stricter stance against hookah pipe use. It is essential that school and community leaders recognise the harms of hookah pipe use and the benefits of satisfying needs so that they can welcome the intervention. From a community perspective, there is a need for FBOs and CBOs to be a part of the intervention by hosting activities and events with the goal of satisfying adolescents' BPN. At these platforms, it would be valuable if facilitators could explain the dangers of the hookah pipe and thereby discourage use in the same way as other substances, such as alcohol. This message may have a particularly profound impact if it comes from a respected FBO or leader. Community members and teachers – potential forerunners for the intervention – should be identified through marketing, recruiting, implementing, and following up. Community members and teachers are important because they are familiar with the context and dynamics. For example, community members would know where gang violence is most rife so they would avoid hosting an intervention in that area. Similarly, teachers would know if they are close to a shopping centre, so the area is very accessible by means of private and public transport.

Lastly, it is important to recognise that whilst this study revealed that non-users experience more satisfaction compared to users, they cannot be forgotten, otherwise they may be tempted to use because of the attention users receive in the intervention. This means that they should be placed into other available programmes in their school and community where their needs are satisfied too.

10.5 Limitations of the Study

This study encountered a number of limitations:

1. Adolescence is experienced differently in different parts of the world. This study made use of mainly Western theories. These theories may not apply in the same way to other contexts. In future, African-centered developmental theories such as the Bantu framework, Akan framework or Yoruba framework could be considered (Lateef, 2020). African-centered developmental theories emphasize the importance of considering culture and heritage.
2. The quantitative questionnaire was too long for some of the adolescents, so they struggled to maintain concentration. This was especially true when completing the latter sections of the questionnaire. In future, shorter questionnaires could be used.
3. The amount of options adolescents could choose from in table 6.3, item one, could have been too many; this could have confused the participants and they could have selected more than one option. This may account for why the total adds up to more than 100%. Fewer options to choose from may be better. This can be achieved by either omitting or merging response options.
4. Only adolescents who attended mainstream schools were included in this study. Thus, children who have dropped out of school, or attended technical or special needs schools, were excluded. In future, these adolescents could participate in a similar study.
5. Data was only collected in five of the eight districts in the Western Cape. Despite several attempts, it remained challenging to access schools in the other three districts due to their lack of interest in participating in the research, their school schedules, or their inability to commit to a date and time for the research to be conducted. There is a need to engage schools prior to data collection on the importance of research and how it can benefit the learners and community.

6. The schools could only provide 1–2 hours for data collection in the quantitative stage. This meant that the survey had to be done in larger groups (groups of 25–30) than desired (groups of 10–15). Two facilitators were present for each group, but participants could have felt that they were not comfortable asking clarifying questions, especially when answering the section of motivation which required users to complete one section (Section D) and non-users to complete a different section (Section E). In future, the data collection time period could be extended to accommodate for the limit time and number of participants.

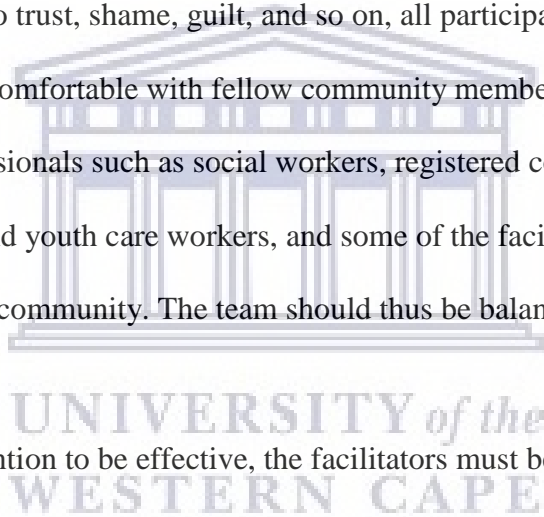
10.6 Recommendations

The recommendations are targeted at practice, policy, and future research. These are listed below.

10.6.1 Recommendations for Practice

- In order for interventions to be implemented in communities, there is a need for implementers to partner with existing structures. These structures include, but are not limited to, local and national government, CBOs, FBOs, schools, local businesses, and media, as each one of these structures have a pivotal role in the success of an intervention. Partnering also avoids duplication and conflict related to clients. When considering which structures to partner with, it is important to ascertain which structures adolescents identify with, which structures interest them and which ones they would most likely benefit from.
- This study revealed that there is a need for an e-intervention. This requires collaboration with professionals who have expertise in designing apps, websites, and so on. Also, it is important to note that all adolescents do not have access to electronic devices, the internet and data, so these requirements have to be met before expecting adolescents to attend an e-intervention.

- Partnering with universities is valuable because they could encourage students and graduates with skills to implement sport and recreation activities. The students and graduate could also serve as mentors and role models to the adolescents.
- Implementers should invest in training community members when conducting community interventions because they understand the community dynamics, they have influence, and it fosters job creation. Using community members to facilitate the intervention is further advantageous because community members can relate to them; they are often role models for adolescents; they are more cognisant of how needs can be satisfied within the community, and they are motivated to ensure that opportunities are created for this to occur. However, due to trust, shame, guilt, and so on, all participants and their family members may not be comfortable with fellow community members conducting the session. For this reason, professionals such as social workers, registered counsellors, psychologists, child and youth care workers, and some of the facilitators should come from outside the local community. The team should thus be balanced to allow for comfortability.
- In order for an intervention to be effective, the facilitators must be appropriately trained before recruitment. They must be well informed about recruiting the intended target group and they must be able to answer questions correctly and not make false promises. This means that a step-by-step guide is needed so that the intervention principles can be conducted uniformly. In addition, room for flexibility should always exist so that the intervention can be adapted to the context in which it is delivered. It is also important that the facilitators are able to engage effectively with adolescents.
- When piloting an intervention, copious notes and careful consideration must occur to determine whether any changes must be made to the intervention.



- This study revealed that experimentation with the hookah pipe occurs early, i.e. before the age of ten. For this reason, there is a need for interventions targeting younger children. The aims of this intervention can be applied for an intervention with younger children, but the activities would need to be adapted so that it is appropriate for younger children. Activities could include games, puzzles, drawing, puppet shows, and songs/poems/rhymes. These types of activities may also be useful for non-school-going children or children attending special needs schools.
- Since hookah pipe users experience trauma, dysfunctional families, and less than desired relationships with their family members. Families may need to be referred for family counselling, parent workshops, or support groups to work through their trauma and manage their stressors. These activities can be facilitated by people with a mental health background. Failure to do this may result in generational trauma and potentially generational hookah pipe use as a means of coping, as smoking the hookah pipe was indicated as a way for families to cope.

10.6.2 Recommendations for Policy

Currently policy refers to all tobacco products, which, by definition, includes the hookah pipe. There is the need for a specific section focusing on hookah pipe use so that it can be viewed as harmful and a concern. The use of hookah pipes in public spaces and in the presence of children and adolescents should be prohibited. Advertising of the hookah pipe and hookah pipe parties should also be prohibited. The number of restaurants offering hookah pipe on the menu is rapidly increasing. This needs to be curbed and restaurants should be prohibited from selling hookah pipe smoking as part of the menu. Policy, guidelines, and White Papers should place emphasis on fostering a nurturing family environment and limiting family members' use of substances. Lastly, it is imperative that policy makers have objective, measurable, and comparable quality indicators for hookah pipe use.

10.6.3 Recommendations for Future Research

As mentioned in the limitations, this study did not include grey literature in the systematic reviews. Therefore, it is recommended that future studies include grey literature when conducting systematic reviews. Literacy levels and concentration span should be taken into consideration when creating the questionnaire. This is especially true for language within the questionnaire and length of the questionnaire. Also, the study of hookah pipe and SDT is emerging in South Africa, but there is a lack of adequate assessment measures in the South African context. South Africa is a multilingual and multicultural country; therefore, contextualised and adequate assessment measures are needed to assess hookah pipe use, family conditions, motivation, and BPN. There is a need for interventions to be studied over time so that conclusions can be made about the effectiveness of the intervention. In cases where interventions are not effective, it is necessary to investigate where the intervention needs to be adapted. It is also essential to understand adolescents' experience of the intervention so that interventions can be adapted to entice participants and keep them motivated to attend. Future research could focus on family members' perspectives of hookah pipe use. It would be interesting to note their perceptions of harm. It would also be beneficial to understand family members' BPN, because if their needs are frustrated, it would be difficult for them to create contexts for adolescents' needs to be satisfied. Lastly, an assessment of the family would be valuable because if families are dysfunctional, they may struggle to commit to the programme. They would therefore need to be referred to access support to manage the family dynamics either before this intervention or simultaneously.

It is intended that the findings of this study coupled with the recommendations could add value when intervening to reduce adolescent hookah pipe use.

10.7 Conclusion

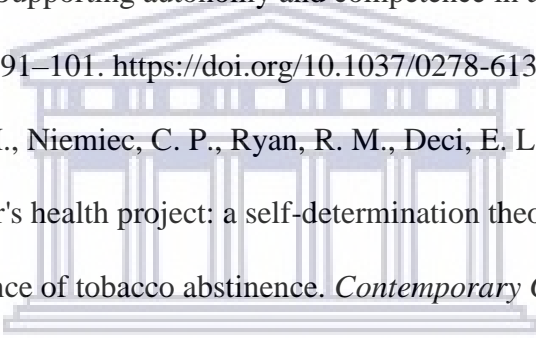
The aim of the present study was to develop an intervention to reduce adolescent hookah pipe use and satisfy BPN. The current chapter concludes the dissertation by summarising the main arguments and results of the phases that led to the development of the intervention. This chapter also highlighted the implications of the study's findings, limitations, and recommendations.

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APPENDICES



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 1A Information Sheet – Participant

Project title: The development of an intervention to meet the BPN of adolescents to reduce Hookah Pipe use

What is this study about?

This is a research project being conducted by Zainab Kader, PhD candidate at the University of the Western Cape. You are invited to voluntarily participate in this research project. The study wants to develop an intervention to meet the BPN of adolescents to reduce Hookah Pipe use.

What will I be asked to do if I agree to participate?

You will be asked to complete a questionnaire and possibly an interview too. The questionnaire will take approximately 45-60 minutes to complete. The duration of the interview will be approximately one hour.

Would my participation in this study be kept confidential?

The utmost will be done to keep your personal information confidential. In aiding the protection of your identity, the information provided will be private; no names or any other descriptors will be used to ensure that you will not be identified when participating in this study. In this way you will remain anonymous and confidentiality will be maintained.

If an article or report is written about this research study, your identity will remain anonymous as best is possible. The reports will be kept in a locked compartment with only the researcher and research supervisor having access to the information. The research findings will not include any of your personal details.

What are the risks of this research?

There are potential risks in participating in this study as discussing a sensitive topic such as this may illicit feelings of distress as participants may feel discomfort or distress. If this causes some difficulty, you will be referred to a resource in your community.

What are the benefits of this research?

This research will contribute to the existing body of knowledge in the field. Also, there are no studies or interventions in the Western Cape that focus on determining motivation for hookah pipe use and interventions to meet the psychological needs of adolescents with the aim of minimising hookah pipe use. Hookah pipe has negative effects on users. This study seeks to tackle prevention and early intervention for adolescent hookah pipe users.

Do I have to be in this research and may I stop participating at any time?

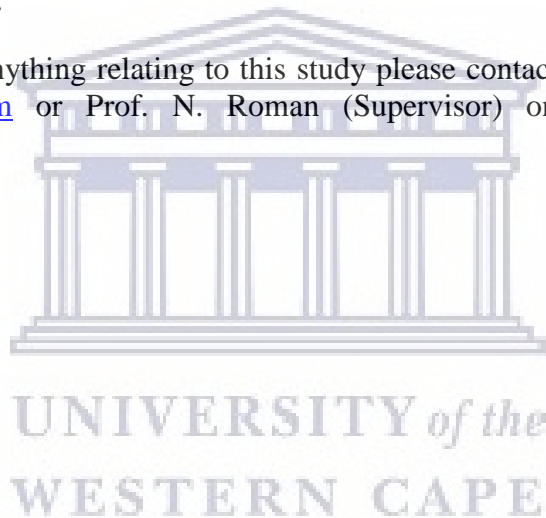
Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, there will be no consequences.

Is any assistance available if I am negatively affected by participating in this study?

Every effort has been taken to protect you from any harm in this study. If however, you may feel affected you will be referred to your nearest community resource for assistance.

What if I have questions?

If you are unsure about anything relating to this study please contact Zainab Kader 084 268 6226 zkader4@gmail.com or Prof. N. Roman (Supervisor) on 021 959 2277/2970 nroman@uwc.ac.za.





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Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 1B: Inligtingsblad – Deelnemer

Projek titel: Die ontwikkeling van 'n intervensie om die sielkundige behoeftes van adolessente te bevredig om die gebruik van Hookah Pyp te verminder

Waaroor gaan die studie?

Hierdie is 'n navorsingsprojek wat deur Zainab Kader, n' PhD student uitgevoer word. Ons nooi jou uit om vrywillig aan hierdie navorsingsprojek deel te neem. Die doel van die studie is om 'n intervensie te ontwikkel wat die sielkundige behoeftes van adolessente te bevredig om die gebruik van Hookah Pyp te verminder.

Wat sal ek gevra word om te doen as ek meedoen om deel te neem?

Jy sal gevra word om n' vraelys te voltooi. Daar sal ook 'n onderhoud met jou gedoen word. Die vroeë lys sal ongeveer 45-60 minute neem om te voltooi. Die onderhoud sal ongeveer 45-60 minute neem. Die vraelyste en onderhoud is vertroulik en anonym. Dus sal daar geen gevolge vir jou wees gebaseer op die inligting wat jy in die vraelys of onderhoud deel.

Sal my deelname aan hierdie studie vertroulik gehou word?

Die uiterste sal gedoen word om jou persoonlike inligting vertroulik te hou. Ter ondersteuning van die beskerming van jou identiteit sal die inligting wat verskaf word, privaat wees. Geen name of enige ander beskrywers sal gebruik word om te verseker dat jy nie geïdentifiseer sal word wanneer jy aan hierdie studie deelneem nie. Op hierdie manier bly jy anoniem en word vertroulikheid gehandhaaf. As 'n artikel of verslag oor hierdie navorsingsstudie geskryf word, sal jou identiteit anoniem bly, sover moontlik. Die verslae sal in 'n geslote kompartement gehou word, met slegs die navorser en navorsingsopsiener wat toegang tot die inligting het. Die navorsingsbevindinge sal nie enige van jou persoonlike besonderhede insluit nie.

Wat is die risiko's van hierdie navorsing?

Daar is moontlike risiko's om aan hierdie studie deel te neem. Om 'n sensitiewe onderwerp soos hierdie te bespreek, kan veroorsaak dat jy as deelnemer gevoelens van ongemak ervaar. As jy enige ongemak ondervind, sal jy vir berading verwys word na n diensveskaffer in jou gemeenskap.

Wat is die voordele van hierdie navorsing?

Huidiglik is daar beperkte navorsing oor "hookah" pyp gebruikers in SuidAfrika, veral onder pre-adolessente en adolessente. Hierdie navorsing sal aanvullend wees tot bestaande kennis in die gebied. Daar is geen studies of intervensies in die Wes Kaap wat fokus op die motivering agter "hookah" pyp gebruik, sowel as moontlike intervensies wat die basiese sielkundige

behoefte van pre-adolescente en adolessente sal aanspreek. Die “Hookah” pyp is bekend daarvoor om negatiewe effekte te hê op gebruikers . Die studie poog om voorkomings en vroeë intervensies te ontwikkel vir adolessente en pre-adolescente wat “Hookah” pyp gebruikers is.

Moet ek in hierdie navorsing wees en mag ek op enige stadium ophou deelneem?

Jou deelname aan hierdie navorsing is heeltemal vrywillig. Jy mag kies om glad nie deel te neem nie. As jy besluit om aan hierdie navorsing deel te neem, kan jy enige tyd ophou deelneem. As jy besluit om nie aan hierdie studie deel te neem nie, of as jy op enige stadium ophou deelneem, sal daar geen gevolge wees nie.

Is daar enige hulp beskikbaar as ek negatief geraak word deur deelname aan hierdie studie?

Alle pogings is aangewend om jou te beskerm teen enige skade in hierdie studie. As jy egter wel geraak voel kan jy verwys word na n diensveskaffer in jou gemeenskap.

Wat as ek vrae het?

As jy onseker is oor enigiets wat verband hou met hierdie studie, kontak asseblief Zainab Kader 084 268 6226 zkader4@gmail.com of Prof N.Roman (toesighouer) tel. 021 959 2970, e-pos: nroman@uwc.ac.za.



Appendix 1C: Iphepha Lolwazi – Inxaxheba



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Private Bag X 17, Bellville 7535, South Africa
 Tel: +27 21-959 2277, Fax: 27 21-959 2845
 E-mail: zkader4@gmail.com

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Isihloko Seprojekthi: Uphuhliso lweenqubo zokukhawulelana nolutsha olugaxeleke kwisiyobisi esaziwa njenge Hookah Pipe, nokukhawulelana nemicelimngeni ethi ibachaphazele ngokwengqondo.

Unobangela woluphando/esisifundo.

Oluphando luqunyelwe ngu Zainab Kader, umfundi we PhD kwi Dyunivesithi yase Ntshonakoloni. Uyamenywa ukuba uthathe inxaxheba kuphando olujonge ekuqinisekiseni unciphiso lokusetyenziswa kwe Hookah Pipe lulutsha.

Zintoni izinto andakuthi ndizibuzwe nendinokuthi ndizenziswe xandinokuthatha inxaxheba kwesisifundo?

Uzokucelwa ukuba uphendule iphepha elinemibuzo okanye uthathe inxaxheba kudliwanondlebe. Eliphepha lemibuzo lizokuthatha ixesha elisondele kwi 45-60 yemizuzu ukuliphendula ngokuphangaleleyo. Udliwanondlebe lona luthathe iyure enye.

Ingaba ukhuseleko lwam luqinisekisiwe kwesisifundo?

Iincukacha zakho ziyokuthi zikhuselwe. Iincukacha ezifana negama, ifani kwakunye nayo yonke imininingwana eyakuthi ingqamane nawe. Ulwazi oyakuthi wabelane ngabo nakunye neempendulo zakho azokwaziwa ukuba zivela kuwe ukuqinisekisa ukhuseleko lwakho. Ukuba ulwazi oluthe lwafunyanwa kuphando lwapapashwa, izazisi zakho ziyakufihlwa ukhuselwe. Upapasho lolwazi olufunyenweyo koluphando luyakuvalwa endaweni yemfihlelo. Ngumqokuni woluphando nomphathi wakhe oyakuthi abenolwazi lwendawo yemfihlo. Imibuzo yesisifundo ayigxinanga kuwe nqo, uncedisana nabafundi abafuna indlela zokunciphisa lengxaki.

Ingaba kunobungozi koluphando?

Ekuthatheni inxaxheba kwesisifundo ungaziva ungakhululekanga kuba isifundo singemeko emasikizi. Ungabanoloyiko lokuphendula ngokuphangaleleyo kuba ucinga ukuba impendulo zakho zinokuchaphazela. Ukuba ungaziva ungakhuselekanga emva kokuba uphendule lemibuzo, uyakuthi uthunyelwe kwinqubo ezikhoyo ekuhlaleni ezinokuthi zikuncede.

Iinzuzo zoluphando?

Oluphando luyakuthi luncedisane nolwazi selukhona malunga nosetyenziso lwe hookah pipe. Apha eNtshonakoloni uphando olujongane nokhawulelana nolutsha olusebenzisa iHookah pipe

alukabikho. Uphando olungqalamelane nonobangela wokuba ulustaha luzigaxele kwesisiyobisi sibachaphazelayo ngokwasengqondweni. iHookah pipe inemiphumela engalunganga kwabo bazifumana sele begaxelekile ekuyisebenziseni. Esisifundo sifuna ukuvelisa indlela zokuphuhlisa ulutsha ukuze lungaxakameleki kwisiyobisi se hookah pipe. Ukuze kufunyanwe indlela zokukhusela abobantwana bangakaqali ukusisebenzisa kwakunye nabo selesisebenzisa. **Ingaba kunyanzelekile ukuba ndithathe inxaxheba kwesisifundo okanye ndingakwazi ukungavumi?**

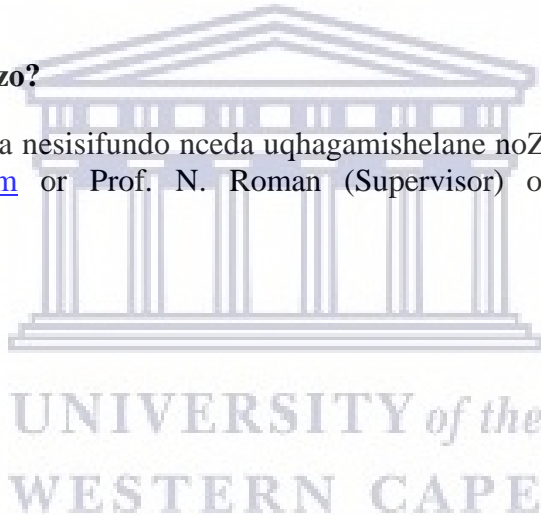
Ukuthatha inxaxheba kwakho kwesisifundo kungokuzithandela. Uthatha inxaxheba ngokuthanda kwakho, ungangayithathi inxaxheba ngokuthanda. Ukuba uzithandele ukuthatha inxaxheba ungangayeka nxa uzisola sele uvumile. Ukunobangaba ukhetha ukungabiyinxalenye yesisifundo okanye uyeke sele ugaphakathi akuzobakho ziphumo zimbi, awuzokohlwaywa.

Ingaba lukhona uncedo olukhoyo ukunobangaba ndithathe inxaxheba kwesisifundo ndaze ndachaphazeleka kakubi?

Amanyathelo okuqinisekisa ukhuseleko nakunye nowuphi umonakalo kuwe onokubangelwa sesisifundo akhona. Umntu ochaphazeleke kakubi uyakuthi athunyelwe kwiziko elifutshane ekuhlaleni.

Ukunobangaba unemibuzo?

Ukuba unemibuzo malunga nesisifundo nceda uqhagamishelane noZainab Kader ku 084 268 6226. zkader4@gmail.com or Prof. N. Roman (Supervisor) on 021 959 2277/2970 nroman@uwc.ac.za.





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Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 2A Information Sheet – Parent

Project title: The development of an intervention to meet the BPN of adolescents to reduce Hookah Pipe use

What is this study about?

This is a research project being conducted by Zainab Kader, PhD candidate at the University of the Western Cape. Your child is invited to voluntarily participate in this research project. The study wants to develop an intervention to meet the BPN of adolescents to reduce Hookah Pipe use.

What will I be asked to do if I agree to participate?

Your child will be asked to complete a questionnaire and possibly an interview too. The questionnaire will take approximately 45-60 minutes to complete. The duration of the interview will be approximately one hour.

Would my participation in this study be kept confidential?

The utmost will be done to keep your child's personal information confidential. In aiding the protection of your child's identity, the information provided will be private; no names or any other descriptors will be used to ensure that your child will not be identified when participating in this study. In this way your child will remain anonymous and confidentiality will be maintained.

If an article or report is written about this research study, your child's identity will remain anonymous as best is possible. The reports will be kept in a locked compartment with only the researcher and research supervisor having access to the information. The research findings will not include any of your personal details.

What are the risks of this research?

There are potential risks in participating in this study as discussing a sensitive topic such as this may illicit feelings of distress as participants may feel discomfort or distress. If this causes some difficulty. Your child will be referred to a resource in your community.

What are the benefits of this research?

This research will contribute to the existing body of knowledge in the field. Also, there are no studies or interventions in the Western Cape that focus on determining motivation for hookah pipe use and interventions to meet the psychological needs of adolescents with the aim of

minimising hookah pipe use. Hookah pipe has negative effects on users. This study seeks to tackle prevention and early intervention for adolescent hookah pipe users.

Do I have to be in this research and may I stop participating at any time?

Your child's participation in this research is completely voluntary. Your child may choose not to take part at all. If your child decides to participate in this research, he/she may stop participating at any time. If he/she decides not to participate in this study or if your child stops participating at any time, there will be no consequences.

Is any assistance available if I am negatively affected by participating in this study?

Every effort has been taken to protect your child from any harm in this study. If however, your child may feel affected you will be referred to your nearest community resource for assistance.

What if I have questions?

If you are unsure about anything relating to this study please contact Zainab Kader 084 268 6226 zkader4@gmail.com or Prof. N. Roman (Supervisor) on 021 959 2277/2970 nroman@uwc.ac.za.



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UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 2B: Inligtingsblad – Deelnemer

Projek titel: ‘n verkenning van die ervarings van ouers wat die ouersessie-komponent van James House BEST Program bygewoon het

Waaroor gaan die studie?

Hierdie is ‘n navorsingsprojek wat deur Zainab Kader, n’ PhD student uitgevoer word. Ons nooi U kind uit om vrywillig aan hierdie navorsingsprojek deel te neem. Die doel van die studie is om ‘n intervensie te ontwikkel wat die sielkundige behoeftes van adolessente te bevredig om die gebruik van Hookah Pyp te verminder.

Wat sal ek gevra word om te doen as ek meedoen om deel te neem?

U kind sal gevra word om n’ vraelys te voltooi. Daar sal ook ‘n onderhoud met U kind gedoen word. Die vraelys sal ongeveer 45-60 minute neem om te voltooi. Die onderhoud sal ongeveer 45-60 minute neem. Die vraelyste en onderhoud is vertroulik en anonym. Dus sal daar geen gevolge vir U kind wees gebaseer op die inligting wat U kind in die vraelys of onderhoud deel.

Sal my deelname aan hierdie studie vertroulik gehou word?

Die uiterste sal gedoen word om U kind persoonlike inligting vertroulik te hou. Ter ondersteuning van die beskerming van U kind identiteit sal die inligting wat verskaf word, privaat wees. Geen name of enige ander beskrywers sal gebruik word om te verseker dat U kind nie geïdentifiseer sal word wanneer U kind aan hierdie studie deelneem nie. Op hierdie manier bly U kind anoniem en word vertroulikheid gehandhaaf. As 'n artikel of verslag oor hierdie navorsingsstudie geskryf word, sal U kind identiteit anoniem bly, sover moontlik. Die verslae sal in 'n geslote kompartement gehou word, met slegs die navorser en navorsingsopsiener wat toegang tot die inligting het. Die navorsingsbevindinge sal nie enige van U persoonlike besonderhede insluit nie.

Wat is die risiko's van hierdie navorsing?

Daar is moontlike risiko's om aan hierdie studie deel te neem. Om 'n sensitiewe onderwerp soos hierdie te bespreek, kan veroorsaak dat U kind as deelnemer gevoelens van ongemak ervaar. In daai geval sal U kind vir berading verwys word na n diensveskaffer in U gemeenskap.

Wat is die voordele van hierdie navorsing?

Huidiglik is daar beperkte navorsing oor “hookah” pyp gebruikers in SuidAfrika, veral onder adolessente. Hierdie navorsing sal aanvullend wees tot bestaande kennis in die gebied. Daar is geen studies of intervensies in die Wes Kaap wat fokus op die motivering agter “hookah” pyp gebruik, sowel as moontlike intervensies wat die basiese sielkundige behoeftes van adolessente

sal aanspreek. Die “Hookah” pyp is bekend daarvoor om negatiewe effekte te hê op gebruikers . Die studie poog om voorkomings en vroeë intervensies te ontwikkel vir adolessente wat “Hookah” pyp gebruikers is.

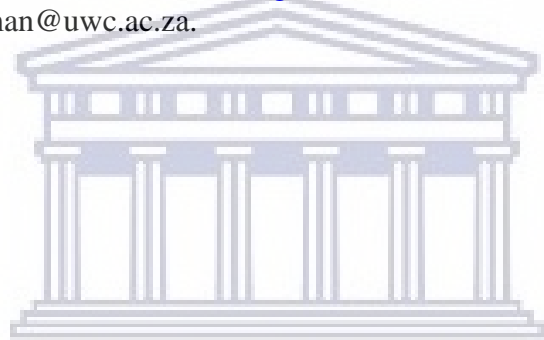
Moet ek in hierdie navorsing wees en mag ek op enige stadium ophou deelneem?

U kind se deelname aan hierdie navorsing is heeltemal vrywillig. U kind mag kies om glad nie deel te neem nie. As U kind besluit om aan hierdie navorsing deel te neem, kan U kind enige tyd ophou deelneem. As U kind besluit om nie aan hierdie studie deel te neem nie, of as U kind op enige stadium ophou deelneem, sal daar geen gevolge wees nie.

Is daar enige hulp beskikbaar as ek negatief geraak word deur deelname aan hierdie studie?

Alle pogings is aangewend om U kind te beskerm teen enige skade in hierdie studie. As U kind egter wel geraak voel kan U kind verwys word na n diensveskaffer in U gemeenskap.

Wat as ek vrae het?As u onseker is oor enigiets wat verband hou met hierdie studie, kontak asseblief Zainab Kader 084 268 6226 zkader4@gmail.com of Prof N.Roman (toesighouer) tel. 021 959 2970, e-pos: nroman@uwc.ac.za.



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UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 2C: Iphepha Lolwazi – Umzali

Isihloko Seprojekthi: Uphuhliso lweenqubo zokukhawulelana nolutsha olugaxeleke kwisiyobisi esaziwa njenge Hookah Pipe, nokukhawulelana nemiceli mingeni ethi ibachaphazele ngokwengqondo.

Unobangela woluphando/esisifundo.

Oluphando luqunyelwe ngu Zainab Kader, umfundi we PhD kwi Dyunivesithi yase Ntshonakoloni. Mzali umntwana wakho uyamenywa azibandakanye koluphando lujonge ekuqinisekiseni unciphiso lokusetyenziswa kwe Hookah Pipe lulutsha.

Zintoni izinto anokuthi azibuzwe nanokuthi azenziswe umntwana ovumayo ukubandakanwa kwesisifundo?

Umntwana wakho uzokucelwa ukuba aphenidule iphepha elinemibuzo okanye athathe inxaxheba kudliwanondlebe. Eliphepha lemibuzo lizokuthatha ixesha elisondele kwi 45-60 yemizuzu ukuliphendula ngokuphangaleleyo. Udliwanondlebe lona luthathe iyure enye.

Ingaba ukhuseleko lomntwana oyakuthi athathe inxaxheba kwesisifundo luqinisekisiwe?

Iincukacha zomntwana oyakuthi azibandakanye koluphando zizakukhuselwa. Iincukacha ezifana negama, ifani yomntwana kwakunye nayo yonke imininingwana eyakuthi ingqamane naye. Ulwazi ayakuthi abelane ngabo umntwana wakho nakunye neempendulo zakhe azokwaziwa ukuba zivela kuye ukuqinisekisa ukhuseleko lwakhe. Ukuba ulwazi oluthe lwafunyanwa kuphando lwapapashwa, izazisi zomntwana ziyakufihlwa akhuselwe. Upapasho lolwazi olufunyenweyo koluphando luyakuvallelwa endaweni yemfihlelo. Ngumqokonyi woluphando nomphathi wakhe oyakuthi abenolwazi lwendawo yemfihlo. Imibuzo yesisifundo ayigxinanga emntwaneni wakho nqo, umntwana wakho uncedisana nabafundi abafuna indlela zokunciphisa lengxaki.

Ingaba kunobungozi koluphando?

Umntwana othatha inxaxheba kwesisifundo angaziva engakhululekanga kuba ethetha ngemeko emasikizi. Angabanoloyiko lokuphendula ngokuphangaleleyo kuba ecinga ukuba impendulo zakhe zokumchaphazela. Ukuba umntwana wakho angaziva engakhuselekanga emva kokuba ephenidule lemibuzo, uyakuthi athunyelwa kwinqubo ezikhoyo ekuhlaleni ezinokuthi zimncede.

Iinzuzo zoluphando?

Oluphando luyakuthi luncedisane nolwazi selukhona malunga nosetyenziso lwe hookah pipe. Apha eNtshonakoloni uphando olujongane nokhawulelana nolutsha olusebenzisa iHookah pipe alukabikho. Uphando olungqalamelane nonobangela wokuba ulustaha luzigaxele kwesisiyobisi sibachaphazelayo ngokwasengqondweni. IHookah pipe inemiphumela engalunganga kwabo bazifumana sele begaxelekile ekuyisebenziseni. Esisifundo sifuna ukuvelisa indlela zokuphuhlisa ulutsha ukuze lungaxakameleki kwisiyobisi se hookah pipe. Ukuze kufunyanwe indlela zokukhusela abobantwana bangakaqali ukusisebenzisa kwakunye nabo selesisebenzisa.

Ingaba kunyanzelekile ukuba ndithathe inxaxheba kwesisifundo okanye ndingakwazi ukungavumi?

Ukuthatha inxaxheba komntwana wakho kwesisifundo kungokuzithandela. Umntwana wakho angangayithathi inxaxheba ethanda. Ukuba uzithandele ukuthatha inxaxheba angayeka nxa ezisola sele evumile. Ukunobangaba umntwana ukhetha ukungabiyinxalenye yesisifundo okanye ayeke sele sengaphakathi akuzobakho ziphumo zimbi, akazokohlwaywa.

Ingaba lukhona uncedo olukhoyo ukunobangaba umntwana othathe inxaxheba angachaphazeleka kakubi sesisifundo?

Amanyathelo okuqinisekisa ukhuseleko nakunye nowuphi umonakalo emntwaneni onokubangelwa sesisifundo akhona. Umntwana ochaphazeleke kakubi uyakuthi athunyelwe kwiziko elifutshane ekuhlaleni.

Ukunobangaba unemibuzo?

Ukuba unemibuzo malunga nesisifundo nceda uqhagamishelane noZainab Kader ku 084 268 6226. zkader4@gmail.com or Prof. N. Roman (Umphati) on 021 959 2277/2970 nroman@uwc.ac.za.

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Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Department of Social Work

Appendix 3A: Consent Form for Parents (Questionnaire and/or Interview)

Title: The development of an intervention to meet the BPN of adolescents to reduce Hookah Pipe use

The letter serves to grant my consent for my child to partake in this study. The data that will be collected will be regarding my child's experience of hookah pipe use, BPN and the role of the environment on hookah pipe use. The objective of the study is to create an intervention to meet BPN and reduce hookah pipe use in adolescents with the information of those who participate in the study.

I understand what this study entails and I am aware that this was explained to my child in a child friendly manner. I am aware that my child can withdraw from the study at any time should he/she not feel comfortable discussing the topic. I understand that the information is private and will be managed confidentially and anonymously. I understand that the interview will be audio recorded. I understand that the information provided during the interviews and/or questionnaires will be anonymously presented in research reports and publication articles.

By signing this document, I am agreeing to allow my child to participate in this study

Name and Surname of child	
Your Name and Surname	
Signature	
Date	

Should you have any questions regarding this study or wish to report any problems you have experienced related to the study, please contact the study coordinator:

Study Coordinator's Name: Zainab Kader

University of the Western Cape

Private Bag X17, Belville 7535

Telephone: 021 959 2277/2970/0842686226

Email: zkader4@gmail.com



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Private Bag X 17, Bellville 7535, South Africa
 Tel: +27 21-959 2277, Fax: 27 21-959 2845
 E-mail: zkader4@gmail.com

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DEPARTEMENT VAN MAATSKAPLIKE WERK

Appendix 3B: Toesteming Vorm vir Ouers (Vraestel en/of Onderhoud)

Projek titel: Die ontwikkeling van 'n intervensie om die sielkundige behoeftes van adolessente te bevredig om die gebruik van Hookah Pyp te verminder

Opskrif van navorsing Projek: Die ontwikkeling van 'n intervensie om die sielkundige behoeftes van adolessente te bevredig om die gebruik van Hookah Pyp te verminder

Die studie was aan my beskryf in n taal wat ek verstaan en ek het vrylik en vrywillig in gestem dat my kind kan deel wees van hierdie studie. My vrae oor die studie was beantwoord. Ek verstaan dat my kind se identiteit nie bekend gemaak sal word nie en dat hy/sy enige tyd kan ontrek van die studie en dit sal my of my kind negatief in enige manier afekteer nie. Ek stem in dat die onderhoud opgeneem word.

Naam en Van van U kind	
U se naam en van	
Handtekening	
Datum	

In dien u enige vrae het oor die studie of as U wens om enige problem aan te meld wat U ervaar het wat te doen het met die studie, kontak asseblief die studie koordineerder:

Naam: Zainab Kader
 Universiteit van die Wes-Kaap
 Private Bag X17, Belville 7535
 Tel: 021 9593638/2277
 S: 084 268 6226
 E-pos: zkader4@gmail.com



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Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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ISEBE LOMSEBENZI WENTLALO

Appendix 3C: Iphepha Lemvume: Abazali

Isihloko sophando nzulu: Uphuhliso lokungenelela ukuze konezise iimfuno zabantwana nangokuncitshiswa kwezinga lokusetyenziswa kwe Hookah Pipe

Olu phando ndilucaciselwe ngolwimi endiluqondayo kwaye ndiyaqonda ndivuma ngokukhululekileyo ukuthabatha inxaxheba. Imibuzo endinayo malunga nolu phando iphendulwe.

Ndiyaqonda ukuba iinkcukaca zam azizuchazwa ndawo kwaye ndingarhoxa kolu phando nanini na ndifuna ndingakhange ndinike sizathu kwaye lonto ayiyi kundichaphazela gwenxa nangayiphi na indlela.

Ndiyayiqonda ba udliwano ndlebe luzakushicilelwa.

Lomntwana othabatha inxaxheba	
Igama nefani yomzali	
Sayina	
Umhla	

Ukuba unemibuzo malunga nolu phando okanye ufuna ukuchaza iingxaki ezithe zavela, nceda qhakamshelana nomphathi wolu phando:

Igama: Zainab Kader
 Idyunivesiti yasentsona koloni
 Private Bag X17, Belville 7535
 Umnxeba: 021 9593638/2277
 Umakhal'ekhukhwini: 084 268 6226
 I-imeli: zkader4@gmail.com



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Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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DEPARTMENT OF SOCIAL WORK

Appendix 4A: Assent Form for Participants (Questionnaire and/or Interview)

Title: The development of an intervention to meet the BPN of adolescents to reduce Hookah Pipe use

The letter serves to grant my assent to partake in this study. The data that will be collected will be regarding my experience of hookah pipe use, BPN and the role of the environment on hookah pipe use. The objective of the study is to create an intervention to meet BPN and reduce hookah pipe use in adolescents with the information of those who participate in the study.

I understand what this study entails and it was explained in a child friendly manner. I am aware I can withdraw from the study at any time should I not feel comfortable discussing the topic. I understand that the information is private and will be managed confidentially and anonymously. I consent to the interview being recorded. I understand that the information provided during the interviews and/or questionnaires will be anonymously presented in research reports and publication articles.

By signing this document, I am agreeing to participate in the study

Name and Surname	
Signature	
Date	

Should you have any questions regarding this study or wish to report any problems you have experienced related to the study, please contact the study coordinator:

Study Coordinator's Name: Zainab Kader

University of the Western Cape

Private Bag X17, Belville 7535

Telephone: 021 959 2277/2970/ 0842686226

Email: zkader4@gmail.com



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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DEPARTEMENT VAN MAATSKAPLIKE WERK

Appendix 4B: Instemming Vorm (Vraestel En/Of Onderhoud)

Projek titel: Die ontwikkeling van 'n intervensie om die sielkundige behoeftes van adolessente te bevredig om die gebruik van Hookah Pyp te verminder

Die studie was aan my beskryf in n taal wat ek verstaan en ek het vrylik en vrywillig in gestem dat ek kan kan deel wees van hierdie studie. My vrae oor die studie was beantwoord. Ek verstaan dat my identiteit nie bekend gemaak sal word nie, dat ek enige tyd kan ontrek van die studie en dit sal nie vir my negatief in enige manier afekteer nie. Ek stem in dat die onderhoud opgeneem word.

Naam en Van	
Handtekening	
Datum	

In dien u enige vrae het oor die studie of as U wens om enige problem aan te meld wat U ervaar het wat te doen het met die studie, kontak asseblief die studie koördineerder:

Naam: Zainab Kader
 Universiteit van die Wes-Kaap
 Private Bag X17, Belville 7535
 Tel: 021 9593638/2277
 S: 084 268 6226
 E-pos: zkader4@gmail.com



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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ISEBE LOMSEBENZI WENTLALO

Appendix 4C: IPHEPHA LEMVUME: UMNTWANA

Isihloko sophando nzulu: Uphuhliso lokungenelela ukuze konezise iimfuno zabantwana nangokuncitshiswa kwezinga lokusetyenziswa kwe Hookah Pipe

Olu phando ndilucaciselwe ngolwimi endilugqondayo kwaye ndiyaqonda ndivuma ngokukhululekileyo ukuthabatha inxaxheba. Imibuzo endinayo malunga nolu phando iphendulwe.

Ndiyaqonda ukuba iinkcukaca zam azizuchazwa ndawo kwaye ndingarhoxa kolu phando nanini na ndifuna ndingakhange ndinike sizathu kwaye lonto ayiyi kundichaphazela gwenxa nangayiphi na indlela.

Ndiyayiqonda ba udliwano ndlebe luzakushicilelwa.

Igama nefani yalowo uthatha inxaxheba	
Sayina	
Umhla	

Ukuba unemibuzo malunga nolu phando okanye ufuna ukuchaza iingxaki ezithe zavela, nceda qhakamshelana nomphathi wolu phando:

Igama: Zainab Kader
 Idyunivesiti yasentsona koloni
 Private Bag X17, Belville 7535
 Umnxeba: 021 9593638/2277
 Umakhal'ekhukhwini: 084 268 6226
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UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 5A: Questionnaire

Dear Children

My name is Zainab Kader. I am a student researcher at the University of the Western Cape. My work is to find out information about things. Your school was chosen so that I can find out some information. I am very interested to know more about (children aged 13-19) who smoke the hookah pipe and their BPN. Then, I want to develop an intervention to meet the BPN and reduce hookah pipe use.

But, I need your permission to ask you certain questions. Remember all the information which you tell me is **confidential**, in other words, no one else will know who you are and what you said when you answer the questions. You will be **ANONYMOUS**. You can choose not to take part in the study and we can end your taking part at any time.

Please **tick** in the correct block on the right hand side AND **sign** in the block provided if you **would or would not like to take part in the study**

Please tick (•)	I want to take part in this study	
	I do not want to take part in this study	
Sign:		

Thank you.

Yours sincerely

Zainab Kader
Researcher (UWC)

Professor Nicolette Roman
Supervisor (UWC)

SECTION A: DEMOGRAPHIC INFORMATION

Please complete the following information about you by ticking the correct response or writing the response in the block provided.

No.	Item	Response				
Please tick the correct block.						
1	Are you a boy or a girl?	Boy			Girl	
2	What is your race?	White	Coloured	Black	Indian	Other
3	What language do you speak at home?	English	Afrikaans	IsiXhosa	Other	
4	Who do you live with?	Both Parents	Mother Only	Father Only	Sisters and brothers only	Other family (grandparents/ aunt/uncle/ cousin etc.)
5	Are your parents	Married	Divorced	Separated	Living together	Single because one parent died (widow)
Write the answer in the block next to the question						
6	How old are you?					
7	Which school do you attend?					
8	Which grade are you in?					
9	Which area do you live?					
10	How many people work (have jobs) in your house?					
11	Are any of these substances used in your family?	Dagga	Yes	No	I Don't Know	
		Mandrax	Yes	No	I Don't Know	
		Heroin	Yes	No	I Don't Know	
		Cocaine	Yes	No	I Don't Know	
		Alcohol	Yes	No	I Don't Know	

SECTION B: PREVALENCE

The following questions are interested in your use of tobacco. Please answer carefully and honestly. No one will see your answers besides the researcher and her supervisors. You will not get in trouble for the answers you provide. Please tick the box with the answer that is true for you.

No.	Item	Response	
Please tick the correct block.			
1	Do you smoke cigarettes	Yes	No
2	How old were you when you started smoking cigarettes?		
3	Have you ever smoked hookah pipe?	Yes	No
4	How old were you when you started smoking the hookah pipe?		
5	Do you still smoke the hookah pipe?	Yes	No
Only complete questions below if you said YES to number 3 otherwise continue to Section C			
6	Have you smoked hookah pipe in the past month	Yes	No
7	Have you smoked hookah pipe in the past week	Yes	No

8	How often do you smoke (please tick <u>ONE</u> box that is most true for you)	Daily	Weekly	Monthly	Once in a while	Experimentation
		1- 2 times a day	1- 2 times a week	1-7 times a month	Once every 3 months	Only tried once
		3-5 times a day	3-4 times a week	8-15 times a month	Once every 6 months	Only tried twice
		More than 5 times a day	5-6 times a week	More than 15 times a month	Once a year	Tried more three or more times
9	What age did you start smoking the hookah pipe	0-5	6-9	10-12	13-15	16-19
10	Have you ever smoked a hookah pipe with dagga inside	Yes			No	
11	Have you ever smoked a hookah pipe with alcohol inside	Yes			No	
12	Will you ever stop smoking hookah pipe	Yes			No	
13	If yes, at what age?	10-19	20-29	30-39	40-49	50-59

Adapted from the hookah pipe questionnaire

SECTION C: HOOKAH PIPE

The following questions are interested in how much you know about the hookah pipe. Please answer carefully and honestly. No one will see your answers besides the researcher and her supervisors. You will not get in trouble for the answers you provide. Please tick the box with the answer that is true for you for all the questions.

No.	Item	Response			
What do you know about the hookah pipe?					
Please tick the correct block.					
1	Have you heard about the hookah pipe?	True	False	Don't know	
2	The hookah pipe is a problem.	True	False	Don't know	
3	The hookah pipe is harmful.	True	False	Don't know	
4	The water in the hookah pipe filters out the tobacco toxins.	True	False	Don't know	
5	Children can smoke the hookah pipe.	True	False	Don't know	
6	You can get cancer from the smoking the hookah pipe.	True	False	Don't know	
7	Children (aged 10-12) can smoke the hookah pipe	True	False	Don't know	
8	Children (aged 13-19) can smoke the hookah pipe	True	False	Don't know	
9	Where do you smoke the hookah pipe? (Please tick <u>ONE</u> box that is most true for you)	Public spaces	Family members house	At a friend's house	
		Parks	Restaurant	At home	
		School	Party	Other	
10	Smoking the hookah pipe will lead to becoming an addict.	True	False	Don't know	
11	Smoking the hookah pipe is a safer alternative to smoking cigarettes?	True	False	Don't know	

12	Smoking the hookah pipe helps people relax	True	False	Don't know		
13	The dangers of smoking the hookah pipe are exaggerated.	True	False	Don't know		
14	Sharing the hookah pipe is harmful to one's health	True	False	Don't know		
15	Hookah pipe smokers can easily quit	True	False	Don't know		
16	Does your parents accept the use of the hookah pipe by family members?	Yes		No		
17	Does your parents accept if people use the hookah pipe in your family home who are not family members?	Yes		No		
18	Do you smoke the hookah pipe together with any of these substances?	Tik	Always	Sometimes	Never	I don't know
		Heroin	Always	Sometimes	Never	I don't know
		Dagga	Always	Sometimes	Never	I don't know
		Cocaine	Always	Sometimes	Never	I don't know
		Alcohol	Always	Sometimes	Never	I don't know
		Other substances	Always	Sometimes	Never	I don't know
19	Who uses the hookah pipe in your house? (Select more than one)	Mother	Father	I use it	Brother	
		Sister	Other (who):			
20	Where is the hookah pipe smoked in your family?	Inside our house	Outside our house	Both		
21	Are there children present when the person smokes the hookah pipe?	Yes	No	Don't know		
22	Are there any children (2-6 years) who smoke the hookah pipe in your family?	Yes	No	Don't know		
23	Are there any children (7-10 years) who smoke the hookah pipe in your family?	Yes	No	Don't know		
24	Are there any children (11-15 years) who smoke the hookah pipe in your family?	Yes	No	Don't know		
25	Are there any children (16-17 years) who smoke the hookah pipe in your family?	Yes	No	Don't know		
26	Are there any persons aged 18-25 years who smoke the hookah in your family?	Yes	No	Don't know		
27	Are there any persons aged 26-35 years who smoke the hookah in your family?	Yes	No	Don't know		
28	Are there any persons older than 36 years who smoke the hookah in your family?	Yes	No	Don't Know		
29	Is the hookah pipe used in your family as a means of communicating between family members?	Yes	No	Don't Know		

30	Is the hookah pipe used in your family as a means of socializing in your family?	Yes	No	Don't Know
31	Do family members talk easier with each other when they are smoking the hookah pipe?	Yes	No	Don't Know

Hookah pipe questionnaire adapted from The College Health Behaviour Survey (2010-2011).

SECTION D: MOTIVATION (HOOKAH PIPE USERS)

ONLY ANSWER THESE QUESTIONS IF YOU SMOKE THE HOOKAH PIPE. Tick the box that is true for you.

No	Item	Not true at all	Not true	Some times true	True	Very true
Interest/Enjoyment						
1	I enjoy smoking the hookah pipe very much.					
2	Smoking the hookah pipe is fun.					
3	I think smoking the hookah pipe is boring. (R)					
4	Smoking hookah pipe does not hold my attention at all.(R)					
5	I would describe smoking the hookah pipe very interesting.					
6	I think smoking the hookah pipe is enjoyable.					
7	While I do smoke the hookah pipe, I think about how much I enjoy it.					
Pressure/Tension						
8	I feel nervous while smoking the hookah pipe.					
9	I feel stressed while smoking the hookah pipe.					
10	I feel relaxed when smoking the hookah pipe.(R)					
11	I am nervous while smoking the hookah pipe					
12	I feel pressured to smoke the hookah pipe					
Perceived Choice						
13	I believe I have some choice about smoking the hookah pipe					
14	I feel like it is my own choice to smoke the hookah pipe					
15	I did not really have a choice about smoking the hookah pipe (R)					
16	I felt like I had to smoke the hookah pipe (R)					
17	I smoke the hookah pipe because I had no choice. (R)					
18	I smoke the hookah pipe because I want to.					
19	I smoke the hookah pipe because I have to. (R)					

Adapted from the Intrinsic Motivation Inventory

SECTION E: MOTIVATION (HOOKAH PIPE NON – USERS)

ONLY ANSWER THESE QUESTIONS IF YOU DO NOT SMOKE THE HOOKAH PIPE. Tick the box that is true for you.

No	Item	Not true at all	Not true	Some times true	True	Very true
The reason I would not smoke the hookah pipe is:						
1	Because I feel that I want to take responsibility for my own health.					
2	Because I would feel guilty or ashamed of myself if I smoked.					
3	Because I personally believe it is the best thing for my health					
4	Because others would be upset with me if I smoked.					
5	Because I want others to see I can do it (not smoke).					
6	Because I have carefully thought about it and believe it is very important for many aspects of my life.					
7	Because I would feel bad about myself if I smoked.					
8	Because it is an important choice I really want to make.					

9	Because I feel pressure from others to not smoke.					
10	Because it is easier to do what I am told than think about it.					
11	Because it is consistent with my life goals.					
12	Because I want others to approve of me.					
13	Because it is very important for being as healthy as possible.					
14	I really don't think about why I would not smoke the hookah pipe					
15	I don't really know why I would not smoke the hookah pipe					

Adapted from the Treatment Self-Regulation Questionnaire (smoking)

SECTION F: BPN SCALE

Please tick the response that suits you best. Consider your feelings **during the last week**.

Please read each of the following items carefully, thinking about how it relates to your life, and then indicate how true it is for you.

No	Item	Not true at all	Not true	Some times true	True	Very true
Relatedness						
1	I feel a connection with people who care for me, and whom I care for.					
2	I am lonely.(R)					
3	I feel close and connected with other people who are important to me.					
4	I feel unappreciated by one or more important people.(R)					
5	I feel a strong sense of closeness with the people I spend time with.					
6	I have disagreements, fights or arguments with people I usually get along with. (R)					
Competence						
7	I am successful in completing difficult tasks and projects.					
8	I experienced some kind of failure, or I am not good at something.(R)					
9	I took on and did well in hard challenges.					
10	I did something stupid, that made me feel incompetent (hopeless/useless) (R)					
11	I did well even with the difficult things.					
12	I struggled to do something I should be good at. (R)					
Autonomy						
13	I am free to do things my own way.					
14	I have a lot of pressures that I did not need (R)					
15	My choices express what I want					
16	There are people telling me what I must to do. (R)					
17	I really do what interests me.					
18	I have to do things that I do not want to (R)					

Adapted from the Balanced Measure of Psychological Needs Scale

SECTION G: ROLE OF THE FAMILY

The following questions is about your family. **There are no right or wrong answers, only your opinions.**

Please tick the option which **suits your situation the best**.

No	Item	Not true at all	Not true	Some times true	True	Very true
Cohesion						
1	My family members really help and support one another.					
2	There is a feeling of togetherness in our family.					
3	Our family does not do things together. (R)					

4	We really get along well with each other.					
5	Family members seem to avoid contact with each other when we at home. (R)					
Conflict						
6	We fight a lot in our family.					
7	Family members sometimes get so angry they threw stuff					
8	Family members hardly ever lose their tempers. (R)					
9	Family members sometimes hit each other.					
10	Family members rarely criticize each other. (R)					
Laissez-Faire Family Style						
11	Members of our family could get away with almost anything.					
12	Family members are not punished or reprimanded when they did something wrong.					
13	It is unclear what would happen when rules are broken in our family.					
14	It is hard to know what the rules are in our family					
15	There is strong leadership in our family					
Family Sociability						
16	We are full of life and good spirits					
17	Our family enjoys being around other people.					
18	Socializing with other people often makes my family uncomfortable. (R)					
19	As a family, we have a large number of friends.					
20	Our family likes having parties.					

Adapted from the Family Functioning Scale

SECTION H: FAMILY SATISFACTION SCALE

Below are five statements with which you may agree or disagree. Using the 1-5 scale below, indicate your agreement with each item by placing the appropriate number in the line preceding that item.

Be open and honest in your responding.

1 – Strongly Disagree

2- Disagree

3- I Don't Agree or Disagree

4- Agree

5- Strongly Agree

____ 1. In most ways my family is close to my ideal

____ 2. The conditions of my family are excellent

____ 3. I am satisfied with my family

____ 4. So far I have gotten the important things I want in my family

____ 5. I would change almost nothing in my family

SECTION I: NEED FOR AN INTERVENTION TO REDUCE HOOKAH PIPE USE

Please tick yes if you think people who smoke hookah pipe needs help and tick n if you think they do not need help. Please comment in the box below – what do you think will make people that smoke hookah pipe stop smoking?

Do you think people who smoke the hookah pipe need help?	Yes	No
Please explain why		
What do you think will make people stop smoking the hookah pipe?		

THANK YOU FOR PARTICIPATING IN THIS STUDY



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 5B: Vraelys

Liewe Kinders

My naam is Zainab Kader. Ek is 'n studentnavorsers by die Universiteit van Wes-Kaapland. My werk is om inligting oor dinge te verkry. Julle skool is gekies om sulke inligting vir my beskikbaar te maak. Ek wil baie graag meer weet van adolessente (kinders 13-19 jaar oud) wat waterpyp ('hookah') rook en hul basiese sielkundige behoeftes. Dan wil ek 'n intervensie ontwikkel om aan die basiese sielkundige behoeftes van adolessente te voldoen en om die gebruik van waterpype te verminder.

Maar ek het julle toestemming nodig om vir julle sekere vrae te vra. Onthou al die inligting wat julle vir my gee is **vertroulik**, met ander woorde, niemand anders sal weet wie jy is en wat jy gesê het toe jy die vrae beantwoord het nie. Jy sal **ANONIEM** (dit wil sê naamloos) wees. Jy kan verkies om nie aan die studie deel te neem nie en ons kan jou deelname enige tyd beëindig.

Maak asseblief 'n **merk**ie in die korrekte blokkie aan die regterkant EN **teken jou naam** in die blok daaronder om aan te dui of of jy **aan die studie wil deelneem of nie**.

Maak asseblief 'n merk (✓)	Ek wil aan die studie deelneem.	
	I wil nie aan die studie deelneem nie.	
Handtekening:		

Dankie.

Zainab Kader
Navorsers (UWK)

Professor Nicolette Roman
Studeleier (UWK)

AFDELING A: DEMOGRAFIESE INLIGTING

Voltooi asseblief die volgende inligting oor jou deur 'n merkie by die korrekte antwoord te maak of die korrekte inligting in die blokkie wat verskaf word in te vul.

No.	Item	Antwoord				
Maak asseblief 'n merkie in die korrekte blokkie.						
1	Is jy 'n seun of 'n meisie?	Seun			Meisie	
2	Wat is jou ras?	Blank	Bruin	Swart	Indiër	Ander
3	Watter taal praat julle by die huis?	Engels	Afrikaans	Xhosa	Ander	
4	By wie woon jy?	Albei ouers	Net ma	Net pa	Net susters en broers	Ander familie (ouma en oupa/ tannie/oom/ neef/niggie ens.)
5	Jou ouers	is getroud	is geskei	is uitmekaar	leef saam	is 'n enkelouer want een ouer is oorlede
Skryf die antwoord in die blokkie langs die vraag.						
6	Hoe oud is jy?					
7	Na watter skool gaan jy?					
8	In watter graad is jy?					
9	In watter area woon jy?					
10	Hoeveel mense in jou huis het 'n werk?					
11	Word enige van die volgende middele in jou gesin gebruik?	Dagga	Ja	Nee	Ek weet nie	
		Mandrax	Ja	Nee	Ek weet nie	
		Heroïne	Ja	Nee	Ek weet nie	
		Kokaine	Ja	Nee	Ek weet nie	
		Alkohol	Ja	Nee	Ek weet nie	

AFDELING B: VOORKOMS

Die volgende vrae handel oor jou gebruik van tabak. Antwoord asseblief versigtig en eerlik. Niemand anders as die navorser en haar studeleiers sal jou antwoorde sien nie. Jy sal nie in die moeilikheid beland oor jou antwoorde nie. Maak asseblief 'n merkie in die blokkie wat vir jou waar is.

No.	Item	Antwoord				
Maak asseblief 'n merkie in die korrekte blokkie.						
1	Rook jy sigarette?	Ja			Nee	
2	Hoe oud was jy toe jy sigarette begin rook het?					
3	Het jy al ooit waterpyp gerook?	Ja			Nee	
4	Hoe oud was jy toe jy die hookah pyp begin rook het?					
5	Rook jy nog steeds die hookah pyp?	Ja			Nee	
Beantwoord net die volgende vrae as jou antwoord by vraag 2 Ja was, anders gaan voort met Afdeling C						
6	Het jy in die afgelope maand waterpyp gerook?	Ja			Nee	
7	Het jy in die afgelope week waterpyp gerook?	Ja			Nee	
8		Daaglik	Weeklik	Maandelik	Af en toe	Eksperiment

	Hoe dikwels rook jy? (Merk die EEN blokkie wat vir jou die naaste aan waar is.)	1- 2 keer per dag	1- 2 keer per week	1-7 keer per maand	Een keer elke 3 maande	Net een keer prober
		3-5 keer per dag	3-4 keer per week	8-15 keer per maand	Een keer elke 6 maande	Net twee keer prober
		Meer as 5 keer per dag	5-6 keer per week	Meer as 15 keer per maand	Een keer per jaar	Drie of meer keer probeer
9	Op watter ouderdom het jy waterpyp begin rook?	0-5	6-9	10-12	13-15	16-19
10	Het jy al ooit 'n waterpyp met dagga daarin gerook?	Ja			Nee	
11	Het jy al ooit 'n hookah pyp gerook wat alkohol in gehad het?	Ja			Nee	
12	Sal jy ooit ophou waterpyp rook?	Ja			Nee	
13	Indien ja, op watter ouderdom?	10-19	20-29	30-39	40-49	50-59

Verwerking van die waterpypvraelys

AFDELING C: WATERPYP

Die volgende vrae handel oor hoeveel jy van die waterpyp weet. Antwoord asseblief versigtig en eerlik. Niemand anders as die navorsers en haar studeerleiers sal jou antwoorde sien nie. Jy sal nie n die moeilikheid beland oor die antwoorde wat jy gee nie. Maak asseblief 'n merkie in die blokkie met die antwoord wat vir jou waar is vir al die vrae.

No.	Item	Antwoord		
Wat weet jy van 'n waterpyp?				
Maak asseblief 'n merkie in die korrekte blokkie.				
1	Het jy al van 'n waterpyp gehoor?	Waar	Onwaar	Weet nie
2	'n Waterpyp is a probleem.	Waar	Onwaar	Weet nie
3	'n Waterpyp is skadelik.	Waar	Onwaar	Weet nie
4	Die water in 'n waterpyp filtreer die tabakgiftstowwe uit.	Waar	Onwaar	Weet nie
5	Kinders kan 'n waterpyp rook.	Waar	Onwaar	Weet nie
6	Jy kan kanker kry van waterpyp rook.	Waar	Onwaar	Weet nie
7	Kinders (met die ouderdom 10-12) kan waterpyp rook.	Waar	Onwaar	Weet nie
8	Kinders (met die ouderdom 13-19) kan waterpyp rook.	Waar	Onwaar	Weet nie
9	Waar rook jy waterpyp? (Merk asseblief <u>EEN</u> bloke wat die meeste waar is vir jou.)	Openbare ruimtes	Familie se huis	By 'n vriend se huis
		Parke	Restaurant	Tuis
		Skool	Partytjie	Ander
10	Waterpyp rook sal van jou 'n verslaafde maak.	Waar	Onwaar	Weet nie
11	Waterpyp rook is 'n veiliger alternatief vir sigarette rook.	Waar	Onwaar	Weet nie
12	Waterpyp rook help mense ontspan.	Waar	Onwaar	Weet nie
13	Die gevare van waterpyp rook word oordryf.	Waar	Onwaar	Weet nie
14	Om saam waterpyp te rook is skadelik vir 'n mens se gesondheid.	Waar	Onwaar	Weet nie
15	Waterpypokers kan maklik ophou.	Waar	Onwaar	Weet nie

16	Aanvaar jou ouers die gebruik van 'n waterpyp deur familieledede?	Ja			Nee	
17	Aanvaar jou ouers dit wanneer mense wat nie familieledede is nie in julle huis 'n waterpyp gebruik?	Ja			Nee	
18	Rook jy partykeer 'n waterpyp saam met enige van hierdie stowwe?	Tik	Altyd	Soms	Nooit	Ek weet nie
		Heroïen	Altyd	Soms	Nooit	Ek weet nie
		Dagga	Altyd	Soms	Nooit	Ek weet nie
		Kokaïen	Altyd	Soms	Nooit	Ek weet nie
		Alkohol	Altyd	Soms	Nooit	Ek weet nie
		Ander stowwe	Altyd	Soms	Nooit	Ek weet nie
19	Wie gebruik 'n waterpyp in jou huis? (Jy kan meer as een kies.)	Ma	Pa	Ek	Broer	
		Suster	Ander (wie?):			
20	Waar word 'n waterpyp by jou huis gerook?	In ons huis		Buite ons huis	Binne en buite	
21	Is daar kinders teenwoordig wanneer 'n waterpyp gerook word?	Ja	Nee		Weet nie	
22	Is daar kinders (2-6 jaar oud) in jou familie wat waterpyp rook?	Ja	Nee		Weet nie	
23	Is daar kinders (7-10 jaar oud) in jou familie wat waterpyp rook?	Ja	Nee		Weet nie	
24	Is daar kinders (11-15 jaar oud) in jou familie wat waterpyp rook?	Ja	Nee		Weet nie	
25	Is daar kinders (16-17 jaar oud) in jou familie wat waterpyp rook?	Ja	Nee		Weet nie	
26	Is daar persone 18-25 jaar oud in jou familie wat waterpyp rook?	Ja	Nee		Weet nie	
27	Is daar persone 26-35 jaar oud in jou familie wat waterpyp rook?	Ja	Nee		Weet nie	
28	Is daar persone meer as 36 jaar oud in jou familie wat waterpyp rook?	Ja	Nee		Weet nie	
29	Word 'n waterpyp in jou familie as 'n manier om met mekaar te kommunikeer gebruik?	Ja	Nee		Weet nie	
30	Word 'n waterpyp in jou familie as 'n manier om te sosialiseer gebruik?	Ja	Nee		Weet nie	
31	Praat familieledede makliker met mekaar wanneer hulle waterpyp rook?	Ja	Nee		Weet nie	

Die waterpypvraelys is 'n verwerking van die College Health Behaviour Survey (2010-2011).

AFDELING D: MOTIVERING (WATERPYPGEBRUIKERS)

BEANTWOORD HIERDIE VRAE NET AS JY WATERPYP ROOK. Merk die blokkie wat vlr jou waar is.

No.	Item	Glad nie waar nie	Nie waar nie	Soms waar	Waar	Baie waar
Belangstelling/Genieting						

1	Ek geniet dit baie om waterpyp te rook.					
2	Dit is pret om waterpyp te rook.					
3	Ek dink dis vervelig om waterpyp te rook.(R)					
4	Waterpyp rook hou glad nie my aandag nie. (R)					
5	Ek dink dis baie interessant om waterpyp te rook.					
6	Ek dink dis lekker om waterpyp te rook.					
7	Terwyl ek waterpyp rook, dink ek aan hoe baie ek dit geniet.					
Druk/Spanning						
8	Ek voel senuweeagtig terwyl ek waterpyp rook.					
9	Ek voel gespanne terwyl ek waterpyp rook.					
10	Ek voel ontspanne wanneer ek waterpyp rook. (R)					
11	Ek is senuweeagtig terwyl ek waterpyp rook.					
12	Ek voel druk om waterpyp te rook.					
Waargenome Keuse						
13	Ek glo ek het 'n keuse of ek waterpyp wil rook.					
14	Ek dink dis my eie keuse om waterpyp te rook.					
15	Ek het nie regtig 'n keuse gehad of ek waterpyp wou rook nie. (R)					
16	Ek het gevoel ek moes waterpyp rook. (R)					
17	Ek rook waterpyp omdat ek geen keuse gehad het nie. (R)					
18	Ek rook waterpyp omdat ek wil.					
19	Ek rook waterpyp omdat ek moet. (R)					

Verwerking van die Motiveringsinventaris

AFDELING E: MOTIVERING (NIEGEBRUIKERS VAN WATERPYP)

BEANTWOORD HIERDIE VRAE NET AS JY NIE WATERPYP ROOK NIE. Merk die blokkie wat vir jou waar is.

No.	Item	Glad nie waar nie	Nie waar nie	Soms waar	Waar	Baie waar
Die rede waarom ek nie waterpyp sal rook nie is:						
1	Omdat ek voel ek wil self verantwoordelikheid vir my gesondheid aanvaar.					
2	Omdat ek skuldig of skaam sou voel as ek gerook het.					
3	Omdat ek glo dit is die beste vir my gesondheid.					
4	Omdat dit ander mense sou ontstel as ek gerook het.					
5	Omdat ek wil hê ander mense moet sien ek kan dit regkry (om nie te rook nie).					
6	Omdat ek ernstig daarvoor gedink het en glo dit is baie belangrik vir baie aspekte van my lewe.					
7	Omdat ek sleg oor myself sou voel as ek gerook het.					
8	Omdat dit 'n belangrike keuse is wat ek regtig wil maak.					
9	Omdat ek druk van ander mense ervaar om nie te rook nie.					
10	Omdat dit makliker is om te doen wat vir my gesê word as om daarvoor te dink.					
11	Omdat dit in ooreenstemming met my lewensdoelwitte is.					
12	Omdat ek wil hê ander mense moet baie van my dink.					
13	Omdat dit baie belangrik is om so gesond as moontlik te wees.					
14	Ek dink nie eintlik oor hoekom ek nie waterpyp sou rook nie.					
15	Ek weet nie eintlik hoekom ek nie waterpyp rook nie.					

Verwerking van die Behandelingselfreguleringsvraelys (rook)

AFDELING F: BASIESE SELKUNDIGE BEHOEFTESKAAL

Merk asseblief die antwoord wat die beste by jou pas. Dink aan jou gevoelens **gedurende die afgelope week.** Lees die volgende items sorgvuldig, dink oor hoe dit met jou lewe verband hou, en dui dan aan hoe waar dit vir jou is.

No.	Item	Glad nie waar nie	Nie waar nie	Party keer waar	Waar	Bae waar
Verwantskap						
1	Ek voel 'n verwantskap met mense wat vir my omgee en vir wie ek omgee.					
2	Ek is eensaam. (R)					
3	Ek voel na aan en verwant aan ander mense wat vir my belangrik is.					
4	Ek voel dat een of meer belangrike mense my nie waardeer nie. (R)					
5	Ek het 'n sterk gevoel van verwantskap met die mense saam met wie ek tyd deurbring.					
6	Ek het meningsverskille, gevegte of argumente met mense met wie ek gewoonlik oor die weg kom. (R)					
Vaardigheid						
7	Ek kan moeilike take en projekte suksesvol voltooi. (R)					
8	Ek het 'n mislukking ervaar, of ek is nie goed met iets nie.					
9	Ek het groot uitdagings aanvaar en sukses behaal daarmee. (R)					
10	Ek het iets doms gedoen wat my onbekwaam (hopeloos/nutteloos) laat voel het.					
11	Ek het goed gevaar selfs met die moeilike dinge. (R)					
12	Ek het gesukkel met iets waarmee ek goed behoort te wees.					
Selfstandigheid						
13	Ek kan dinge op my eie manier doen.					
14	Ek het baie druk wat ek nie nodig het nie. (R)					
15	My keuses gee uitdrukking aan wat ek wil hê.					
16	Daar is mense wat vir my sê wat ek moet doen. (R)					
17	Ek doen regtig dit waarin ek belang stel.					
18	Ek moet dinge doen wat ek nie wil doen nie. (R)					

Verwerking van die Basiese Sielkundige Behoefteskaal

AFDELING G: ROL VAN DIE FAMILIE

Die volgende vrae handel oor jou familie. **Daar is nie regte of verkeerde antwoorde nie, net jou menings.** Merk asseblief die opsies wat die beste by jou situasie pas.

No.	Item	Glad nie waar nie	Nie waar nie	Party keer waar	Waar	Bae waar
Samehorigheid						
1	My familieledede help en ondersteun mekaar werklik.					
2	Daar is 'n gevoel van samehorigheid in ons familie.					
3	Ons familie doen nie dinge saam nie. (R)					
4	Ons kom regtig goed met mekaar oor die weg.					
5	Dit lyk asof familieledede kontak met mekaar vermy wanneer ons by die huis is. (R)					
Konflik						
6	Ons familie baklei met mekaar.					
7	Familieledede word partykeer so kwaad dat hulle goed rondgooi.					
8	Familieledede verloor byna nooit hul humeur nie. (R)					
9	Familieledede slaan mekaar partykeer.					
10	Familieledede kritiseer mekaar selde. (R)					
Laat-maar-loop-familiestyl						
11	Ons familieledede kom met byna enigiets weg.					
12	Familieledede word nie gestraf of berispe wanneer hulle iets verkeerd doen het nie.					

13	Dit is nie duidelik wat sou gebeur wanneer reëls in ons familie oortree sou word nie.					
14	Dit is moeilik om te weet wat die reëls in ons familie is.					
15	Daar is sterk leierskap in ons familie.					
Familiesosialiteit						
16	Ons is vol lewe en opgewek.					
17	Ons familie hou daarvan om saam met ander mense te wees.					
18	Om met ander mense te sosialiseer maak my familie dikwels ongemaklik. (R)					
19	Ons het baie vriende as 'n familie.					
20	Ons familie hou daarvan om partytjie te hou.					

Verwerking van die Familiefunksionering skaal

AFDELING H: FAMILIE TEVREDENHEID SKAAL

Hieronder is vyf stellings waarmee u mag saamstem of verskil. Gebruik die 1-5 skaal hieronder en dui jou ooreenkoms met elke item aan deur die toepaslike nommer in die lyn voor daardie item te plaas.

Wees oop en eerlik in u antwoord

1 – Verskil sterk

2- Verskil

3- Verskil nie en stem ook nie saam nie

4- Stem saam

5- Stem sterk saam

___ 1. Op die meeste maniere is my familie naby my ideaal

___ 2. Die voorwaardes van my familie is uitstekend

___ 3. Ek is tevrede met my familie

___ 4. Tot dusver het ek die belangrike dinge wat ek in my familie wil hê, gekry

___ 5. Ek sal amper niks in my familie verander nie

AFDELING I: BEHOEFTE AAN 'N INTERVENSIE OM GEBRUIK VAN WATERPYPE TE VERMINDER

Merk asseblief **Ja** as jy dink mense wat waterpyp rook het hulp nodig en merk **Nee** as jy dink hulle het nie hulp nodig nie. Gee asseblief jou mening in die volgende blokkie – wat dink jy sal mense laat ophou waterpyp rook?

Dink jy mense wat waterpyp rook het hulp nodig?	Ja	Nee
Verduidelik asseblief waarom.		
Wat dink jy sal mense laat ophou waterpyp rook?		

DANKIE DAT JY AAN HIERDIE STUDIE DEELGENEEM HET.



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 5C: Umbuzo

Molweni Bantwana

Igama lam nguZainab Kader. Ndingumphandi ongumfundi kwiDyunivesithi yaseNtshona Koloni. Umsebenzi wam kukufumana ulwazi malunga nezinto ezithile. Isikolo senu sithe sakhethwa ukuze ndifumane kuso ulwazi. Ndinomdla omkhulu wokwazi malunga nabantwana abakwisigaba sobudala kunye nabo bafikisayo (abakwiminyaka eli-13 ukuya kweli-19 ubudala), abatshaya i-hookah pipe (eluhlobo olutsha lwenqawe), kwakunye neemfuneko zakho ezisisiseko ngokwawengqondweni. Emva koko, ndifuna ukudala ungenelo lokukhawulelana neemfuneko ezisisiseko ngokwaasengqondweni, zabantwana abaminyaka ili-13 ukuya kweli-19, ze kunciphe ukusetyenziswa kwale hookah pipe.

Kodwa kuqala, ndidinga imvume yenu yokuba ndinibuze imibuzo. Khumbulani ukuba lonke ulwazi enindixelela lona luyimfihlelo, ngamanye amazwi, akukho bani ungomnye oya kuthi azi ukuba ningoobani na, nokuba nithethe nathini na, xa beniphendula imibuzo. Aniyi KWAZIWA. Ningakhetha ukuba ningathabathi nxaxheba kolu phando, yaye singakunqumamisa ukuthabatha kwakho inxaxheba nangaliphi na ithuba.

Nceda uphawule kwibhokisi echanekile kwesokunene kwakho WANDULE ukutyikitya keibhokisi enikezelweyo ukuba **ungathanda okanye awungethandi kusini na ukuthabatha inxaxheba kolu phando.**

Nceda usebenzise olu phawu (✓)	Ndiyafuna ukuthabatha inxaxheba kolu phando	
	Andifuni kuthabatha nxaxheba kolu phando	
Tyikitya/Sayina:		

Enkosi.

Ozithobileyo

Zainab Kader
Umphandi (UWC)

Njingalwazi Nicolette Roman
Uphathi (UWC)

ICANDELO A: ULWAZI LOKUBALA NOKUFUNDA AMANANI ABAZELWEYO, ABABHUBHILEYO, ABAGULAYO, NJALO NJALO, BENDAWO ETHILE

Nceda ugcwalise olu lwazi lulandelayo malunga nawe ngokuthi uphawule impendulo echanekileyo okanye ubhale impendulo echanekileyo kwibhokisi enikezelweyo.

Inani	Umbuzo	IMPENDULO				
Nceda uphawule ibhokisi echanekileyo						
1	Ingaba uyinkwenkwe okanye intombazana?	Inkwenkwe			Intombazana	
2	Ungowaluphi uhlanga?	Umhlophe	UngoweBala	Ungumntu omnyama	UliNdiya	Olunye
3	Uthetha oluphi ulwimi? Ekhaya?	IsiNgesi	IsiBhulu	IsiXhosa	Olunye	
4	Uhlala nabani?	Nabazali bobabini	Nomama yedwa	Notata yedwa	Noodade nabantakwethu kuphela	Nolunye usapho (Utatotomkhlu nomakhulu/umakazi/ umalumekazi/ umalume/umzala, njl njl.)
5	Abazali bakho ingaba	Batshatile	Bawuchitha umtshato	Bohlukene	Bahlala kunye	Umzali wam uyedwa kuba omnye wasweleka (ngumhlolokazi)
Bhala impendulo kwibhokisi esecaleni kombuzo						
6	Mingaphi iminyaka yakho?					
7	Ufunda kwisiphi isikolo?					
8	Ufunda kwiliphi ibanga?					
9	Uhlala kwiyiphi indawo?					
10	Bangaphi abantu abasebenzayo (abaphangelayo) kwikhaya lakho?					
11	Ingaba eziziyobisi zilandelayo ziyasetyenziswa lusapho lwakho?	Intsangu	Ewe	Hayi	Andazi	
		I-Mandrax	Ewe	Hayi	Andazi	
		I-Heroin	Ewe	Hayi	Andazi	
		I-Cocaine	Ewe	Hayi	Andazi	
		Utywala	Ewe	Hayi	Andazi	

ICANDELO B: UKUBA KHO JIKELELE

Le mibuzo ilandelayo ingomdla ekusebenziseni kwakho icuba. Nceda uyiphendule ngenyameko nangokunyaniseka. Akukho bani uya kuzibona iimpindulo zakho ngaphandle komphandi kunye nabamphathi bakhe. Awuyi kungena nkathazweni ngeempindulo ozinikezayo. Nceda uphawule kwibhokisi enempindulo echaneke malunga nawe.

Inani	Umbuzo	Impendulo
Nceda uphawule kwibhokisi echanekileyo.		

1	Uyazitshaya iisigarethi?	Ewe	Hayi			
2	Wawuna ngaphi ukuqala kwakho utshaya icuba?					
3	Wakhe wayitshaya i-Hookah pipe?	Ewe	Hayi			
4	Wawuna ngaphi ukuqala kwakho utshaya hoka pipe					
5	Usayitshayo hoka pipe	Ewe	Hayi			
Gcwalisa le mibuzo ingasezantsi kuphela ukuba ubuthe EWE kumbuzo wesi-3, kungenjalo ugqithele kwiCandelo C						
6	Ukhe wayitshaya i-hookah pipe kule nyanga iphelileyo?	Ewe	Hayi			
7	Ukhe wayitshaya i-hookah pipe kule veki iphelileyo?	Ewe	Hayi			
8	Utshaya kangaphi (nceda uphawule ibhokisi ibe <u>NYE</u>, eyiyeyona ibhekiselele kuwe)?	Ntsuku zonke	Veki zonke	Nyanga zonke	Kanye emva kwethuba	Ukuvavanya
1-2 amaxesha ngosuku		1-2 amaxesha ngeveki	1-7 amaxesha ngenyanga	Kanye kwiinyanga ezi-3 rhoqo	Ndayizama kanye	
3-5 amaxesha ngosuku		3-4 amaxesha ngeveki	8-15 amaxesha ngenyanga	Kanye emva kweenyanga ezi-6 rgoqo	Ndayizama kanye	
Ngaphezu kwamaxesha ama-5 ngosuku		5-6 amaxesha ngeveki	Ngahezu kwamaxesha ali-15 ngenyanga	Kanye ngonyaka	Ndayizama kathathu okanye ngaphezulu	
9	Waqala uneminyaka emingaphi ukutshaya i-hookah pipe	0-5	6-9	10-12	13-15	16-19
10	Wakhe wayitshaya i-hookah pipe inentsangu ngaphakahi?	Ewe	Hayi			
11	Ngaphambili wakhe wayitshaya hoka pipe eno	Ewe	Hayi			

	tywala ngaphakathi?					
12	Ungaze uyeke ukutshaya i-hookah pipe?	Ewe		Hayi		
13	Ukuba impendulo ngu “ewe”, xa uneminyaka emingaphi?	10-19	20-29	30-39	40-49	50-59

Ilungiswe ukusuka kwiphapha lemibuzo yophando nge-hookah pipe

ICANDELO C: I-HOOKAH PIPE

Le mibuzo ilandelayo ingomdla malunga nolwazi lwakho nge-hookah pipe. Nceda uphendule ngenyameko nangokunyanisekileyo. Akukho bani uya kuthi azibone iimpindulo zakho ngaphandle komphandi wolwazi kunye nabaphathi bakhe. Awuyi kungena nkathazweni ngeempindulo othe wazinikezela. Nceda uphawule kwibhokisi enempendulo echanekileyo malunga nawe, kuyo yonke imibuzo.

Inani	Umbuzo	Impendulo		
Wazi ntoni nge-hookah pipe?				
Nceda uphawule ibhokisi echanekileyo.				
1	Ukhe weva nge-hookah pipe?	Kunjalo	Akunjalo	Andazi
2	I-hookah pipe yingxaki.	Kunjalo	Akunjalo	Andazi
3	I-hookah pipe inobungozi.	Kunjalo	Akunjalo	Andazi
4	Amanzi akwi-hookah pipe ahluzi iityhefu zecuba.	Kunjalo	Akunjalo	Andazi
5	Abantwana nabo bangayitshaya i-hookah pipe.	Kunjalo	Akunjalo	Andazi
6	Ungafumana umhlaza ngokuthi utshaye i-hookah pipe.	Kunjalo	Akunjalo	Andazi
7	Abantwana (abaminyaka iphakathi kwe-10 ne-12) bangayitshaya i-hookah pipe.	Kunjalo	Akunjalo	Andazi
8	Abantwana (abaminyaka iphakathi kwe-13 ne--19) bangayitshaya i-Hookah pipe.	Kunjalo	Akunjalo	Andazi
9	Uyitshaya phi i-hookah pipe? (Nceda uphawule ibhokisi ibe <u>NYE</u> evumelana nemeko yakho).	Kwiindawo zikawonke-wonke	Kwindlu yelungu losapho	Kwindlu yomhlobo
		Ezipakini	Erestyu	ekhaya
		Esikolweni	Epatini	Kwenye indawo
10	Ukutshaya i-hookah pipe kukhokhelela ekubeni lixhoba layo kulowo uyisebenzisayo.	Kunjalo	Akunjalo	Andazi
11	Ukutshaya i-hookah pipe kukhuseleke ngcono kunokutshaya iisigarethi?	Kunjalo	Akunjalo	Andazi
12	Ukutshaya i-hookah pipe kunceda abantu ukuba bakhululeke ngokwasemzimbeni	Kunjalo	Akunjalo	Andazi
13	Iingozi zokutshaya i-hookah pipe ziyabaxwa.	Kunjalo	Akunjalo	Andazi

14	Ukubolekisana nge-hookah pipe kuyayonakalisa impilo yomntu.	Kunjalo	Akunjalo	Andazi		
15	Abantu abatshaya i-Hookah pipe bangayiyeka ngokulula.	Kunjalo	Akunjalo	Andazi		
16	Abazali bakho bayakuvumela ukusetyenziswa kwe-hookah pipe ngamalungu osapho?	Ewe	Hayi			
17	Ingaba abazali bakho bayavuma ukuba i-hookah pipe isetyenziswe ekhayeni lakho ngabantu abangengawo amalungu osapho lwakho?	Ewe	Hayi			
18	Ingaba i-hookah pipe uyitshaya kunye nayo nayiphi na kwezi zinto zilandelayo?	I-Tik	Rhoqo	Maxa wambi	Nakanye	Andazi
		I-Heroine	Rhoqo	Maxa wambi	Nakanye	Andazi
		Intsangu	Rhoqo	Maxa wambi	Nakanye	Andazi
		i-Cocaine	Rhoqo	Maxa wambi	Nakanye	Andazi
		Utywala	Rhoqo	Maxa wambi	Nakanye	Andazi
		Enye into	Rhoqo	Maxa wambi	Nakanye	Andazi
19	Ngubani osebenzisa I – Hookah pipe kowenu? (Khetha zibe ngaphezulu kwesinye)	Ngumama	Ngutata	Ndiyayisebenzisa	Ngumnakwethu	
		Ngudade wethu	Ngomnye (ngubani?):			
20	Itshayelwa phi i-hookah pipe kusapho lwakho?	Phakathi endlwini	Ngaphandle kwendlu	Ndawo zombini		
21	Ingaba abantwana bakho ngeli xesha lo mntu etshaya i-hookah pipe?	Ewe	Hayi	Andazi		
22	Ingaba bakho abantwana (abaminyaka mi-2 ukuya kwemi-6 ubudala) abatshaya i-hookah pipe kusapho lwakho?	Ewe	Hayi	Andazi		
23	Ingaba bakho abantwana (abaminyaka i-7 ukuya kweli-10 ubudala) abatshaya i-hookah pipe kusapho lwakho?	Ewe	Hayi	Andazi		
24	Ingaba bakho abantwana (abaminyaka ili-11 ukuya kweli-15 ubudala) abatshaya i-hookah pipe kusapho lwakho?	Ewe	Hayi	Andazi		
25	Ingaba bakho abantwana (abaminyaka ili-16 ukuya kweli-17 ubudala)	Ewe	Hayi	Andazi		

	abatshaya i-hookah pipe kusapho lwakho?			
26	Ingaba bakho abantu abaminyaka ili-18 ukuya kwengama-25 ubudala, abatshaya i-hookah kusapho lwakho?	Ewe	Hayi	Andazi
27	Ingaba bakho abantu abaminyaka ingama-26 ukuya kwengama-35 ubudala, abatshaya i-hookah pipe kusapho lwakho?	Ewe	Hayi	Andazi
28	Ingaba bakho abantu abangaphezulu kweminyaka engama-36 ubudala, abatshaya i-hookah pipe kusapho lwakho?	Ewe	Hayi	Andazi
29	Ingaba i-hookah pipe isetyenziswa njengendlela yonxibelelwano phakathi kwamalungu osapho?	Ewe	Hayi	Andazi
30	Ingaba i-hookah pipe isetyenziswa njengento yokuchitha isithukuthezi xa nihleli nosapho lwakho?	Ewe	Hayi	Andazi
31	Ingaba amalungu osapho lwakho ancokola ngokulula xa etshaya i-hookah pipe?	Ewe	Hayi	Andazi

Iphapha lemibuzo yophando lolwazi lilungiswe ukusuka kuPhando olwenziwe yi-College Health Behaviour (ngo-2010 ukuya kutsho ku-2011).

ICANDELO D: INKUTHAZO (ABASEBENZISI BE-HOOKAH PIPE)

PHENDULA LE MIBUZO KUPHELA UKUBA UYAYITHSAYA I-HOOKAH PIPE. Phawula ibhokisi echaneke ngokubhekiselele kuwe.

Inani	Umbuzo	Asiyonyanikwaphjela	Asiyonyani	Yinyani ngama-nye amaxesha	Yinyani	Yiyonyani
Umdla/Ukonwabela						
1	Ndikonwabela kakhulu ukutshaya i-hookah pipe.					
2	Ukutshaya i-hookah pipe kumnandi.					
3	Ndicinga ukuba ukutshaya i-hookah pipe kuyakruqula.					
4	Ukutshaya i-hookah pipe akundiphazamisi ekuthabatheni ingqalelo kwaphela.					
5	Ndingakuchaza ukutshaya i-hookah pipe njengokunika umdla kakhulu.					

6	Ndicinga ukuba ukutshaya i-hookah pipe kuyonwabeleka.					
7	Ngeli xesha ndisenza lo msebenzi, ndicinga ngendlela endikonwabela ngayo ukuyitshaya.					
Uxinzelelo/Ukuxhalaba						
8	Ndiziva ndixhalabile xa nditshaya i-hookah pipe.					
9	Ndiziva ndinoxinzelelo xa nditshaya i-hookah pipe.					
10	Ndiziva ndikhululekile ngokwasemzimbeni xa nditshaya i-hookah pipe.					
11	Ndiyaxhalaba xa nditshaya i-hookah pipe					
12	Ndiziva ndinoxinzelelo xa nditshaya i-hookah pipe					
Ukukhetha okucingelwayo						
13	Ndikholelwa ekubeni ndinakho ukuzikhethela ukuba ndiyitshaye i-hookah pipe					
14	Ndiziva ngathi kukuzikhethela kwam ukuba nditshaye i-hookah pipe					
15	Bendingenayo enye indlela ngaphandle kokuba nditshaye i-hookah pipe					
16	Ndizive ngathi kunyanzelekile ukuba ndiyitshaye i-hookah pipe					
17	Nditshaya i-hookah pipe kuba ingekho enye indlela.					
18	Nditshaya i-hookah pipe kuba ndifuna.					
19	Nditshaya i-hookah pipe kuba ndinyanzelekile.					

Lilungiswe ukusuka kwi-Intrinsic Motivation Inventory

ICANDELO E: INKUTHAZO (ABANGASEBENZISI-HOOKAH PIPE)

PHENDULA LE MIBUZO KUPHELA UKUBA AWUYISEBENZISI I-HOOKAH PIPE. Phawula ibhokisi echanekileyo ngokubhekiselele kuwe.

Inani	Umbuzo	Asiyonyani kwaphela	Asiyonyani	Yinyani ngama-nye ama-xesha	Yinyani	Yiyonyani
Unobangela wokuba ndibe andinakutshaya i-hookah pipe kukuba:						
1	Ndiziva ndifuna ukuthabatha uxanduva ngempilo yam.					
2	Ndingaziva ndinobutyala okanye ndineentloni ukuba ndingatshaya.					
3	Ndikholelwa ekubeni yiyona nto ilungele impilo yam.					
4	Abanye bangacaphuka ukuba ndingatshaya.					
5	Ndifuna abanye babone ukuba ndinakho (ukungatshayi).					
6	Ndiye ndacingisisa malunga nako, ndaze ndakholelwa ekubeni kubaluleke kakhulu kwezinye izinto ebomini bam.					

7	Ndingazicaphukela ukuba ndingatshaya.					
8	Kukukhetha okubalulekileyo endifuna ukukwenza ngokwenene.					
9	Ndiziva ndinoxinzelelo olusuka kwabanye ukuba ndingatshayi.					
10	Kulula ukwenza oko ndikuxelelwayo kunokuba ndicinge ngako.					
11	Kuyahambelana neenjongo zam zobomi.					
12	Ndifuna abanye bandincome.					
13	Kubalulekile ukuhlala usempilweni kanga ngoko.					
14	Andicingi ngesizathu esibangela ukuba ndingayitshayi i-hookah pipe					
15	Andisazi ngenene isizathu esibangela ukuba ndingayitshayi i-hookah pipe					

Lilungiswe ukusuka kwiphapha lemibuzo yophando lwe-Treatment Self-Regulation (ukutshaya)

ICANDELO F: UTHOTHO LWAMAQANDO OKULINGANISA EEMFUNENKO EZISISISEKO NGOKWESENGOONDWENI

Nceda uphawule eyona mpendulo ihambelana nawe ngqo. Cinga ngoluvo novakalelo lwakho **kule veki iphelileyo**.

Nceda ufunde le mibuzo ilandelayo ngenyameko, ucinge ngendlela ebhekisa ngayo kubomi bakho, wandule ukuphawula ubunyani bayo ngawe.

Inani	Umbuzo	Asiyonyanikwaphela	Asiyonyani	Yinyani ngamanye amaxesha	Yinyani	Yiyonyani
	Ukuzalana					
1	Ndiyaluva unxulumano nabantu abandikhathaleleyo, nendibakhathaleleyo nam.					
2	Ndililolo.					
3	Ndiziva ndisondele yaye ndinxulumana nabantu ababalulekileyo kum.					
4	Ndiziva ndingathandwa ngomnye okanye abanye babantu ababalulekileyo.					
5	Ndiva ukusondelelana okukhulu phakathi kwam kunye nabantu endichitha kunye nabo ixesha.					
6	Ndiba nokungavumelani, ukulwa okanye iingxabano kunye nabantu endiqhele ukuvana kunye nabo.					
	Ukuba nakho					
8	Ndiyaphumelela ekugqibeni imisebenzi enzima neeprojekthi ezinzima.					
9	Ndikhe andaphumelela, okanye kukho into endingaqhubi kakuhle kuyo.					
10	Ndiphakame ndaqhuba kakuhle kwimingeni ebinzima.					
11	Ndenze into engatshongo khona, endenze ndaziva ndingenakho					

	(ndingenathemba/ndingento yanto).					
12	Ndiqhube kakuhle nangona bekukho izinto ebezindinzimela.					
13	Ndifumene ubunzima ekwenzeni into ebendiqhele ukugqwesa kuyo.					
	Ukuziphatha					
13	Ndikhululekile ukuba ndingazenzela izinto ngendlela yam.					
14	Ndinoxinzelelo olukhulu ebendikade ndingaludingi.					
15	Izinto endizikhethayo zibonakalisa endikufunayo.					
16	Kukho abantu abandixelelayo emandikwenze.					
17	Ndiyafuna ngenen ukwenza oko kunika umdla kum.					
18	Kufuneka ndenze izinto endingafuni kuzenza					

Lilungiswe kwi- BPN Scale

ICANDELO G: INDIMA YOSAPHO

Le mibuzo ilandelayo imalunga nosapho lwakho. **Akukho zimpendulo zichanekileyo nezingachanekanga, kuphela zizimvo zakho.** Nceda uphawule leyo **ihambelana ngqo nemeko yakho.**

Inani	UMBUZO	Asiyo-nyani kwaphela	Asiyo nyani	Yinyani ngamanye amaxesha	Yinya -ni	Yiyona nyani
	Ukubambisana					
1	Amalungu osapho lwam ayandinceka kakhulu yaye siyaxhasana.					
2	Siziva sibanye kusapho lwethu.					
3	Usapho lwethu aluzenzi kunye izinto . (R)					
4	Siyavana kakhulu sikunye.					
5	Amalungu osapho ayathanda ukungafuni ukunxibelelana xa esekhaya. (R)					
	Impixano					
6	Silwa rhoqo kusapho lwam.					
7	Amalungu osapho ayacaphuka ngamanye amaxesha ade ajulane ngezinto.					
8	Amalungu osapho lwam awafane abe nomsindo. (R)					
9	Amalungu osapho ayabethana ngamanye amaxesha.					
10	Amalungu osapho awafane agxekane. (R)					
	Uhlobo lokucingelana					
11	Amalungu osapho lwethu ayakwazi ukuvumelana phantse ngayo yonke into.					
12	Amalungu osapho awohlwaywa okanye angxoliswe xa enze into engalunganga.					

13	Akucaci ukuba kungenzeka ntoni na ukuba imithetho ingathi yophulwe kusapho lwethu.					
14	Kunzima ukwazi ukuba yiyiphi na imithetho elawula usapho lwethu					
15	Kukho ubunkokheli obuluqilima kusapho lwethu					
	Ukuthanda ukuba nabanye kusapho					
16	Sinobomi obugcweleyo yaye nobunomoya olungileyo					
17	Usapho lwethu luyakonwabela ukuba kunye nabanye abantu.					
18	Ukuba kunye nabanye abantu kukholisa ukulwenza lungakhululeki usapho lwam. (R)					
19	Silusapho, sinabahlobo abanzinzi.					
20	Usapho lwam luyathanda ukubamba amatheko okuzonwabisa.					

Lilungiswe ukusuka kwi-Family Functioning Scale

ICANDELO H: INKQUBO YOKUBHALISWA KWENKUBA

Ngezantsi zingxelo eziHlanu ongaVumelana okanye ungaVumelani nazo. Kufuneka usebenzise isixa 1-5 esingezantsi, bonisa isivumelwano sakho nento nganye ngokubeka inambolo efanelekileyo kumgca owedlule loo nto.

1 – AndiVumelani tuu

2- Andivumi

3- NdiVumelana ndingaVumelani

4- NdiyaVuma

5- NduVuma kakhulu

_____ 1. Usapho lwam lusondele kum ngezona ndlela zininzi

_____ 2. Imiqathango yosapho lwam iphezulu

_____ 3. Ndanelisekile kusapho lwam

_____ 4. Okwangoku ndisifumene izinto ezibalulekileyo endizifunayo kusapho lwam

_____ 5. Zininzi izinto endingenozitshintsha kusapho lwam

ICANDELO I: IMFUNEKO YONGENELELO EKUNCIPHISENI UKUSETYENZISWA KWE-HOOKAH PIPE

Nceda uphawule ngo 'ewe' ukuba ucinga ukuba abantu abatshaya i-hookah pipe badinga uncedo, ze uphawule ngo 'hayi', ukuba ucinga ukuba abaludingi uncedo. Nceda unike ezakho izimvo kwibhokisi elapha ngezantsi – Ucinga ukuba yintoni enokwenza ukuba abantu abatshaya i-hookah pipe bayeke ukuyitshaya?

Ingaba ucinga ukuba abantu abatshaya i-hookah pipe badinga uncedo?	Ewe	Hayi
Nceda ucacise ukuba kutheni usitsho.		
Ucinga ukuba yintoni eya kuthi yenze ukuba abantu abatshaya i-hookah pipe bayeke ukuyitshaya?		

ENKOSI NGOKUTHABATHA KWAKHO INXAXHEBA KOLU PHANDO



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 6A: Interview Schedule

Age		Grade		Name of School	
Gender		Race*		Which area do you live?	
Language		How many people live in your house?		How many people work in your home?	

*Race is requested purely for demographic reasons

Hookah Pipe use has become very popular over the last ten years and some people seem to like it. Some people say that it is fun and other people say it is dangerous. I would like to know more about the hookah pipe and what you think. There are no right or wrong answers. I am interested in your opinion. Can I ask you some questions so that you can help me learn more about this new fashion? No one will know what we speak about because this conversation is confidential and no one will be able to link you to this study. I need to record the information so that I can listen to our conversation again because it is important that I get all the facts right when I transcribe and write a report. The recording will be destroyed after the information has been transcribed (written). Is this ok?

Please tick

Yes		No		Sign		Date	
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Knowledge, Attitude and Perception

1. What do you know about the hookah pipe?
2. What do you think about hookah pipe use (or what comes to mind when you think of the hookah pipe, good thing, bad thing etc.)?
3. What do you think are the advantages and disadvantages of smoking hookah pipe?
4. What do you think are the advantages and disadvantages of not smoking hookah pipe?
5. What do you think, why do some people smoke the hookah pipe and others do not smoke hookah pipe?
6. If you smoke hookah, would the important people in your life (such as family and friends) think it is good or bad. Please explain.
7. **How true is this statement:** You can stop using the hookah pipe for the next three months (if person says that they do not smoke, generalise the statement by saying people can stop using ...). Please explain
8. **How true is this statement:** You can stop using the hookah pipe forever (if person say that they do not smoke, generalise the statement to saying people can stop using ...). Please explain.
9. **How true this statement is:** The choice to smoke or not smoke the hookah pipe is completely up to you (if person says that they do not smoke, generalise the statement by saying people can choose to use or stop using the hookah pipe). Please explain.

Prevalence

10. Who do you think uses the hookah pipe (what type of people, e.g. age. race. status etc.)?
11. At what age do you think people start using the hookah pipe? (ask participant: why this age)
12. What do you think about this age of use (too young, too old; explain)?
13. When should people start smoking the hookah pipe?
14. When should they stop smoking the hookah pipe?
15. What do you think about people younger than you that smoke the hookah pipe?

16. What do you think of adults that smoke the hookah pipe?
17. What do you think of family members that smoke the hookah pipe?
18. Do you have any family members that smoke the hookah pipe?
19. Who do you know that uses the hookah pipe? (explore relationship e.g. mother, friends, cousin)
20. Sometime when we are not sure about a decision, we look to others. Who would you look at to help you decide if you should smoke the hookah pipe or not (explore relationship not names)?
21. Why this person/people?
22. Do you smoke the hookah pipe? Why or why not
23. **IF YES:** At what age did you start? Why did you start
24. Do you use it with other substances? If yes, ask which substances
25. **IF NO:** Have you ever experimented with hookah pipe and if so at what age.
26. What made you start and stop?

Motivation FOR SMOKING the hookah pipe use

27. Why do you smoke the hookah pipe?
28. How do you feel when you smoke (the good and the bad? Probe physical and emotional)
29. What do you enjoy most about smoking the hookah pipe?
30. Who do smoke with and how do you feel when you smoke with these people?
31. How does smoking the hookah pipe help you?
32. Where do you smoke? Why here?
33. Who knows that you smoke?
34. How does or would your family feel about you smoking?
35. Do you think people choose to smoke the hookah pipe out of their free will? Why do you say this? (ask: do you smoke because it is your choice, reflect on peer pressure)
36. Do you think people feel proud about smoking the hookah pipe? Why?
37. What about smoking the hookah pipe makes you feel *good*?

Motivation FOR NOT SMOKING the hookah pipe

38. Why don't you smoke the hookah pipe?
39. What benefits do you experience from not smoking?
40. How do you feel when the people around you smoke?
41. How do you feel when you are with people that do not smoke?
42. Have you been offered a chance to smoke? How do you respond to this?
43. How do your friends and family feel about you not smoking?
44. Do you think people choose to not to smoke the hookah pipe out of their free will? Why do you say this? (ask: do you not smoke because it is your choice, reflect on feeling forced not to)
45. Do you think people that do not smoke the hookah pipe feel proud about not smoking? Why?
46. What about not smoking the hookah pipe makes you feel *good*?

Thank you for this information, you are really helping me understand so much more about the hookah pipe. I have a few more questions about learning about you. Are you still ok to continue? (If yes continue, if no, ask the person if they would like a short break and then ask if they ready to continue).

BPN

Autonomy

47. In life, how free do you feel to do the things you like to do? (After response probe: for example, smoke hookah)
48. How free do you feel to make important choices about your life? (After response probe: for example, smoke hookah)
49. When do people tell you what to do and who are these people? (After response probe: about hookah)
50. Do you sometimes feel forced to do things? Like what? (After response probe: for example, smoke hookah)

Competence

51. What makes you feel successful or proud? (After response probe: Does smoking hookah (or not smoking) ever make you feel successful?)
52. When do you feel successful or proud?
53. Do you master difficult tasks? Tell me about that. (After response probe: do you master it better if you smoke?)
54. Do you sometimes feel useless and hopeless like you cannot do something right? (After response probe: Like smoke hookah – please explain)
55. How do you respond to a difficult task? (After response probe: what do you do when something is difficult, e.g. maths, saying no to smoking hookah)

Relatedness

56. What people do you consider close to you? (After response probe: Do you smoke hookah with these people?)
57. How do you feel when you are with these people? (After response probe: How do you feel when you are smoking (or not smoking in the case of non-users) with these people?)
58. How do you think these people feel when they are with you? (After response probe: When they smoke with you)
59. How often do you feel lonely? Please explain (After response probe: Do you feel lonely when you smoke hookah?)
60. Have you ever felt like the important people in your life do not appreciate you? Please Explain
61. Are you able to talk to people about things that is important to you? (After response probe: such as your hookah pipe use (or non-use))
62. Are there people in your life who you feel close and connected with? Tell me a bit more about why you say this. (After response probe: what do they think about you smoking hookah?)

Family

63. Tell me about your family?
64. What do you like and what don't you like about your family?
65. Are there people in your family that like to fight or use drugs? (ask what kind of drugs)
(Particularly interested in close family such as parents/siblings or people living in the home)
66. How does this affect you?

Behaviour Change

67. Do you think people can change their hookah pipe smoking behaviour? How?
68. What will encourage teenagers to stop smoking the hookah pipe
69. **ONLY FOR HOOKAH PIPE USERS:** Would you be willing to stop hookah pipe smoking. Why or why not?
70. **ONLY FOR HOOKAH PIPE USERS:** What situations will make it easy for you to not smoke hookah?
71. **ONLY FOR HOOKAH PIPE USERS:** What situations will make it difficult for you to not smoke hookah?
72. **ONLY FOR HOOKAH PIPE USERS:** What will encourage you to stop smoking the hookah pipe?
73. What can hookah pipe users do instead of smoking the hookah pipe?
74. What will make teenagers feel free to do the things they enjoy
75. What will make teenagers feel successful?
76. What will make teenagers feel connected and close to the important people in their lives?
77. If you could design a programme that would makes teenagers feel great, what would that look like?

Thank you so much for your time. This is really important information that you gave me

TO BE COMPLETED BY THE INTERVIEW CONDUCTOR

Name and Surname

Signature

Date

This interview schedule is based on the principles of self-determination theory and theory of reasoned action/planned behaviour



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 6B: Onderhoudskedule

Ouderdom		Graad		Naam van Skool	
Geslag		Ras*		Watter area woon jy?	
Huistaal		Hoeveel mense woon in jou huis?		Hoeveel mense werk in jou huis?	

* Ras word slegs vir demografiese redes aangevra

Hookahpyp gebruik het baie gewild geword oor die afgelope tien jaar en sommige mense hou daar van. Sommige mense sê dit is pret en ander mense sê dit is gevaarlik. Ek wil graag meer weet oor die hookahpyp en wat jy dink. Daar is geen regte of verkeerde antwoorde nie. Ek wil graag weet wat jy dink. Kan ek u 'n paar vrae vra, sodat u my kan help om meer oor hierdie nuwe mode te leer? Niemand sal weet waaroor ons praat nie, want hierdie gesprek is vertroulik en niemand sal u kan koppel aan hierdie studie nie. Ek moet die inligting opneem sodat ek weer na ons gesprek kan luister, want dit is belangrik dat ek alles wat jy se reg kry wanneer ek 'n verslag skryf. Die opname sal vernietig word nadat die inligting getransskribeer (geskryf) is. Is hierdie reg met jou?

Merk asb

Ja		Nee		Handtekening		Datum	
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Kennis, Houding en Persepsie

1. Wat weet jy van die hookahpyp?
2. Wat dink jy van die hookahpyp gebruik (of wat sal jy in gedagte hou as jy aan die hookahpyp dink, goeie ding, slegte ding, ens.)?
3. Wat dink jy is die voordele en nadele van hookahpyp rook?
4. Wat dink jy is die voordele en nadele van nie hookahpyp rook? (Wat dink jy, hoekom rook sommige mense en ander mense nie?)
5. As jy hookahpyp rook, sal die belangrike mense in jou lewe (soos familie en vriende) dink dit is goed of sleg. Verduidelik asseblief.
6. **Hoe waar is die volgende:** Jy kan ophou om die hookahpyp vir die volgende drie maande te gebruik (as iemand sê dat hulle nie rook nie, veralgemeen die stelling deur te sê mense kan ophou gebruik ...). Verduidelik asseblief.
7. **Hoe waar is die volgende:** Jy kan ophou om die hookahpyp vir ewig te gebruik (as iemand sê dat hulle nie rook nie, veralgemeen die stelling om te sê mense kan ophou gebruik ...). Verduidelik asseblief.
8. **Hoe waar is die volgende:** Jy is die enigste een wat besluit of jy die hookahpyp rook of nie rook. (as iemand sê dat hulle nie rook nie, veralgemeen die stelling deur te sê dat mense kan kies om die hookahpyp te gebruik of te stop). Verduidelik asseblief.

Algemeenheid

9. Wie dink jy gebruik die hookahpyp (watter tipe mense, bv. Ouderdom, ras, status ens.)?
10. Op watter ouderdom dink jy begin mense met die hookahpyp? (Vra hoekom die deelnemer hierdie ouderdom gesê het)
11. Wat dink jy van hierdie ouderdom van gebruik (te jonk, te oud, verduidelik)?

12. Wanneer moet mense begin hookahpyp rook?
13. Wanneer moet hulle ophou om die hookahpyp te rook?
14. Wat dink jy van mense jonger as jy wat hookahpyp rook?
15. Wat dink jy van volwassenes wat hookahpyp rook?
16. Wat dink jy van familieledede wat hookahpyp rook?
17. Het jy enige familieledede wat hookahpyp rook?
18. Ken jy mense wat die hookahpyp gebruik? (verken verhouding, bv. ma, vriende, neef)
19. Soms wanneer ons nie seker is oor 'n besluit nie, kyk ons na ander. Na wie sal jy kyk om jou te help besluit of jy die hookahpyp moet rook of nie (verken verhoudings nie name nie)?
20. Hoekom hierdie persoon / persone?
21. Rook jy hookahpyp? Hoekom of hoekom nie
22. **INDIEN JA:** Op watter ouderdom het jy begin? Hoekom het jy begin
23. **INDIEN JA:** Gebruik jy dit met ander middels? Indien wel, vra watter middels
24. **INDIEN NEE:** Het u al ooit die hookahpyp probeer en indien wel op watter ouderdom.
25. Wat het jou laat begin en stop?

Motivering VIR ROOKING van die hookahpyp gebruik

26. Hoekom rook jy die hookahpyp?
27. Hoe voel jy wanneer jy rook (die goeie en die slegte? Vra oor fisiek en emosioneel)
28. Wat geniet jy die meeste van die hookahpyp?
29. Wie rook saam met jou en hoe voel jy wanneer jy met hierdie mense rook?
30. Hoe help dit jou as jy hookahpyp rook?
31. Waar rook jy? Hoekom daar?
32. Wie weet dat jy rook?
33. Hoe voel of sal jou gesin voel oor jou wat rook?
34. Dink jy mense kies uit hulle eie wil om hookahpyp te rook?
35. Hoekom sê jy dit? (vra: rook jy omdat dit jou keuse is, reflekteer op portuurdruk)
36. Dink jy mense voel trots om die hookahpyp te rook? Hoekom?
37. Wat omtrent hookahpyp rook laat vir jou goed voel?

Motivering OM NIE die hookahpyp te rook nie

38. Hoekom rook jy nie die hookahpyp nie?
39. Watter voordele ervaar jy deur om nie te rook?
40. Hoe voel jy wanneer die mense om jou rook?
41. Hoe voel jy wanneer jy met mense is wat nie rook nie?
42. Word jy geleenthede gegee om te rook? Hoe reageer jy hierop?
43. Hoe voel jou vriende en familie omdat jy nie rook nie?
44. Dink jy mense kies om nie die hookahpyp te rook uit hul vrye wil? Hoekom sê jy dit? (vra: rook jy nie omdat dit jou keuse is. Reflekteer oor gedwing om nie te rook nie)
45. Dink jy mense wat nie die hookahpyp rook nie, voel trots om nie te rook nie? Hoekom?
46. Wat omtrent nie rook van hookahpyp laat jou goed voel?

Dankie vir hierdie inligting, jy help my regtig baie om die hookahpyp beter te verstaan. Ek het nog 'n paar vrae. Is jy nog steeds okay om voort te gaan? (indien nee, vra die persoon of hulle 'n kort pouse wil hê en vra dan of hulle gereed is om voort te gaan).

Basiese Sielkundige Behoeftes

Outonomie

47. In die lewe, hoe vry voel jy om dinge te doen wat jy graag wil doen? (Na reaksie vra meeroor byvoorbeeld, hookahpyp rok)
48. Hoe vry voel jy om belangrike keuses te maak oor jou lewe? (Na reaksie vra meer oor byvoorbeeld, hookahpyp rook)

49. Wanneer vertel mense vir jou wat jy moet doen en wie is hierdie mense? (Na reaksie vra meer oor byvoorbeeld hookahpyp rook.)
50. Voel jy soms gedwing om dinge te doen? Soos wat? (Na reaksie vra meer oor byvoorbeeld hookahpyp rook.)

Bekwaamheid

51. Wat maak jou suksesvol of trots voel? (Na reaksie vra meer oor byvoorbeeld maak die rook van hookahpyp (of nie rook) jou ooit jou suksesvol voel?)
52. Wanneer voel jy suksesvol of trots?
53. Bemeester jy moeilike take? Vertel my daarvan. (Na reaksie vra meer oor byvoorbeeld bemeester jy dit beter as jy rook?)
54. Voel jy soms nutteloos en hopeloos soos jy niks reg kan doen nie? (Na reaksie vra meer oor byvoorbeeld soos oor die rookvandiehookah pyp - verduidelik asseblief)
55. Hoe reageer jy op 'n moeilike taak? (Na reaksie vra meer oor byvoorbeeld wat doen jy as iets moeilik is, soos Wiskunde en om nee te sê vir hookahpyp rook)

Verwantskap

56. Watter mense beskou jy as na aan jou? (Na reaksie vra meer byvoorbeeld soos rook jy hookahpyp met hierdie mense?)
57. Hoe voel jy wanneer jy by hierdie mense is? (Na reaksie vra meer byvoorbeeld Hoe voel jy wanneer jy rook (of nie rook vir nie-gebruikers) by hierdie mense?)
58. Hoe dink jy voel hierdie mense wanneer hulle by jou is? (Na reaksie vra meer byvoorbeeld wanneer hulle saam met jou rook)
59. Hoe dikwels voel jy eensaam? Verduidelik asseblief (Na reaksie vra meer byvoorbeeld voel jy eensaam wanneer jy hookahpyp rook?)
60. Het jy al ooit gevoel dat die belangrike mense in jou lewe jou nie waardeer nie? Verduidelik asseblief
61. Kan jy met mense praat oor dinge wat vir jou belangrik is? (Na reaksie vra meer byvoorbeeld: soos jou hookah pyp gebruik (of nie-gebruik).)
62. Is daar mense in jou lewe aan wie jy naby en verbind voel? Vertel vir my 'n bietjie meer oor hoekom jy so se. (Na reaksie vra meer oor Wat dink hulle van jou hookahpyp rook of nie rook?)

Familie

63. Vertel my van jou familie?
64. Wat hou jy van en wat hou jy nie van jou gesin nie?
65. Is daar mense in jou familie wat met anders baklei of dwelms gebruik? (vra watter soort dwelms) (*fokus spesefiek op noue familie soos ouers / broers en susters of mense wat in die huis woon*)
66. Hoe beïnvloed dit jou?

Gedragsverandering

67. Dink jy mense kan hul hookahpyp rookgedrag verander? Hoe?
68. Wat sal tieners aanmoedig om op te hou om die hookahpyp te rook?
69. **SLEGS VIR HOOKAHPYP GEBRUIKERS:** Sal jy bereid wees om te stop met 'n hookahpyp rook? Hoekom of hoekom nie?
70. **SLEGS VIR HOOKAHPYP GEBRUIKERS:** Watter situasies sal dit vir jou maklik maak om nie hookahpyp te rook nie?
71. **SLEGS VIR HOOKAHPYP GEBRUIKERS:** Watter situasies sal dit vir jou moeilik maak om nie hookah te rook nie?
72. **SLEGS VIR HOOKAH PIPE GEBRUIKERS:** Wat sal jou aanmoedig om op te hou om die hookahpyp te rook?
73. Wat kan hookahpyp gebruikers doen in plaas van hookahpyp te rook?
74. Wat sal maak dat tieners vry voel om die dinge wat hulle geniet, te doen?

75. Wat sal tieners suksesvol laat voel?
76. Wat sal tieners verbind en na aan die belangrike mense in hul lewens laat voel?
77. As jy 'n program kan ontwerp wat tieners goed sal laat voel, hoe sal dit lyk?

Baie dankie vir u tyd. Dit is baie belangrike inligting wat jy vir my gegee het.

VOLDOEN DEUR DIE ONDERHOUDSOPVOER

Naam en Van

Handtekening

Datum

Hierdie onderhoudskedule is gebaseer op die beginsels van selfbeskikkingsteorie en teorie van geredeneerde aksie / beplande gedrag



UNIVERSITY *of the*
WESTERN CAPE



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 7: Critical Appraisal Tools for the Screening of Articles – Determinants

Scoring method: Total score divided by the total number of items

Grading of quality assessment checklist for observation score:

0-33%	Bad	34-66%	Satisfactory	67-100%	Good
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Quantitative Appraisal tool (Adapted from Roman and Frantz, 2012)

1. Was the study conducted at with adolescents?
 - a. Yes (1)
 - b. No (0)
2. Was the sampling method representative of the population intended to the study?
 - a. Probability sampling (simple random, systematic, stratified, cluster, two/multi stage) (1)
 - b. Non-probability sampling (purposive, quota, convenience and snowball) (0)
 - a. Yes (1)
 - b. No (0)
3. Was the measurement tool valid and reliable?
 - a. Yes (1)
 - b. No (0)
4. What was the source of the data?
 - a. Primary (1)
 - b. Secondary (0)
5. Does the study make specific reference to Hookah Pipe
 - a. Yes (1)
 - b. No (0)
6. Was ethical approval obtained
 - a. Yes 1)
 - b. No (0)
7. Were the quantitative methods appropriate?
 - a. Yes (1)
 - b. No (0)
8. Was the research design appropriate to address the research question?
 - a. Yes (1)
 - b. No (0)

Qualitative Appraisal Tool (Adapted from CASP)

1. Was the study conducted with adolescents?
 - a. Yes (1)

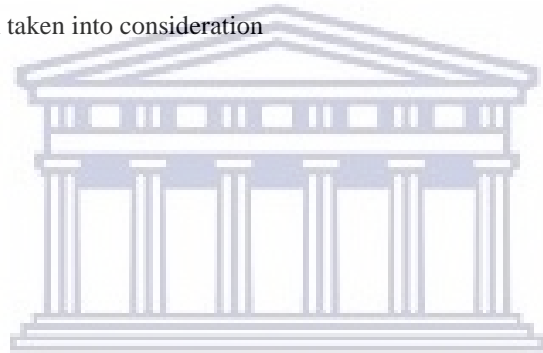
- b. No(0)
2. Is the sampling process clearly stated?
 - a. Yes (1)
 - b. No (0)
3. Did the research design appropriately address the research question?
 - a. Yes (1)
 - b. No (0)
4. Was the research setting justified?
 - a. Yes (1)
 - b. No (0)
5. Are the research methods made explicit? (*interviews, focused groups, topic guide etc*)
 - a. Yes (1)
 - b. No (0)
6. Has the researcher clearly responded to reflexivity during the study?
 - a. Yes (1)
 - b. No (0)
7. Was drop out response reported?
 - a. Yes
 - b. No (0)
8. Has ethical issues been taken into consideration?
 - a. Yes (1)
 - b. No (0)
9. Was the data analysis sufficiently rigorous?
 - a. Yes (1)
 - b. No (0)
10. Are the findings explicit?
 - a. Yes (1)
 - b. No (0)
11. Do the authors identify new area for research?
 - a. Yes (1)
 - b. No(0)



Mixed Method Appraisal Tool

1. Was the study conducted with adolescents?
 - a. Yes (1)
 - b. No (0)
2. Is the sampling process clearly stated?
 - a. Yes (1)
 - b. No (0)
3. Did the research design appropriately address the research question?
 - a. Yes (1)
 - b. No (0)
4. Was the research setting justified?
 - a. Yes (1)
5. Was drop out response reported?
 - a. Yes
 - b. No (0).
6. Was the inclusion and exclusion criterion clearly stated?
 - a. Yes (1)
 - b. No (0)
7. If there was more than one group of subjects, was this clearly stated?
 - a. Yes (1)

- b. No (0)
- 8. Are the methods of data collection adequately explained?
 - a. Yes (1)
 - b. No (0)
- 9. Are the findings interpreted in the context of other studies and theory?
 - a. Yes (1)
 - b. No (0)
- 10. Is adequate evidence provided to support the analysis?
 - a. Yes (1)
 - b. No (0)
- 11. Is reliability / consistency over time reported?
 - a. Yes (1)
 - b. No (0)
- 12. Are the researcher's own position, assumption and bias outlined?
 - a. Yes (1)
 - b. No (0)
- 13. Are the findings of this study generalizable to the study population?
 - a. Yes (1)
 - b. No (0)
- 14. Has ethical issues been taken into consideration
 - a. Yes (1)
 - b. No (0)



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UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 8: Critical Appraisal Tools for The Screening of Articles – Interventions

REACH		
QUESTION	SCORING	
Does the article indicate who the intervention is intended for (inclusion criteria)?	Yes = 1	No = 0
Does the article report on exclusion criteria?	Yes = 1	No = 0
Does the article report on the representativeness of the target population? (gender)?	Yes = 1	No = 0
Does the article report on participation rate?	Yes = 1	No = 0
Are there reports on indirect beneficiaries?	Yes = 1	No = 0
EFFECTIVENESS		
Did the intervention achieve the intended objectives?	Yes = 1	No = 0
Does the article report on the limitations of the intervention?	Yes = 1	No = 0
Are there reports of attrition (no. of people who completed the programme)?	Yes = 1	No = 0
Does the article include recommendations to improve the intervention?	Yes = 1	No = 0
Does the article include recommendations for practice?	Yes = 1	No = 0
ADOPTION		
Is the setting described in terms of country and place of intervention (e.g. school, clinic)?	Yes = 1	No = 0
Is the context described (low socio economic, rural etc.)?	Yes = 1	No = 0
Is reference made to how accessible the place of intervention was to the participants (for example, their school, local clinic etc.)?	Yes = 1	No = 0
Are there reports on the adoption of the intervention by the participants (for example, were they open to the intervention, resistant etc.)?	Yes = 1	No = 0
Are there reports on consultation or partnering with community/school/family/other stakeholders prior to the intervention?	Yes = 1	No = 0
IMPLEMENTATION		
Are there reports of resources required to conduct the intervention?	Yes = 1	No = 0
Are there reports of who did the intervention (social worker, teacher etc.)?	Yes = 1	No = 0
Is the duration and frequency of the intervention described?	Yes = 1	No = 0
Is training or experience required to implement the intervention?	Yes = 1	No = 0
Did participants evaluate the intervention?	Yes = 1	No = 0
MAINTENANCE		
Does the article report on long term effects of the intervention (after 6 months)	Yes = 1	No = 0
Does the article report on indicators used for intervention follow-up?	Yes = 1	No = 0

Are there reports on the attrition rates (number of those completed the intervention vs. number that participated in the follow up)?	Yes = 1	No = 0
Are there reports on relapse?	Yes = 1	No = 0
Is the method of follow up indicated (telephone calls, interviews, questionnaire etc.)?	Yes = 1	No = 0
TOTAL	25	



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Appendix 9: Data Extraction Tool: Determinants

No	Code	Author, year	Sample details	n	Age	% ♀ (F)	Relevant variables (Determinants)	Odd's Ratio of determinant of hookah pipe use	95% Confidence Interval (CI)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									



Appendix 10: Data Extraction Tool – Interventions

			REACH	EFFICACY <i>(please refer to table 2 for further information about efficacy)</i>		ADOPTION	IMPLEMENTATION		MAINTENANCE
Author, Year	Study Design	Aim of Study	Target Population and Recruitment	Limitation of intervention	Recommended for practice	Adoption (setting, consultations and participant feedback)	Intervention	Interventionist and training/experience	Maintenance of results
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Appendix 11: STROBE Checklist: Chapter 6

Adolescent hookah pipe use: Comparing users and non-users harm perception, BPN and motivation

Developed from:

Von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Annals of internal medicine*, 147(8), 573-577.

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	196
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	196-197
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	197-199
Objectives	3	State specific objectives, including any prespecified hypotheses	199
Methods			
Study design	4	Present key elements of study design early in the paper	200
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	200-201
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	201
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case	n/a
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	202-203
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	201-204
Bias	9	Describe any efforts to address potential sources of bias	201
Study size	10	Explain how the study size was arrived at	201
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	201
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	204
		(b) Describe any methods used to examine subgroups and interactions	204
		(c) Explain how missing data were addressed	204
		(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	204
		(e) Describe any sensitivity analyses	n/a

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	205
		(b) Give reasons for non-participation at each stage	205
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	206-211
		(b) Indicate number of participants with missing data for each variable of interest	206
		(c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	206-211
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	206-211
		(b) Report category boundaries when continuous variables were categorized	206-211
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	206-211
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	206-211
Discussion			
Key results	18	Summarise key results with reference to study objectives	212-215
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	215
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	212-215
Generalisability	21	Discuss the generalisability (external validity) of the study results	215
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	xxvi

Appendix 12: COREQ Checklist: Chapter 7

Adolescent hookah pipe use: A qualitative study on the role of BPN and motivation

Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Developed from:

Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

No. Item	Guide questions/description	Reported on Page #	
Domain 1: Research team and reflexivity			
<i>Personal Characteristics</i>			
1. Inter viewer/facilitator	Which author/s conducted the inter view?	N/A The information was removed to accommodate word count for Journal	
2. Credentials	What were the researcher's credentials? E.g. PhD, MD		
3. Occupation	What was their occupation at the time of the study?		
4. Gender	Was the researcher male or female?		
5. Experience and training	What experience or training did the researcher have?		
<i>Relationship with participants</i>			
6. Relationship established	Was a relationship established prior to study commencement?		
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research		
8. Interviewer characteristics	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic		
Domain 2: study design			
<i>Theoretical framework</i>			
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	225	
<i>Participant selection</i>			
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	226	
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	226	
12. Sample size	How many participants were in the study?	229	
13. Non-participation	How many people refused to participate or dropped out? Reasons?	228	
<i>Setting</i>			
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	226-227	
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	226-227	
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	228-229	
<i>Data collection</i>			
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	227	
18. Repeat interviews	Were repeat inter views carried out? If yes, how	227	

	many?	
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	227
20. Field notes	Were field notes made during and/or after the interview?	227
21. Duration	What was the duration of the interviews?	227
22. Data saturation	Was data saturation discussed?	227
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	227
Domain 3: analysis and findings		
Data analysis		
24. Number of data coders	How many data coders coded the data?	
25. Description of the coding tree	Did authors provide a description of the coding tree?	n/a
26. Derivation of themes	Were themes identified in advance or derived from the data?	230
27. Software	What software, if applicable, was used to manage the data?	227
28. Participant checking	Did participants provide feedback on the findings?	227
Reporting		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	230
30. Data and findings consistent	Was there consistency between the data presented and the findings?	228-237
31. Clarity of major themes	Were major themes clearly presented in the findings?	230
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	230

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Appendix 13A: STROBE Checklist: Chapter 8

The role of families in adolescent hookah pipe use: Implications for policy and practice

Developed from:

Von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Annals of internal medicine*, 147(8), 573-577.

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	248
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	248-249
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	249-253
Objectives	3	State specific objectives, including any prespecified hypotheses	253
Methods			
Study design	4	Present key elements of study design early in the paper	n/a
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Same as Ch 6
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	n/a
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case	n/a
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	254-256
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	254-256
Bias	9	Describe any efforts to address potential sources of bias	253
Study size	10	Explain how the study size was arrived at	253
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	254-255
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	253
		(b) Describe any methods used to examine subgroups and interactions	253
		(c) Explain how missing data were addressed	253
		(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	257
		(e) Describe any sensitivity analyses	257

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	260
		(b) Give reasons for non-participation at each stage	260
		(c) Consider use of a flow diagram	260
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	260
		(b) Indicate number of participants with missing data for each variable of interest	260
		(c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	n/a
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	n/a
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	n/a
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	n/a
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	260-265
		(b) Report category boundaries when continuous variables were categorized	261-265
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	257
Discussion			
Key results	18	Summarise key results with reference to study objectives	274-279
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	279
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	274-279
Generalisability	21	Discuss the generalisability (external validity) of the study results	279
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	xxvi

Appendix 13B: COREQ Checklist: Chapter 8

The role of families in adolescent hookah pipe use: Implications for policy and practice

Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Developed from:

Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

No. Item	Guide questions/description	Reported on Page #	
Domain 1: Research team and reflexivity			
<i>Personal Characteristics</i>			
1. Inter viewer/facilitator	Which author/s conducted the interview?	N/A This part had to be left out to accommodate the word count of the book chapter	
2. Credentials	What were the researcher's credentials? E.g. PhD, MD		
3. Occupation	What was their occupation at the time of the study?		
4. Gender	Was the researcher male or female?		
5. Experience and training	What experience or training did the researcher have?		
<i>Relationship with participants</i>			
6. Relationship established	Was a relationship established prior to study commencement?		
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research		
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic		
Domain 2: study design			
<i>Theoretical framework</i>			
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	251-253	
<i>Participant selection</i>			
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	257-258	
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	258	
12. Sample size	How many participants were in the study?	262	
13. Non-participation	How many people refused to participate or dropped out? Reasons?	266	
<i>Setting</i>			
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	258	
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	258	
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	266-267	
<i>Data collection</i>			
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	258	
18. Repeat interviews	Were repeat interviews carried out? If yes, how	258	

	many?	
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	258-259
20. Field notes	Were field notes made during and/or after the inter view?	259
21. Duration	What was the duration of the inter views?	258
22. Data saturation	Was data saturation discussed?	258
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	258
Domain 3: analysis and findings		
Data analysis		
24. Number of data coders	How many data coders coded the data?	259
25. Description of the coding tree	Did authors provide a description of the coding tree?	258-259
26. Derivation of themes	Were themes identified in advance or derived from the data?	268-269
27. Software	What software, if applicable, was used to manage the data?	n/a
28. Participant checking	Did participants provide feedback on the findings?	n/a
Reporting		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	268-269
30. Data and findings consistent	Was there consistency between the data presented and the findings?	268-274
31. Clarity of major themes	Were major themes clearly presented in the findings?	268-274
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	268-274

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UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 14: Delphi Workshop Participant Consent Form

Project title: The development of an intervention to meet the BPN and reduce adolescent hookah pipe use

Dear Participant

My name is Zainab Kader. I am a PhD Candidate at the University of the Western Cape within the Child and Family Studies Unit. I am interested in designing an intervention to reduce hookah pipe use and improve satisfaction of BPN. In order to develop this intervention, I need input from a diverse range of people so that different perspectives can be considered and incorporated in the design of this intervention.

The information gathered in this workshop will be used to inform the design of the intervention. Your participation in this workshop is voluntary. Information shared in this workshop is confidential. In aiding the protection of your identity, the information provided will be private; no names or any other descriptors will be used to ensure that you will not be identified when participating in this study. In this way you will remain anonymous and confidentiality will be maintained. If an article or report is written about this research study, your identity will remain anonymous as best is possible. The reports will be kept in a locked compartment with only the researcher and research supervisor having access to the information. The research findings will not include any of your personal details. The session will be audio recorded

I _____ (name and surname) **AGREE TO PARTICPATE** in this phase of the study.

Signature

Date

If you are unsure about anything relating to this study please contact Zainab Kader 084 268 6226 zkader4@gmail.com or Prof. N. Roman (Supervisor) on 021 959 2277/2970 nroman@uwc.ac.za.



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2277, Fax: 27 21-959 2845

E-mail: zkader4@gmail.com

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Appendix 15: Delphi Workshop Participant Demographic Details Form



Project title: The development of an intervention to meet the BPN and reduce adolescent hookah pipe use

Please complete demographics table below. This table provides the researcher with some background information about each participant and their expertise. All information is treated with the strictest confidentiality.


Name and Surname							
Gender		Race		Age			
Highest Level of Education (indicate course)							
Organization/Institution							
Department							
Role/Title							
Sector	Government/ Policy Development	NGO/NPO/ CBO/FBO	Academia/ Research	Other Please indicate below			
OTHER:							
Number of years' work experience							
Number of years of experience with:		Substance use/Hookah pipe					
		Adolescents					
		Interventions: Plan/ develop/ implement/monitor/ evaluate					
		Self Determination Theory					
Please describe the focus of your work in relation to the focus of this workshop							

*Age and race is requested in order to demonstrate a representative and diverse participant group

Appendix 16: UWC Ethics Approval

 UNIVERSITY of the WESTERN CAPE	OFFICE OF THE DIRECTOR: RESEARCH RESEARCH AND INNOVATION DIVISION	Private Bag X17, Bellville 7535 South Africa T: +27 21 959 2988/2948 F: +27 21 959 3170 E: research-ethics@uwc.ac.za www.uwc.ac.za
<p>29 May 2017</p>		
<p>Ms Z Kader Social Work Faculty of Community and Health Sciences</p>		
<p>Ethics Reference Number: HS17/4/5</p>		
<p>Project Title:</p>	<p>The development of an intervention to meet the basic psychological needs (BPN) of preadolescents and adolescents to reduce Hookah Pipe use.</p>	
<p>Approval Period:</p>	<p>27 May 2017 – 27 May 2018</p>	
<p>I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.</p>		
<p>Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval. Please remember to submit a progress report in good time for annual renewal.</p>		
<p>The Committee must be informed of any serious adverse event and/or termination of the study.</p>		
		
<p><i>Ms Patricia Josias Research Ethics Committee Officer University of the Western Cape</i></p>		
<p>PROVISIONAL REC NUMBER - 130416-049</p>		
<p>FROM HOPE TO ACTION THROUGH KNOWLEDGE</p>		

Appendix 17: WCED Approval to Conduct Research at Schools

	Western Cape Government Education	Directorate: Research
REFERENCE: 20170531 –1547 ENQUIRIES: Dr AT Wyngaard		Audrey.wyngaard@westerncape.gov.za tel: +27 021 467 9272 Fax: 0865902282 Private Bag x9114, Cape Town, 8000 wced.wcape.gov.za
Miss Zainab Kader 84 Queens Road Walmer Estate 7925		
Dear Miss Zainab Kader		
RESEARCH PROPOSAL: THE DEVELOPMENT OF AN INTERVENTION TO MEET THE BASIC PSYCHOLOGICAL NEEDS (BPN) OF PREADOLESCENTS AND ADOLESCENTS TO REDUCE HOOKAH PIPE USE		
Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:		
<ol style="list-style-type: none"> 1. Principals, educators and learners are under no obligation to assist you in your investigation. 2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation. 3. You make all the arrangements concerning your investigation. 4. Educators' programmes are not to be interrupted. 5. The Study is to be conducted from 25 July 2017 till 29 September 2017 6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December). 7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number? 8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted. 9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department. 10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services. 11. The Department receives a copy of the completed report/dissertation/thesis addressed to: The Director: Research Services Western Cape Education Department Private Bag X9114 CAPE TOWN 8000 		
We wish you success in your research.		
Kind regards. Signed: Dr Audrey T Wyngaard Directorate: Research DATE: 01 June 2017		
Lower Parliament Street, Cape Town, 8001 tel: +27 21 467 9272 fax: 0865902282 Safe Schools: 0800 45 46 47		Private Bag X9114, Cape Town, 8000 Employment and salary enquiries: 0861 92 33 22 www.westerncape.gov.za

Appendix 18: Publishing and Reviewer Comments

Determinants of adolescent hookah pipe use: A systematic review (Chapter 4)	
Journal of Child & Adolescent Substance Abuse <onbehalfof@manuscriptcentral.com>	Mon, Mar 30, 8:52 PM
30-Mar-2020	
Dear Miss Kader:	
Your manuscript entitled "Determinants of adolescent hookah pipe use: A systematic review", which you submitted to Journal of Child & Adolescent Substance Abuse, has been reviewed. The reviewer comments are included at the bottom of this letter.	
The reviewer(s) would like to see some revisions made to your manuscript before publication. Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript.	
When you revise your manuscript please highlight the changes you make in the manuscript by using the track changes mode in MS Word or by using bold or colored text.	
To start the revision, please click on the link below:	
*** PLEASE NOTE: This is a two-step process. After clicking on the link, you will be directed to a webpage to confirm. ***	
https://mc.manuscriptcentral.com/weas?URL_MASK=c4e5c630a4534130b9c2e4b2f365c2bc	
This will direct you to the first page of your revised manuscript. Please enter your responses to the comments made by the reviewer(s) in the space provided. You can use this space to document any changes you made to the original manuscript. Please be as specific as possible in your response to the reviewer(s).	
This link will remain active until you have submitted your revised manuscript. If you begin a revision and intend to finish it at a later time, please note that your draft will appear in the "Revised Manuscripts in Draft" queue in your Author Center.	
IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.	
Because we are trying to facilitate timely publication of manuscripts submitted to Journal of Child & Adolescent Substance Abuse, your revised manuscript should be uploaded by 28-Jul-2020. If it is not possible for you to submit your revision by this date, we may have to consider your paper as a new submission.	
Once again, thank you for submitting your manuscript to Journal of Child & Adolescent Substance Abuse and I look forward to receiving your revision.	
Sincerely, Vincent Van Hasselt, Ph.D. Co-Editor, Journal of Child & Adolescent Substance Abuse vanhasse@nova.edu	
Reviewer(s)' Comments to Author:	
Reviewer: 1	
Comments to the Author Relevant and interesting topic. Suggestions:	

As English language articles were used in the study, the reader would benefit from the information and comment on how many other languages articles were found in databases on the topic searched. Such overview would help understand the “strength” of the study better.

The methods of choosing studies, their quality assessment and review process are presented in detail, the data analysis description lacks comparable level of information. This makes following the complex results section more difficult.

Label tables with information to make tables more self-explanatory on their own

Re-label graph to underscore more clearly that methodology used follows PRISMA standards as opposed to the graph's content being adapted from Moher et al.

Good Day

Thank you for reviewing our manuscript. Please see responses to the reviewer's comments below:

Relevant and interesting topic

Thank you for your interest in the paper and your positive feedback about the relevance of this review.

As English language articles were used in the study, the reader would benefit from the information and comment on how many other languages articles were found in databases on the topic searched. Such overview would help understand the “strength” of the study better.

That is an interesting and important point but English was set as a limiter when conducting the searches.

Therefore, the results did not yield studies in other languages. Besides the available language skills in the research team, this decision was also based on a previous research synthesis providing no evidence that language restricted meta-analyses (k=79) lead to biased estimates of intervention effectiveness (Moher et al., 2000)

Moher, D., Klassen, T. P., Schulz, K. F., Berlin, J. A., Jadad, A. R., & Liberati, A. (2000). What contributions do languages other than English make on the results of meta-analyses?. *Journal of clinical epidemiology*, 53(9), 964-972.

The methods of choosing studies, their quality assessment and review process are presented in detail, the data analysis description lacks comparable level of information. This makes following the complex results section more difficult.

More detail has been added to the data analysis - Narrative synthesis using thematic analysis was used in this study because each study reported the strength of the determinant differently, for example, some made use of odds ratio whilst others made use of percentage, Nagelkerke R2 or Crude Prevalence Ratio. The relevance of the determinants was based on the effect size of the associations with the outcome of interest. The data was analysed according to the study properties and the strength of the association. This meant that the greater the odds or higher the percentage, the more relevant the determinant for hookah pipe use. Once all the results were presented and analysed, the researcher further analysed all the results and then identified the most relevant determinants of hookah pipe use amongst adolescents and grouped them into family factors, peers/friends factors, individual factors, school factors and other factors.

Label tables with information to make tables more self-explanatory on their own

Table 1 is now labelled as: The methodological quality of the studies used to identify the determinants of adolescent hookah pipe use.

Table 2 is now labelled as: Relevance of determinants regarding adolescent hookah pipe use

Table 3 is now labelled as: Most relevant determinants regarding adolescent hookah pipe use

Re-label graph to underscore more clearly that methodology used follows PRISMA standards as opposed to the graph's content being adapted from Moher et al.

Removed: Adapted from Moher et al. and relabelled to: Flow diagram of the review process methodology using the PRISMA standards

Regards

Zainab Kader

From: Journal of Child & Adolescent Substance Abuse <onbehalf@manuscriptcentral.com>

Date: 2020/05/06 01:02 (GMT+02:00)

To: zkader4@gmail.com, zainab@jameshouse.org.za

Subject: Journal of Child & Adolescent Substance Abuse - Decision on Manuscript ID WCAS-2018-0089.R1

05-May-2020

Dear Miss Kader:

Your manuscript entitled "Determinants of adolescent hookah pipe use: A systematic review", which you submitted to Journal of Child & Adolescent Substance Abuse, has been reviewed. The reviewer comments are included at the bottom of this letter.

The reviews are in general favourable and suggest that, subject to minor revisions, your paper could be suitable for publication. Please consider these suggestions, and I look forward to receiving your revision.

When you revise your manuscript please highlight the changes you make in the manuscript by using the track changes mode in MS Word or by using bold or colored text.

To start the revision, please click on the link below:

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Because we are trying to facilitate timely publication of manuscripts submitted to Journal of Child & Adolescent Substance Abuse, your revised manuscript should be uploaded by 04-Jul-2020. If it is not possible for you to submit your revision by this date, we may have to consider your paper as a new submission.

Once again, thank you for submitting your manuscript to Journal of Child & Adolescent Substance Abuse and I look forward to receiving your revision.

Sincerely,
 Vincent Van Hasselt, Ph.D.
 Co-Editor, Journal of Child & Adolescent Substance Abuse
vanhasse@nova.edu

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author

Thank you for the revised version of the article.
 Please include the supplementary material at the end of the article.
 Also the text needs language proofing.
 All the best in your future work!

Responses to reviewer

Thank you for reviewing our manuscript
 The supplementary material has been included at the end of the article
 Language Proofing: Will send to an editor for language proofing

From: Journal of Child & Adolescent Substance Abuse <onbehalf@manuscriptcentral.com>
 Date: 2020/06/25 05:43 (GMT+02:00)
 To: zkader4@gmail.com, zainab@jameshouse.org.za
 Subject: Journal of Child & Adolescent Substance Abuse - Decision on Manuscript ID WCAS-2018-0089.R1

Dear Miss Kader:

Ref: Determinants of adolescent hookah pipe use: A systematic review

Our reviewers have now considered your paper and have recommended publication in Journal of Child & Adolescent Substance Abuse. We are pleased to accept your paper in its current form which will now be forwarded to the publisher for copy editing and typesetting.

You will receive proofs for checking, and instructions for transfer of copyright in due course.

The publisher also requests that proofs are checked through the publisher's tracking system and returned within 48 hours of receipt.

Thank you for your contribution to Journal of Child & Adolescent Substance Abuse and we look forward to receiving further submissions from you.

Sincerely,
 Vincent Van Hasselt, Ph.D.
 Co-Editor, Journal of Child & Adolescent Substance Abuse
vanhasse@nova.edu

Systematic review of interventions aimed at reducing hookah pipe use: Implications for practitioners and clinicians (Chapter 5)

Systematic review of interventions aimed at reducing hookah pipe use: Implications for practitioners and clinicians

SAn Medical Journal

The following is the correspondence between the editors and the author.

Subject: Decision on your submission to SAMJ: SAMJ013892

Date: 07 Feb 2019

To: "Zainab Kader" zkader4@gmail.com

From: "SAn Medical Journal (em@editorialmanager.com)"

Dear Miss Kader,

Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript.

For your guidance, reviewers' comments are appended below.

If you are prepared to undertake the work required, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript.

Your revision is due by Mar 07, 2019. Please let us know if you require additional time.

To submit a revision, go to <https://www.editorialmanager.com/samj/> and log in as an Author. You will see a menu item called Submission Needing Revision.

Best wishes

Bridget Farham, PhD
 Editor
 SAn Medical Journal

Reviewers' comments:

Reviewer's Responses to Questions

Please comment on your General impression of this manuscript - bear the following in mind:

Is the article relevant?

Does it offer anything new?

Are there similar studies in our region/outside the region?

Does it add to the existing medical body of knowledge?

On first glance, are the methods, results and conclusions reasonable?

Do the conclusions actually draw on the results?

Does the article have a clear message?

Will it help SAMJ readers make better clinical decisions and, if so, how?

Is a general medical journal the right place for it?

Reviewer #1: General remarks: Thank you for the opportunity to review this very interesting piece. This paper addresses an important public health issue. Hookah pipe smoking has become an increasingly popular means of tobacco smoking. A systematic review of interventions to quit the use of hookah is important to identify effective and feasible interventions that could be promoted.

Abstract

Introduction 1. Page 1; Lines 39-42: In this sentence, hookah pipe is being presented as an alternative measure to reduce tobacco use. Hookah pipe smoking is an old means of smoking tobacco. Please rephrase sentence.

2. Page 1; Line 50: change "cause" to "causes"

3. Page 2; line 1: change last word "are" to "is"

4. Page 2; Lines 19-20: "...but this may not be clarified only through efficacy studies." This is vague, Please rephrase.

Methods 1. Page 2; line 50: add "s" to the word "word"

2. Page 2; Line 58: Sentence is unclear. Consider rephrasing

Results 1. Page 3; lines 48 – 60: take to methods section

2. Page 4 lines 1-3: Figure 1 and Table 2 would fit better with the methods section

3. Page 4; lines 12 to 13: The use of the letter "k" is not understood. Is this supposed to be "n"? I'm not sure "k" and "n" could be used interchangeably in statistics.

4. Page 4; line 18: change "adulthood" to "adult smokers"

5. Page 4; line 23: change "targeted" to "recruited"

6. Page 4, line 40: is "intensive" supposed to be "intervention"?

7. Page 4, line 52-59: the sentence is too long. Please revise.

8. Page 5, line 7: more information is needed to understand what is meant by "colleges in the Midwest"

9. Page 5, lines 55-56: is the author referring to one or the 3 studies?

10. Page 5, line 1: On page 4, line 39, the authors mentioned that only 3 studies mentioned retention but on this page "4 studies" is mentioned. Please reconcile both information

Discussion 1. Page 7, line 10: change "unlikely" to "slim"

2. Page 7, lines 14-15: It is important to highlight the fact that there was no study from Africa in the results section also

3. Page 7: The 2 sentences beginning on line 16 to 23 need to be rephrased

4. Page 7, line 23: what do we need to protect users and non-users from? Please give some examples

5. Page 7, lines 28-29: How is a road show related to being a peer-based intervention? More explanation needed here.

6. Page 7, lines 42-44: The example does not fit well with the immediate consequences of using hookah pipe. Please explain more or rephrase example

7. Page 7, lines 45: The statement "since hookah pipe use is a social phenomenon, there is need to be a

social element" seems incomplete.

8. Page 7, lines 46: here a recommendation for research is made. It is better to have all recommendations relating to research in the same section or paragraph.

References All good

General comment 1. This paper needs language editing. A lot of typographical/grammatical errors were identified in the paper which could not be individually mentioned in this report.

2. The punctuation mark (full stop) near the cited references should be just before the references and not after, if the reference is in AMA style.

Reviewer #2: This is a systematic review of interventions aimed at reducing the use of hookah pipes.

As the review highlights, and the article emphasizes, intervention research on hookah pipes is limited globally, but particularly in African settings (the review yielded no African studies). Given that studies have shown highly elevated levels of hookah pipe smoking in certain SAn communities, the current systematic review helps to address a research gap of high concern.

A systematic review is an appropriate starting point to have identified intervention research gaps and call for further research in this area.

The conclusions appropriately relate to the work undertaken, and the article articulates a clear message.

This article provides a summary and fresh perspectives on interventions to reduce hookah pipe smoking, that will be useful to SAMJ readers, both clinicians and public health professionals.

In the light of the above comments, it is disappointing that the authors have shown limited attention to the grammatical and typographical aspects of the article. The article contains a large number of errors in this regard (for example it should read "data were" rather than "data was") that need to be corrected prior to possible publication in the SAMJ.

Similarly, the references, both in the text and reference list, poorly adhere to the requirements for referencing in the Vancouver Style.

Please comment on the Methods and analysis presented in this manuscript

Study design

Is the research question and planned outcomes clearly defined?

Was the sample adequate and sufficiently described?

Are the methods adequately described and appropriate to the study objectives?

Statistical considerations

Are simple statistical methods applied appropriately?

Reviewer #1: This was a systematic review. Standard framework was used to assess the articles included in the review and a PRIMSA chart was included to show the the selection procedure of this study.

Reviewer #2: While I do have some experience, I am not an expert on systematic reviews. From my knowledge however, this systematic review has adequately followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Please comment on the Results, Discussion and Conclusions presented in this manuscript

Results

Is the population/sample adequately described?

Are the results clearly presented?

Are they credible and do they answer the research question?

Are tables clear and useful, not simply mirroring data discussed in the Results text?

Reviewer #1: Yes (please see my earlier comments). Table 2 could be further summarized and included in the paper. Tables 1 and 2 as they are now would be better as a supplementary tables.

Reviewer #2: The results of the systematic review are adequately described and presented in the Tables, and are also credible.

Discussion

Are the results well discussed in light of previous evidence and the literature?

Are the limitations of the study sufficiently discussed?/ Are the strengths and weakness discussed?

Is the meaning and relevance of the study discussed?

Reviewer #1: Yes (please see my earlier comments)

Reviewer #2: The discussion is a thorough evaluation of the available (limited) evidence, especially in African settings, on interventions to reduce hookah smoking. Based on the findings, the author/s also give new insights and perspectives on future interventions aimed at reducing or preventing the use of hookah pipes, as well as future research directions.

Conclusion

Are the implications of the research summarised?

Do the authors make relevant recommendations for future research or application?

Reviewer #1: Yes

Reviewer #2: The Conclusion is succinct and adequately captures the key points raised by the systematic review.

Reviewer #2: The article is very useful, and contains interesting perspectives and pertinent information to guide both interventions and research directions in relation to hookah pipes, especially in African settings. The large number of grammatical, punctuation and typographical errors detract from the article. Similarly, the referencing in both the text and reference list is poor.

Here are some specific concerns:

Page 1, Line 42: The studies referred to were undertaken in specific groups/settings, or at a single school, and should not be used to create an impression of national relevance.

Page 4, Line 42: clarify what is meant by "brief arm".

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Page 4, Line 45: loss to follow up rather than "drop out".

Page 6, Line 57: what is meant by "take on"?

Page 7, Line 16: interventions have been undertaken, but not all have been scientifically evaluated or report.

Page 7, Lines 24-26: do the authors have any perspectives on the advertising and display of hookah pipes at points of sale? And how regulations or controls in this regard may relate to current or proposed tobacco regulation?

Dear Dr Farham,

We were delighted to hear that you are interested in the topic of our manuscript (SAMJ013892) and give us the opportunity to revise the manuscript. Herewith we submit the revised version of our manuscript entitled "A systematic review of interventions aimed at reducing hookah pipe use: "Implications for practitioners and clinicians."

We believe that we further strengthened the contribution of this manuscript to the literature by following to the reviewers' comments. Detailed responses to the reviewers' comments are described below.

Of course, we remain at your disposal should you have any further suggestions for improvements of our paper.

On behalf of all authors,

Sincerely,

Zainab Kader

Responses to reviewers

Reviewer #1: General remarks: Thank you for the opportunity to review this very interesting piece. This paper addresses an important public health issue. Hookah pipe smoking has become an increasingly popular means of tobacco smoking. A systematic review of interventions to quit the use of hookah is important to identify effective and feasible interventions that could be promoted.

Thank you for your interest in the paper and your positive feedback about the importance of this review.

Abstract

Introduction 1. Page 1; Lines 39-42: In this sentence, hookah pipe is being presented as an alternative measure to reduce tobacco use. Hookah pipe smoking is an old means of smoking tobacco. Please rephrase sentence.

*"Reduction in **tobacco** use" has been changed to "reduction in **cigarette** use". The reference was consulted again and based on the authors understanding tobacco use is understood as cigarette use specifically in the reference.*

Furthermore, the following sentence was added "Unfortunately, this does not minimise the burden but exacerbates it." This sentence was added so that it is not assumed that smoking the hookah pipe would lead to a reduction in tobacco use.

2. Page 1; Line 50: change "cause" to "causes"
This has been changed

3. Page 2; line 1: change last word "are" to "is"
This has been changed

4. Page 2; Lines 19-20: "...but this may not be clarified only through efficacy studies." This is vague, please rephrase.

Lines 19-20 have been rephrased

*Based on previous research, it would seem that intervening in hookah use may require alternative approaches but this may not be clarified only through efficacy studies **since they mainly focus on intervention outcomes and not the properties of interventions**. Therefore, this study sought to systematically review interventions aimed at reducing hookah pipe use in order to suggest recommendations for clinicians and practitioners **using the RE-AIM Framework**.*

Methods 1. Page 2; line 50: add “s” to the word “word”

This has been changed

2. Page 2; Line 58: Sentence is unclear. Consider rephrasing

This has been changed to “The review process consisted of three phases to identify appropriate studies for this study.”

Results 1. Page 3; lines 48 – 60: take to methods section

This has been moved to the Methods section: Review Procedure

2. Page 4 lines 1-3: Figure 1 and Table 2 would fit better with the methods section

Figure 1 has been shifted to the Methods section: Review Procedure. However, the authors feel that Table two should remain by the results section as it is describing the results/properties of the included studies. Table 3 follows on from table 3 by providing the effect sizes of the interventions in order to strengthen the efficacy results found from using the RE-AIM Framework.

3. Page 4; lines 12 to 13: The use of the letter “k” is not understood. Is this supposed to be “n”? I’m not sure “k” and “n” could be used interchangeably in statistics.

“k” has been changed to “n”

4. Page 4; line 18: change “adulthood” to “adult smokers”

This has been changed

5. Page 4; line 23: change “targeted” to “recruited”

This has been changed

6. Page 4, line 40: is “intensive” supposed to be “intervention”?

*Changed to the “**intensive intervention arm**”. The authors of this study³⁴ refers to their interventions as brief arm and intensive arm.*

7. Page 4, line 52-59: the sentence is too long. Please revise.

The sentence has been revised

Table three describes how effective the interventions were. Interventions were effective because it enhanced the social skills needed to avoid the use of drugs and improved the self-efficacy of the participants. The brief cessation treatment for hookah pipe smokers appeared feasible. Behaviour support interventions with or without bupropion achieved six-month smoking abstinence among hookah pipe smokers. Modified perceptions of harm and addiction related to the hookah pipe and the intervention had a primary preventative effective on study participants.

8. Page 5, line 7: more information is needed to understand what is meant by “colleges in the Midwest”

More information about colleges in the Midwest is provided:

*Interventions were located online³⁰, Berlin lung hospital²⁷ and at **Colleges in the Midwest where participants enrolled in the Quit and Win contest to quit smoking attended.***

9. Page 5, lines 55-56: is the author referring to one or the 3 studies?

Three studies found that participants achieved prolonged abstinence at follow up^{31 32 34}. Reference 31, 32 and 34 are the studies.

10. Page 5, line 1: On page 4, line 39, the authors mentioned that only 3 studies mentioned retention but on this page “4 studies” is mentioned. Please reconcile both information

On page 4, line 39, The three studies that are described in line 39 in the reach section refer to the retention rates of participating in the intervention^{24, 34, 36} whereas the four studies in the maintenance section refer to participants at baseline that participated in follow up^{32, 34, 35, 36}.

Discussion 1. Page 7, line 10: change “unlikely” to “slim”
This has been changed

2. Page 7, lines 14-15: It is important to highlight the fact that there was no study from Africa in the results section also

This has been added in the results section under the heading description of studies

*Sixty percent of the studies were from Asia, 30% were from North America and 10% was from Europe. **There were no studies from Africa.***

3. Page 7: The 2 sentences beginning on line 16 to 23 need to be rephrased
The sentence has been rephrased

However, these recommendations are not limited to only resource constraint settings. They may be applied in different contexts if it is feasible. Since information and interventions related to hookah pipe use and treatment is still in its early stages, it is advisable that clinicians and practitioners should attend trainings and familiarise themselves with hookah pipe research. This is important so that they have a clear understanding of how it differs to cigarettes and other tobacco products so that they can advise and intervene appropriately. Government also has an important role to play in the reduction of hookah pipe use therefore awareness and information sessions should be lobbied with government departments so that it can be prioritized in the budgets in order to provide the service at schools, workplace, clinics and community centres.

4. Page 7, line 23: what do we need to protect users and non-users from? Please give some examples

Examples have been provided

Banning hookah pipe in public spaces and in the company of children is important to protect users from peers that may negatively influence them to add substances or use other substances concurrently, being labelled, being caught by law officials, community leaders or parents, which may lead to dire consequences such as punishment, embarrassment or harassment. Banning of smoking in public places is crucial for nonusers too as they may experience health problems from second hand smoke and they may be influenced, exposed or coerced into hookah pipe smoking

5. Page 7, lines 28-29: How is a road show related to being a peer-based intervention? More explanation needed here.

More explanation has been provided

A road show involving hookah pipe users from different ages and backgrounds may be a possibility. A variation of actors is needed so that it can appeal to a wide range of audience. For example, if the road show is aimed at adolescents, there should be adolescent actors so that it is considered peer based and relatable.

6. Page 7, lines 42-44: The example does not fit well with the immediate consequences of using hookah pipe. Please explain more or rephrase example

The example has been changed

These effects must be described in a way that would be intriguing to the person's interests and age so that it is comprehensible and relatable. For example, telling an adolescent that he may get cancer when he is older may not be as effective as informing him how smoking hookah affects his ability to play rugby (if that is his interest). Similarly, telling a pregnant mother how smoking hookah may affect her unborn child would be more comprehensible than telling her that smoking the hookah pipe negatively affects the environment.

7. Page 7, lines 45: The statement “since hookah pipe use is a social phenomenon, there is need to be a social element” seems incomplete.

The sentence has been completed

*Since hookah pipe use is a social phenomenon, there needs to be a social element **when planning the intervention.***

8. Page 7, lines 46: here a recommendation for research is made. It is better to have all recommendations relating to research in the same section or paragraph.

This recommendation refers to counselling not research. The change has been made in the text

Exploration of why people use the hookah pipe should occur – this may be done in individual or group counselling sessions.

References All good

Thank you

General comment 1. This paper needs language editing. A lot of typographical/grammatical errors were identified in the paper which could not be individually mentioned in this report.

2. The punctuation mark (full stop) near the cited references should be just before the references and not after, if the reference is in AMA style.

Thank you for the feedback. The authors have made use of an editor to address typographical/grammatical errors

SAMJ guidelines requests Vancouver style, which we adopted in the current version of the manuscript.

Reviewer #2: This is a systematic review of interventions aimed at reducing the use of hookah pipes.

As the review highlights, and the article emphasizes, intervention research on hookah pipes is limited globally, but particularly in African settings (the review yielded no African studies). Given that studies have shown highly elevated levels of hookah pipe smoking in certain SAn communities, the current systematic review helps to address a research gap of high concern.

A systematic review is an appropriate starting point to have identified intervention research gaps and call for further research in this area.

The conclusions appropriately relate to the work undertaken, and the article articulates a clear message.

This article provides a summary and fresh perspectives on interventions to reduce hookah pipe smoking that will be useful to SAMJ readers, both clinicians and public health professionals.

In the light of the above comments, it is disappointing that the authors have shown limited attention to the grammatical and typographical aspects of the article. The article contains a large number of errors in this regard (for example it should read "data were" rather than "data was") that need to be corrected prior to possible publication in the SAMJ.

Similarly, the references, both in the text and reference list, poorly adhere to the requirements for referencing in the Vancouver Style.

Thank you for taking time to read our paper and showing a keen interest in our work.

The authors will make use of an editor to address typographical/grammatical errors.

Attention will be given to the requirements for referencing in the Vancouver Style.

Please comment on the Methods and analysis presented in this manuscript

Study design

Is the research question and planned outcomes clearly defined?

Was the sample adequate and sufficiently described?

Are the methods adequately described and appropriate to the study objectives?

Statistical considerations

Are simple statistical methods applied appropriately?

Reviewer #1: This was a systematic review. Standard framework was used to assess the articles included in the review and a PRIMSA chart was included to show the selection procedure of this study.

Reviewer #2: While I do have some experience, I am not an expert on systematic reviews. From my knowledge however, this systematic review has adequately followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Please comment on the Results, Discussion and Conclusions presented in this manuscript

Results

Is the population/sample adequately described?

Are the results clearly presented?

Are they credible and do they answer the research question?

Are tables clear and useful, not simply mirroring data discussed in the Results text?

Reviewer #1: Yes (please see my earlier comments). Table 2 could be further summarized and included in the paper. Tables 1 and 2 as they are now would be better as a supplementary tables.

Thank you for sharing your view. However, the authors feel that Table 2 is important to bring across properties of the existing interventions by using the RE-AIM framework therefore they tend to agree with reviewer 2 to leave the tables as is since it adequately describes the results of the systematic review

Reviewer #2: The results of the systematic review are adequately described and presented in the Tables, and are also credible.

Thank you

Discussion

Are the results well discussed in light of previous evidence and the literature?

Are the limitations of the study sufficiently discussed?/ Are the strengths and weakness discussed?

Is the meaning and relevance of the study discussed?

Reviewer #1: Yes (please see my earlier comments)

Reviewer #2: The discussion is a thorough evaluation of the available (limited) evidence, especially in African settings, on interventions to reduce hookah smoking. Based on the findings, the author/s also give new insights and perspectives on future interventions aimed at reducing or preventing the use of hookah

pipes, as well as future research directions.

Thank you

Conclusion

Are the implications of the research summarised?

Do the authors make relevant recommendations for future research or application?

Reviewer #1: Yes

Reviewer #2: The Conclusion is succinct and adequately captures the key points raised by the systematic review.

Thank you

Reviewer #2: The article is very useful, and contains interesting perspectives and pertinent information to guide both interventions and research directions in relation to hookah pipes, especially in African settings. The large number of grammatical, punctuation and typographical errors detract from the article. Similarly, the referencing in both the text and reference list is poor.

Here are some specific concerns:

Page 1, Line 42: The studies referred to were undertaken in specific groups/settings, or at a single school, and should not be used to create an impression of national relevance.

The sentence has been changed

A SAn study found that the use of hookah pipes is highly prevalent among students² and it is initiated at a young age³

Page 4, Line 42: clarify what is meant by "brief arm".

The change has been made in text

Brief arm (i.e. less intensive intervention),

Page 4, Line 45: loss to follow up rather than "drop out".

The change has been made

Page 6, Line 57: what is meant by "take on"?

The change has been made in text

"take on" has been changed to "adopt"

Page 7, Line 16: interventions have been undertaken, but not all have been scientifically evaluated or report. the sentence has been changed

The sentence has been changed

The following recommendations are presented for clinicians and practitioners operating in resource constraint settings, such as Africa in mind because this study has shown that no interventions to reduce hookah pipe use in Africa has been reported or evaluated.

Page 7, Lines 24-26: do the authors have any perspectives on the advertising and display of hookah pipes at points of sale? And how regulations or controls in this regard may relate to current or proposed tobacco regulation?

The section below has been added

There should be stricter regulations and adherence to policies on the purchase of hookah pipes, tobacco and coals as well as advertising and display. In SA, the Tobacco Control Bill of 2018 identifies the hookah pipe as a tobacco product. The bill states retailers may not display the tobacco product at the place of business but may make the product available to consumers under the age of 18. Furthermore, the Minister must prescribe standardised packaging and labelling of tobacco products in terms of colour, texture, size, manufacturers details, tax stamps and health warnings. The Bill further stipulates that no person shall advertise or promote of cause any other person to advertise or promote tobacco products.

The names of authors, affiliations, author contribution and funding has been indicated in the revised manuscript based on the feedback provided from the editor that focused on editing the typographical/grammatical errors. Please advise if this needs to be removed.

from: SAMJ <em@editorialmanager.com>
reply-to: SAMJ <submissions@hmpg.co.za>

to: Zainab Kader <zkader4@gmail.com>

date: Feb 23, 2019, 9:35 PM
subject: Submission Confirmation for SAMJ013892

Ref.: SAMJ013892

Systematic review of interventions aimed at reducing hookah pipe use: Implications for practitioners and clinicians

Dear Miss Kader,

SAn Medical Journal has received your revised submission.

You may check the status of your manuscript by logging onto Editorial Manager at (<https://www.editorialmanager.com/samj/>).

Best wishes,

SAn Medical Journal

from: SAMJ <em@editorialmanager.com>
reply-to: SAMJ <submissions@hmpg.co.za>

to: Zainab Kader <zkader4@gmail.com>

date: Mar 5, 2019, 8:09 AM
subject: Your Submission
mailed-by: editorialmanager.com
signed-by: editorialmanager.com

Ref.: SAMJ013892

Systematic review of interventions aimed at reducing hookah pipe use: Implications for practitioners and clinicians

SAn Medical Journal

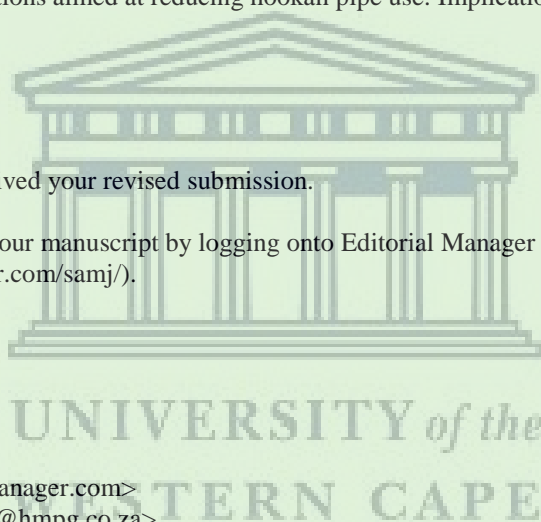
Dear Miss Kader,

We are pleased to tell you that your work has now been accepted for publication in SAn Medical Journal.

Thank you for submitting your work to the journal.

Best wishes

Bridget Farham, PhD



Editor
SA Medical Journal

Adolescent Hookah Pipe Use in SA: A Mixed-Methods Study Exploring the Role of Family (Chapter 8)

Monday, 13 July 2020

Comments were sent in an email with track changes. The comments and response to the comments are presented in the table below

REVIEWER COMMENTS	AUTHOR RESPONSES
Use chapter font and font size formatting as applied in template	Noted, will do
Not adding value to the abstract. Provide an overall summary narratively of what both the quali and quanti data suggested in line with the aim of the study	<p>Replaced the highlighted section with:</p> <p>Hookah pipe users reported no differences between their families' permissiveness and sociability. They also reported no difference in terms of their family conflict and family satisfaction. This finding was contradicted when users explained that they witnessed more family violence, experienced trauma as a result of family members and they experienced less parental involvement compared to non-users. Hookah pipe users have more family members that use substances compared to hookah pipe non-users, parents of hookah pipe users are more accepting of the hookah pipe in the home and it is more common that the hookah pipe is used as a method for socialising amongst hookah pipe users' family members. Moreover, family behaviour and attitudes contribute to the choice to smoke or not smoke the hookah pipe.</p>
<p>Perhaps start off with introducing what this is, the different names that it is called across the globe the contents that are often smokes / added to it when smoked. You should assume the reader does not know what this is.</p> <p>The aim of the introduction is to introduce the reader to the field of study that is to be examined in the chapter.</p>	<p>We have added the following information at the start of the introduction:</p> <p>The hookah pipe may also be referred to as shisha, narghile, argileh, hubble-bubble, and Goza. (Wright, Burrow & Hurst, 2016; Bello et al., 2019). The hookah pipe is a device used to smoke legal and illegal substances. The hookah pipe is usually smoked in a group for approximately 45-60 minutes. The hookah pipe is prepared by filling the vase at the base of the hookah pipe with water. After the vase is filled to an appropriate amount to assure airflow, the stem is placed into the vase and tightly sealed. In some cases, the water is substituted with alcohol. The flavoured tobacco is then packed into the head of the hookah pipe. In some cases, the tobacco is mixed with cannabis and/or other substances. A piece of foil covers the tobacco filled head and small holes are poked into the foil. This is placed on top of the stem. This is followed by connecting a protruding pipe, known as the hose. Lastly, a lit charcoal is placed on top of the foil covered head. At this point, the smoking can commence. The hookah pipe is passed from person to person every few seconds or minutes depending on how long each person smokes and the</p>

	number of people in the group (Bhatnagar et al., 2019; Sadeghi et al., 2019).
Provide some more information of how this theory can be used as a lens for the topic to be examined. Currently it provides a generic overview, it needs to relate to the topic which the chapter aims to cover.	We have applied the theory to topic. Please see refer to conceptual framework in the article
Would remove this heading as there isn't enough information provided below for constitute a lit review	We have removed the heading literature review. We have combined the information from the theoretical framework and literature review and renamed it conceptual framework.
Replace foster resilience with protective factor	Replaced
The current introduction section is very thin and does not adequately introduce the reader to the field of study and why it is important to be examining hookah pipe smoking among adolescents from the perspectives of families using an SDT lens	Information has been added at the beginning of the introduction to introduce the reader to the field of study. At the end of the introduction, we have inserted a comment about why it is important to be examining hookah pipe smoking among adolescents from the perspectives of families using an SDT lens
Perhaps a graphic which shows how the two phases would work together to address the overall aim of the study / chapter?	A figure has been added
Instead of this generic text use the text below the table as the body of the results section and make reference to the relevant tables for more information	The text has been moved before the table. So, the table will follow the narrative/explanation of the table
If you are using race in the chapter, I would suggest you motivating why you have decided to use race as a demographic category for description. If these isn't a sufficient case built for why race was examined I would suggest removing it from the chapter.	Information about race has been removed
Not unpacked but rather the quotes that make up these themes are presented	Sentence has been changed to: The quotes that make up these themes are presented in Table 6. Table 6 is followed by a narrative explaining each theme.
There is no indication that this is a theme. It is inferred your role as the author is to guide the reader throughout the chapter	We have included a heading titled: Themes We have place the word Theme and theme number next to each theme. For example Theme 1: The hookah pipe as a gateway
The results section feels like the results are just slapped together and not presented in a way that tells some story of the different pieces of results from the quali and quanti sections of the study. There are also many instances where it is assumed that the reader should know that a new theme is being introduced rather than using text and sub-headings to indicate this	We have relooked at the results section and tried to integrate the information better. Please refer to results section in chapter
In general or in relation to hookah pipe use? Is that not the aim of the chapter?	These comments have been addressed in the discussion chapter.
How does this introductory paragraph to the the discussion align with the overall aim of the chapter and the title of the chapter? Please revisit	We have relooked at the discussion and incorporated all the reviewer comments. We have endeavoured to provide a richer and more in depth discussion that captures the essence of the results in relation to existing literature by identifying similarities and differences. We identify the gap and indicate how this study addresses the gap.
I would suggest revisiting the title of the chapter, the aim of the chapter, the information / results presented and to then tailor the discussion accordingly. Currently the discussion presents a very general account of what could be unpacked in greater depth	We have also discussed what makes the young people that were the participants in the study so

<p>and focusing specifically on hookah pipe use in the family.</p> <p>It should further present to us how the results which were found is similar or different to other studies which exist – and what makes the young people that were the participants in the study so important from other developmental phases in relation to the topic.</p>	<p>important from other developmental phases in relation to the topic.</p> <p>Title changed to: Family Matters: The role of family in adolescent hookah pipe use and satisfaction of BPN</p>
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An Intervention to Reduce Adolescent Hookah Pipe Use and Satisfy BPN: A Modified Delphi Approach (Chapter 9)

From: Cogent Psychology <em@editorialmanager.com>

Date: 2020/05/15 09:01 (GMT+02:00)

To: Zainab Kader <zkader4@gmail.com>

Subject: 202711799 (Cogent Psychology) A revise decision has been made on your submission

Ref: COGENTPSYCHOLOGY-2020-0042

202711799

AN INTERVENTION TO REDUCE ADOLESCENT HOOKAH PIPE USE AND SATISFY BPN: A MODIFIED DELPHI APPROACH

Cogent Psychology

Dear Zainab Kader

Your manuscript entitled "AN INTERVENTION TO REDUCE ADOLESCENT HOOKAH PIPE USE AND SATISFY BPN: A MODIFIED DELPHI APPROACH", which you submitted to Cogent Psychology, has now been reviewed.

The reviews, included at the bottom of the letter, indicate that your manuscript could be suitable for publication following revision. We hope that you will consider these suggestions, and revise your manuscript.

Please submit your revision by Jun 14, 2020, if you need additional time then please contact the Editorial Office.

To submit your revised manuscript please go to <https://rp.cogentoa.com/dashboard/> and log in. You will see an option to Revise alongside your submission record.

If you are unsure how to submit your revision, please contact us on psychology@cogentoa.com

Please ensure that you include the following elements in your revised submission:

- * public interest statement - a description of your paper of NO MORE THAN 150 words suitable for a non-specialist reader, highlighting/explaining anything which will be of interest to the general public (to find out more about how to write a good Public Interest Statement, and how it can benefit your research, you can take a look at this short article: <http://explore.cogentoa.com/author-tool-kit/public-interest-statement>)
- * about the author - a short summary of NO MORE THAN 150 WORDS, detailing either your own or your group's key research activities, including a note on how the research reported in this paper relates to wider projects or issues.

You also have the option of including the following:

- * photo of the author(s), including details of who is in the photograph - please note that we can only publish one photo
- * cover image - you are able to create a cover page for your article by supplying an image for this purpose, or nominating a figure from your article. If you supply a new image, please obtain relevant permissions to reproduce the image if you do not own the copyright.

If you require advice on language editing for your manuscript or assistance with arranging translation, please do consider using the Taylor & Francis Editing Services.

Please ensure that you clearly highlight changes made to your manuscript, as well as submitting a thorough response to reviewers.

We look forward to receiving your revised article.

Best wishes,

Lucia Monacis
Editor
Cogent Psychology

Comments from the Editors and Reviewers:

Title, Abstract and Introduction – overall evaluation
Reviewer 1: Sound with minor or moderate revisions

Methodology / Materials and Methods – overall evaluation
Reviewer 1: Sound with minor or moderate revisions

Objective / Hypothesis – overall evaluation
Reviewer 1: Sound with minor or moderate revisions

Figures and Tables – overall evaluation
Reviewer 1: Sound with minor or moderate revisions

Results / Data Analysis – overall evaluation
Reviewer 1: Sound with minor or moderate revisions

Interpretation / Discussion – overall evaluation
Reviewer 1: Sound with minor or moderate revisions

Conclusions – overall evaluation
Reviewer 1: Sound with minor or moderate revisions

References – overall evaluation
Reviewer 1: Sound with minor or moderate revisions

Compliance with Ethical Standards – overall evaluation
Reviewer 1: Sound

Writing – overall evaluation
Reviewer 1: Sound with minor or moderate revisions

Supplemental Information and Data – overall evaluation
Reviewer 1: Not applicable

Comments to the author

Reviewer 1: Totally the present article is well-established and the subject is interesting, but some major revision should be considered.

- More suitable title should be selected for the article. Title is long and should decrease to 10-12 words.
- The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone.
- The necessity and innovation of the article should be presented to the introduction.
- It is suggested to present the structure of the article at the end of the introduction.
- A flowchart should be added to the article to show the research methodology.
- The major defect of this study is the debate or Argument is not clear stated in the introduction session. Hence, the contribution is weak in this manuscript. I would suggest the author to enhance your theoretical discussion and arrives your debate or argument.
- The questionnaire should be presented in the appendix of the article.
- Literature review is not enough. There some articles, which must be added to literature review:
Kipkorir et al. Gender Perspective on Drivers of Cigarette Smoking: Two Part Model Approach;
Rokach, A. Loneliness in Pre and Post-operative Cancer Patients: A Mini Review;
Moghaddam et al. A Review on the Addictive Materials Paan Masala (Paan Parag) and Nass (Naswar).

- Page 10: the following paragraph is unclear, so please reorganize that:
 “Fifteen people participated in the main workshop. Of which 60% were female and 80% were of coloured race. Participants age ranged from 27-58 years old. Their education levels ranged from completing a diploma to Masters. The participants were from Academia (13.3%), research organisation (6.7%), provincial government (46.7%), local government (6.7%) and NGO’s (26.6%). Number of work experience years ranged from 0-35 years. Experience in substance use ranged from 0-35 years, experience working with adolescents ranged from 0-35 years, experience in intervention development ranged from 0-35 years and experience in SDT ranged from 0-30 years. All participants were from the Western Cape, SA.”
- More suitable title should be selected for the table 4 instead of “Family Prong”.
- Please avoid reference overkill/run-on, i.e. do not use more than 3 references per sentence.
- Sections and sub-sections should be numbered in order.
- Much more explanations and interpretations must be added for the results, which are not enough.
- It is suggested to compare the results of the present research with some similar studies which is done before.
- Please make sure your conclusions' section underscore the scientific value added of your paper, and/or the applicability of your findings/results, as indicated previously. Please revise your conclusion part into more details. Basically, you should enhance your contributions, limitations, underscore the scientific value added of your paper, and/or the applicability of your findings/results and future study in this session.
- DOI of the references must be added (you can use “<https://crossref.org/>”).

Title, Abstract and Introduction – overall evaluation

Reviewer 3: Unsound or fundamentally flawed

Methodology / Materials and Methods – overall evaluation

Reviewer 3: Unsound or fundamentally flawed

Objective / Hypothesis – overall evaluation

Reviewer 3: Sound with minor or moderate revisions

Figures and Tables – overall evaluation

Reviewer 3: Sound with minor or moderate revisions

Results / Data Analysis – overall evaluation

Reviewer 3: Sound with minor or moderate revisions

Interpretation / Discussion – overall evaluation

Reviewer 3: Sound with minor or moderate revisions

Conclusions – overall evaluation

Reviewer 3: Sound

References – overall evaluation

Reviewer 3: Sound with minor or moderate revisions

Compliance with Ethical Standards – overall evaluation

Reviewer 3: Sound

Writing – overall evaluation

Reviewer 3: Sound with minor or moderate revisions

Supplemental Information and Data – overall evaluation

Reviewer 3: Sound with minor or moderate revisions

Comments to the author

Reviewer 3: Dear Author(s),

Below, I mentioned the minor revisions and suggestions with personal viewpoint. I hope it will be potential to contribution to this paper.

1. (Abstract and keywords)

In the Abstract, it is necessary to delete unnecessarily repeated sentences. For example, I found “to reduce adolescent hookah pipe use and satisfy”. And to further understand the overall procedure of method, please add the participants (including specific sample). In addition, about the keywords there were too value in family, school, and community. How about these keywords change “physical/social environment or surrounding environment”?

2. (Method and Results) data collection and procedure

This is a well raised paper about Africa people (adolescence, it is not sure) of exposure to environmental tobacco carving. Specifically, to develop the intervention of this problem, it is meaningful that the author(s) suggested the four pronged approach.

Though, I have some concerns about the analytical procedure and theoretical foundation for organizing the proposed research design (figure in 12 page). In 3 page, let me know the further explanation how you connect SDT motivation theory with current issue (adolescent tobacco use)?

I remain unsure why the participants include non-adolescent to reduce adolescent hookah use. Thus, in my thought, you need to add the rational reasons in the introduction.

In the Stage 2 of table 1 (6 page), as “Age if onset for hookah smoking also ranged from 1-19”, it means use year or start year? Let me know the value “1”.

In table 3, you need to check more appropriate expression of included information. For example, “No of years’ experience (Adolescents)” means experience working with adolescents? And there is 35 about Intervention in 10 column (No. 2), however, as I reviewed in Results section, the range of maximum to minimum values is specified 0-12 years. Additionally, in case of “experience in substance use”, is it right minimum value? Please double-check the values that the author(s) wrote on the table 3 (11 page).

3. (others)

In this paper, there are some that need to be modified within the sentences as followed.

First, the numbers about tables and figures are written differently (e.g., Table 3 from 11 to 12 page).

Second, specify an accurate description of the abbreviations to enhance the legibility of the contents in the text (e.g., RE-AIM in 4 page).

Please, check some mistakes. In citation information as to Livingstone-Banks et al (2019), it doesn’t match with issue number (I checked the information from the DOI).

Dear Authors,

your manuscript is well established and presents valuable results. It could be published with major revisions. You should add more interpretations for the results. Please, see some comments which could be help to improve it.

Good Day

Thank you for reviewing our manuscript. Please see responses to the reviewer’s comments below:

GENERAL	
REVIEWER COMMENTS	AUTHOR RESPONSES
* PUBLIC INTEREST STATEMENT - a description of your paper of NO MORE THAN 150 words suitable for a non-specialist reader, highlighting/explaining anything which will be of interest to the general public (to find about more	Public interest statement has been added Adolescent hookah pipe smoking is harmful and a growing public health concern. According to Self Determination Theory (SDT), adolescents are motivated to pursue behaviours that fulfil their

<p>about how to write a good Public Interest Statement, and how it can benefit your research, you can take a look at this short article: http://explore.cogentia.com/author-tool-kit/public-interest-statement)</p>	<p>needs of autonomy, competence and relatedness. Sometimes, smoking the hookah pipe is used as a way to cope when these needs are not met. The aim of this study was to design an intervention to reduce adolescent hookah pipe use and satisfy their BPN. The design of the intervention required the researchers to co-create an intervention with stakeholders that had expert knowledge and skills. A four pronged intervention focusing on the adolescent, their family, school and community was designed. This intervention is valuable because it can raise awareness, contribute to healthy physical and mental development of adolescents, and because it incorporates the school, family and the community so that adolescents are supported at all these levels.</p>
<p>ABOUT THE AUTHOR - a short summary of NO MORE THAN 150 WORDS, detailing either your own or your group's key research activities, including a note on how the research reported in this paper relates to wider projects or issues.</p>	<p>Details about the first/corresponding Zainab Kader is a Registered Counsellor with the Health Professions Council of SA and PhD Candidate at the University of the Western Cape. Zainab completed her BPsych in 2012 where she was awarded the Deans Merit Award. She obtained her MA in Child and Family Studies in 2015 where she was also awarded the Deans Merit Award. Zainab has published research locally and internationally focusing on family conflict and SDT, behavioural interventions and systematic reviews related to hookah pipe smoking. Zainab has research and practical experience working with children, adolescents and adults in resource constrained environments who are exposed to an array of social ills. Her work focuses on designing and implementing interventions. Furthermore, she is a supervisor for students pursuing their Post Graduate Diploma in Child and Family Studies and she is practicing as a Registered Counsellor focusing on trauma at the local municipality.</p>
<p>PHOTO OF THE AUTHOR(s), including details of who is in the photograph - please note that we can only publish one photo</p>	<p>Inserted</p>
<p>REVIEWER ONE</p>	
<p>Totally the present article is well-established and the subject is interesting</p>	<p>Thank you for your kind words and reviewing our article</p>
<p>More suitable title should be selected for the article. Title is long and should decrease to 10-12 words.</p>	<p>Original title: An intervention to reduce adolescent hookah pipe use and satisfy BPN: A modified Delphi approach</p> <p>More suitable title: Intervention to reduce adolescent hookah pipe use and satisfy BPN</p>
<p>The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone.</p>	<p>Reworked the abstract to clearly state the purpose, principle results and major conclusion</p>
<p>The necessity and innovation of the article should be presented to the introduction.</p>	<p>The necessity and innovation of the article has been presented in the introduction. The following paragraph has been added on Page 6.</p> <p>This paper is deemed necessary and innovative because it addresses a health hazard in a way that</p>

	<p>has not been done before. Traditional tobacco cessation interventions and existing hookah pipe interventions provide brief interventions focusing only on the user (Kader et al., 2019), this study is interested in the different factors and environments influencing adolescent hookah pipe use.</p> <p>Furthermore, it studies hookah pipe use from a SDT needs perspective because the experience of needs satisfaction and needs frustration serves as a motivating factor to pursue behaviours (or not pursue behaviours) such as hookah pipe use. This article incorporates ideas from literature, adolescents and stakeholders with expert knowledge and experience through the modified Delphi approach methodology.</p>
<p>It is suggested to present the structure of the article at the end of the introduction</p>	<p>The structure of the article has been presented at the end of the introduction. This is the paragraph that was inserted.</p> <p>A comprehensive background emphasising the importance of intervening in adolescent hookah pipe use from a SDT perspective has been provided. This is followed by describing the methodology of how the intervention was developed and how stakeholders were consulted. Thereafter, the intervention and the feedback from the stakeholders are presented. Lastly, this article provides a discussion about the intervention and highlights the limitations and recommendations for future studies.</p>
<p>A flowchart should be added to the article to show the research methodology</p>	<p>Flow chart inserted</p>
<p>The major defect of this study is the debate or Argument is not clear stated in the introduction session. Hence, the contribution is weak in this manuscript. I would suggest the author to enhance your theoretical discussion and arrives your debate or argument</p>	<p>Since the aim of the paper was to describe the intervention, the authors have focused on how SDT is used in the development of this intervention and not have a theoretical debate on its own. The authors have added a paragraph focusing on how SDT connects to adolescent hookah pipe use. The following paragraph has been added.</p> <p>Since the aim of the paper was to describe the intervention, the authors have focused on how SDT is used in the development of this intervention and not have a theoretical debate on its own. SDT connects to adolescent hookah pipe use because it allows for the internal exploration of why adolescents smoke the hookah pipe that extends beyond the common reasons that are recognized as determinants of adolescents' hookah pipe use such as sweet smell, escape boredom, relaxation etc. (Pashaeypoor et al., 2019). SDT is interested in the psychological motivators of the behaviour. It is hypothesized that adolescents are motivated to smoke the hookah pipe in an attempt to satisfy their BPN. Smoking the hookah pipe allows adolescents to experience autonomy by believing that they are choosing to smoke, competence because they may experience a sense of mastery when they are able to perform tricks with the smoke and relatedness by experiencing social connections when they are spending time with their friends while smoking. Moreover, the school, community and family</p>

	<p>environment, which is regarded as important in SDT, has an influencing role in adolescent hookah pipe use as it may condone or condemn the behaviour and satisfy or thwart need satisfaction (Ryan & Deci, 2017). When needs are not satisfied in these contexts, adolescent may be geared towards seeking needs fulfilment elsewhere, for example, through hookah pipe smoking. These factors are typically not considered when intervening in hookah pipe use because the focus is mainly on providing education programmes about the harm of smoking and/or adapting tobacco smoking cessation interventions to address hookah pipe use (Kader et al., 2019;). This is not sufficient because smoking the hookah pipe a different experience compared to cigarette smoking because of its social element (Siddiqi, 2018). Therefore, the desire to intervene from an SDT perspective is novel.</p>
<p>The questionnaire should be presented in the appendix of the article.</p>	<p>The following appendices have been added: Appendix A: Quantitative Questionnaire Appendix B: Qualitative Interview Schedule Appendix C: Delphi Workshop Participant Demographic Details Form</p>
<p>Literature review is not enough. There some articles, which must be added to literature review: Kipkorir et al. Gender Perspective on Drivers of Cigarette Smoking: Two Part Model Approach; Rokach, A. Loneliness in Pre and Post-operative Cancer Patients: A Mini Review; Moghaddam et al. A Review on the Addictive Materials Paan Masala (Paan Parag) and Nass (Naswar).</p>	<p>Thank you for the articles, they were very interesting. I have included and cited them in the literature review</p> <p>Kipkorir et al – included in page 3 Since the rise of tobacco use is common amongst males and females, tax adjustments, smoking rules and price hikes of tobacco could deter males and females from smoking (Kipkorir, Ngeno & Serem, 2019). Income status is an important consideration for tobacco smoking since the majority of the world’s smokers (81%), are in low-and middle-income countries (Cambron, Kosterman & Hawkins, 2018). This is evident in where Kenya, Kipkorir et al., (2019) highlights that approximately 6000 Kenyans die of tobacco-related diseases, while more than 220 000 children continue to smoke each day where smokers.</p> <p>Rokach – included in page 3 Smoking can be attributed to increased poverty and social ills, adjusting or coping with serious illnesses, diagnoses of depression and anxiety disorders as well as smoking-specific work and family contexts (Cambron, Kosterman & Hawkins, 2018; Rokach, 2019).</p> <p>Moghaddam et al in page 1 Hookah pipe smoking exposes adolescents to nicotine, which is addictive and dangerous because it causes a rapid release of adrenaline from the cortex of adrenal glands. This release causes concerning symptoms such as shortness of breath as well as increased blood pressure, heart rate and blood sugar levels. Symptoms of nicotine toxicity could also cause nausea, sweating, diarrhoea, difficulty breathing and abdominal pain (Moghaddam et al.,2019).</p>
<p>Page 10: the following paragraph is unclear, so please reorganize that:</p>	<p>Rephrased</p>

<p>“Fifteen people participated in the main workshop. Of which 60% were female and 80% were of coloured race. Participants age ranged from 27-58 years old. Their education levels ranged from completing a diploma to Masters. The participants were from Academia (13.3%), research organisation (6.7%), provincial government (46.7%), local government (6.7%) and NGO’s (26.6%). Number of work experience years ranged from 0-35 years. Experience in substance use ranged from 0-35 years, experience working with adolescents ranged from 0-35 years, experience in intervention development ranged from 0-35 years and experience in SDT ranged from 0-30 years. All participants were from the Western Cape, SA.”</p>	<p>Fifteen people participated in the main workshop. The majority of the participants were female (60%). Eighty percent of the participants were of coloured race (also referred to as mixed race). The participants ages ranged from 27-58 years old. All participants indicated having tertiary education ranging from a diploma to a Master’s degree. The participants were representatives from academia (13.3%), research organisations (6.7%), provincial government (46.7%), local government (6.7%) and Non Profit Organisations (26.6%). Participants varied in terms of total years of work experience, they reported between 0-35 years’ work experience. Their experience in substance abuse management ranged from 0-35 years, their experience working with adolescents ranged from 0-35 years, their experience in intervention development ranged from 0-35 years and their experience in SDT ranged from 0-30 years. All participants were from the Western Cape, SA.</p>
<p>More suitable title should be selected for the table 4 instead of “Family Prong”.</p>	<p>Table 4 relabelled to Intervention for the family members of hookah pipe users</p>
<p>Please avoid reference overkill/run-on, i.e. do not use more than 3 references per sentence.</p>	<p>We removed references in excess of 3 references per sentence</p>
<p>Sections and sub-sections should be numbered in order.</p>	<p>Sections and sub-sections have been numbered</p>
<p>Much more explanations and interpretations must be added for the results, which are not enough.</p>	<p>We have added more explanations, interpretations and compared the results with present research.</p>
<p>It is suggested to compare the results of the present research with some similar studies which is done before.</p>	<p>This has been highlighted in yellow in the results section of the article.</p>
<p>Please make sure your conclusions' section underscore the scientific value added of your paper, and/or the applicability of your findings/results, as indicated previously. Please revise your conclusion part into more details. Basically, you should enhance your contributions, limitations, underscore the scientific value added of your paper, and/or the applicability of your findings/results and future study in this session.</p>	<p>We have revised the contribution section (last paragraph of the discussion), limitations, future research and conclusion section in text.</p>
<p>DOI of the references must be added (you can use “https://crossref.org/”).</p>	<p>DOI’s have been added</p>
<p>REVIEWER THREE</p>	
<p><u>(Abstract and keywords)</u> In the Abstract, it is necessary to delete unnecessarily repeated sentences. For example, I found “to reduce adolescent hookah pipe use and satisfy”. And to further understand the overall procedure of method, please add the participants (including specific sample). In addition, about the keywords there were too value in family, school, and community. How about these keywords change “physical/social environment or surrounding environment”?</p>	<p>Deleted in last sentence: “to reduce adolescent hookah pipe use and satisfy”</p> <p>Added to clearly indicate specific sample: Phase 2 was the development of the intervention in collaboration with stakeholders from academia, policy and practice (n=25). The stakeholders formed the sample for this study.</p> <p>Keywords edited to include: family environment, physical/social environment</p>
<p><u>(Method and Results) data collection and procedure</u> This is a well raised paper about Africa people (adolescence, it is not sure) of exposure to environmental tobacco carving. Specifically, to develop the intervention of this problem, it is</p>	<p>Thank you for reviewing our paper and considering it meaningful</p>

<p>meaningful that the author(s) suggested the four pronged approach.</p>	
<p>Though, I have some concerns about the analytical procedure and theoretical foundation for organizing the proposed research design (figure in 12 page).</p>	<p>More details have been provided about how we derived at the proposed research design (figure) on page 15. Please see paragraph below</p> <p>The four prongs were established by consolidating the results from phase one, consulting with expert stakeholders in phase two and considering the theoretical underpinning of SDT. The results from both phases of the study indicated that the intervention should not only focus on the adolescents and that there is a need for the family be included in the intervention because families can deter hookah pipe use and contribute to needs satisfaction or frustration. SDT emphasises that the environment, such as school and community is integral in encouraging or discouraging behaviours and can contribute to need satisfaction and frustration. Having an afterschool and weekend programme allows for needs to be satisfied because adolescents can choose to which activities interest them (autonomy), they can experience a sense of accomplishment when doing well in their selected activity (competence) and they can experience a bond with their peers at the afterschool and weekend programme (relatedness). This will not only encourage need satisfaction but it will also keep adolescents occupied so that they will not be bored or feel the need to resort to hookah pipe smoking.</p>
<p>In 3 page, let me know the further explanation how you connect SDT motivation theory with current issue (adolescent tobacco use)?</p>	<p>The authors have added a paragraph focusing on how SDT connects to adolescent hookah pipe use. The following paragraph has been added.</p> <p>SDT allows for the internal exploration of why adolescents smoke the hookah pipe that extends beyond the common reasons that are recognized as determinants of adolescents hookah pipe use such as sweet smell, escape boredom, relaxation etc. (Pashaeypoor et al., 2019). SDT is interested in the psychological motivators of the behaviour. It is hypothesized that adolescents are motivated to smoke the hookah pipe in an attempt to satisfy their BPN. Smoking the hookah pipe allows adolescents to experience autonomy by believing that they are choosing to smoke, competence because they may experience a sense of mastery when they are able to perform tricks with the smoke and relatedness by experiencing social connections when they are spending time with their friends while smoking. Moreover, the school, community and family environment, which is regarded as important in SDT, has an influencing role in adolescent hookah pipe use as it may condone or condemn the behaviour and satisfy or thwart need satisfaction (Ryan & Deci, 2017). When needs are not satisfied in these contexts, adolescent may be geared towards seeking needs fulfilment elsewhere, for example, through hookah pipe smoking. These factors are typically not considered when intervening in</p>

	hookah pipe use because the focus is mainly on providing education programmes about the harm of smoking and/or adapting tobacco smoking cessation interventions to address hookah pipe use (Kader et al., 2019). This is not sufficient because smoking the hookah pipe a different experience compared to cigarette smoking because of its social element (Siddiqi, 2018). Therefore, the desire to intervene from an SDT perspective is novel.
I remain unsure why the participants include non-adolescent to reduce adolescent hookah use. Thus, in my thought, you need to add the rational reasons in the introduction.	The following explanation was inserted in the article explaining why the participants include non-adolescents to reduce adolescent hookah use In an attempt to design an intervention that reduces hookah pipe use and satisfies BPN, literature and adolescents were consulted as a first phase. Thereafter, in phase two, a planning group including stakeholders from the academic, policy and practice landscape with vast knowledge and experience was established. It was deemed valuable to gain input from an expert panel regarding the subject matter in order to incorporate first hand experiences, be cognisant about existing strategies to address the problem and to gain the necessary critique to improve the initial ideas.
In the Stage 2 of table 1 (6 page), as “Age if onset for hookah smoking also ranged from 1-19”, it means use year or start year? Let me know the value “1”.	Clarified in text Age of onset for hookah smoking also ranged from 1 years old -19 years old but the mean age was 13.25. It means participant indicated that he/she started smoking at age 1. Whilst this may seem strange and is only a minority, a similar finding was found in a previous qualitative study where a participant indicated that her nephew is age 2 and “smokes”. This is a result of watching older family members smoke.
In table 3, you need to check more appropriate expression of included information. For example, “No of years’ experience (Adolescents)” means experience working with adolescents? And there is 35 about Intervention in 10 columns (No. 2), however, as I reviewed in Results section, the range of maximum to minimum values is specified 0-12 years. Additionally, in case of “experience in substance use”, is it right minimum value? Please double-check the values that the author(s) wrote on the table 3 (11 page).	Table headings changed to Working with substance use/Hookah Pipe Working with adolescents Planning, developing, implementing, monitoring or evaluating interventions the 35 is indicated in Table 3 explanations. 0-12 years was for Table 2 explanation Yes, the numbers are correct, I double checked it against the raw data
In this paper, there are some that need to be modified within the sentences as followed. First, the numbers about tables and figures are written differently (e.g., Table 3 from 11 to 12 page).	We have made edits in text (highlighted in yellow) so that the table/figure identification is clearer. We are 100% about what the reviewer is saying/asking
Second, specify an accurate description of the abbreviations to enhance the legibility of the contents in the text (e.g., RE-AIM in 4 page).	Sentence added: The RE-AIM framework focusses on addressing reach, efficacy, adoption, implementation and maintenance of interventions.
Please, check some mistakes. In citation information as to Livingstone-Banks et al (2019), it doesn’t match with issue number (I checked the information from the DOI).	Edited according to recommended citation

From: Cherry Roque <em@editorialmanager.com>
Date: 2020/06/04 20:29 (GMT+02:00)
To: Zainab Kader <zkader4@gmail.com>
Subject: Cogent Psychology | Query concerning your accepted manuscript 202711799

Dear Dr Zainab Kader,

Congratulations on the acceptance of your manuscript by Cogent Psychology.

Unfortunately, the publication of your article is currently being delayed because of the following issues:

- please could you supply the clean editable source files(without highlights and track changes) for your main document and biography – this will be the word/latex/notepad file that you used to create your manuscript.

I have removed the highlighting

- the public interest statement must be no more than 165 words. Please could you edit this and resupply it to me.

The public interest statement is 145 words

- the about the author text must be no more than 165 words. Please could you edit this and resupply it to me.

The public interest statement is 146 words

- Updated appendix ABC (without track changes)

I have removed the highlighting

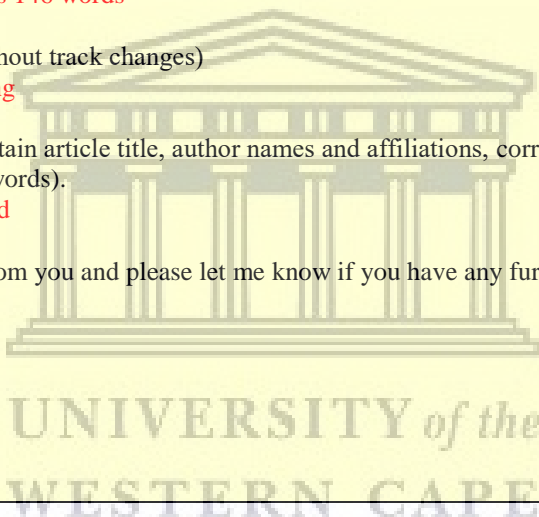
- Updated title page (must contain article title, author names and affiliations, corresponding author information, abstract and keywords).

The title page has been updated

We look forward to hearing from you and please let me know if you have any further queries.

Best wishes,

Ricks Dalida
On behalf Cherry Roque
Administrator
Cogent Psychology



Appendix 19: Editors Certificate

Lee-Anne Roux

PROFESSIONAL EDITING SERVICES

BTH (Honors) Practical Theology UNISA 2006 • BA Honors (Psychology) UNISA 2009 • MTH (Practical Theology) Stellenbosch University 2013
PHD (Practical Theology) Stellenbosch University 2019

13 September 2020

TO WHOM IT MAY CONCERN

RE: LANGUAGE EDITING

This letter serves to confirm that I have edited the thesis titled:

**AN INTERVENTION TO REDUCE ADOLESCENT HOOKAH PIPE USE
AND SATISFY THEIR BASIC PSYCHOLOGICAL NEEDS**

By

Zainab Kader

Student Number: 2930198

(excluding Chapters 5 and 9 – as these have already been published)

Please feel free to contact me if you need any further information.

Yours sincerely,

Dr Lee-Anne Roux

Email: leeanneroux@gmail.com OR leeanne@proof-reading.co.za

Cell: 082 825 7325

www.proof-reading.co.za