

**HOOKAH PIPE USE: COMPARING MALE AND FEMALE UNIVERSITY  
STUDENTS' KNOWLEDGE, RISK PERCEPTIONS AND BEHAVIOURS**

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## LIST OF ACRONYMS

ALA	American Lung Association
CO	Carbon monoxide
COHb	Carboxyhaemoglobin
LPG	Liquid petroleum gas
PAHs	Polycyclic aromatic hydrocarbons
SHS	Second – hand tobacco smoke
TobReg	Tobacco Product Regulation
WHO	World Health Organization



## ABSTRACT

Hookah pipe use is widely viewed as a safe alternative to cigarette smoking rather than a potential health-risk. In fact, for young people hookah pipe use may represent an initial stage of later addiction and the transition to cigarette smoking. Furthermore, studies conducted abroad, suggest that the use of the hookah pipe firstly started as a cultural phenomenon, and secondly, as with cigarette smoking, the hookah pipe has become a social phenomenon. Despite these challenges, studies provide sufficient evidence that hookah pipe use is a potential health risk. The primary aim of the study was to compare male and female university students' knowledge, risk perceptions and behaviours concerning hookah pipe smoking. A quantitative methodological approach, with a cross-sectional design, was used to conduct the research study. A final self-selected sample of 389 participants voluntarily participated in this study. The final sample included 64% females and 36% males with a mean age of 22.2 years; with the mean age for first-time hookah pipe smoking was 15.7 years. The instrument used was a self-administered questionnaire constructed from The College Health Behavior Survey (2010-2011) which was developed at the University of Missouri-Columbia. Descriptive quantitative results were conducted using Statistical Package for Social Sciences (SPSS version 20) and presented. The results suggest 70% of hookah pipe users daily smoke the hookah pipe with more than 20% smoking on campus. This was similar for males and females. Users perceived the hookah pipe to be less harmful and less addictive than cigarette smoking. Furthermore, smoking the hookah pipe is considered socially acceptable and is also smoked in the family home. Implications for policy are stated.

## **KEYWORDS**

### **Hookah pipe**

A hookah or waterpipe is a single or multi stemmed instrument for smoking tobacco in which the smoke is cooled and filtered by passing through water (WHO, 2005).

### **Nicotine**

An alkaloid (antitrogen containing chemical) made by the tobacco plant or produced synthetically (Spear & Miyauchi, 2005).

### **Smoking session**

The hookah pipe smoking session is the length of time taken to smoke the hookah pipe (Shihadeh & Saleh, 2005).

### **Passive smoking**

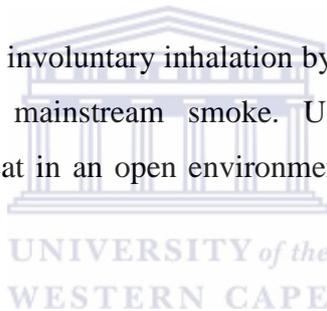
Passive smoking is defined as the involuntary inhalation by a nonsmoker of a combination of diluted sidestream smoke and mainstream smoke. Usually this occurs in a closed environment, but it can be a threat in an open environment as well (Knishkowsky & Amitai, 2004).

### **Addiction**

“Addiction may be defined as a process whereby a behavior, that can function both to produce pleasure and to provide relief from internal discomfort, is employed in a pattern characterized by (1) recurrent failure to control the behavior (powerlessness) and (2) continuation of the behavior despite significant negative consequences unmanageability)” (Goodman, A, 1990).

### **Observational Learning Theory**

The observational learning theory suggests that an individual can obtain behaviours by simply watching them perform (Bandura & Walters, 1963).



## DECLARATION

I declare that *Hookah pipe use: comparing male and female students' knowledge, risk perceptions and behaviours concerning hookah pipe use* is my own work, that it has not been submitted before for any degree or examination at any other university, and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

*Signed:* .....

*Karin Elizabeth Daniels*



*November 2012*

## **DEDICATION**

**This thesis is dedicated to my Creator**

**“The things which are impossible  
with men are possible with God”**

**(Luke, 18:27)**



## ACKNOWLEDGEMENTS

All honour, thanks and praise to God, my Creator, who has given me the health, strength and ability to complete this journey, and those whom He has appointed to instruct me.

I would like to acknowledge all those who have gone the extra mile on my behalf. Among those are the lecturers at the university allocated to help me, all participants who volunteered for this research study, my family, friends and my spiritual leaders.

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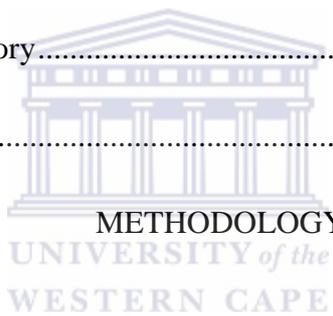
- My siblings, Vincent, Constance, Samuel, Japtha, Jonathan, Estelle and Dawn. I am blessed to have you and I cannot imagine life without siblings like you. Thank you for your advice and support through tears of frustration. Thank you for always managing to put a smile on my face, making me laugh and always applauding my achievements.
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# CHAPTER 1

## INTRODUCTION

### 1.1 Background and rationale

Tobacco use is one of the leading causes of death and has also been linked to different cancers (Knishkowsky & Amitai, 2005). Research studies done by Maziak, Ward and Eissenberg (2007) show flavoured tobacco, another form of tobacco use, has become popular amongst young people by the way of a very old, but yet a very modern smoking device, the hookah pipe or the water pipe, known by many individuals globally as argileh, goza, shisha, or hubble-bubble. Although cigarette smoking is the most common form of tobacco consuming products, hookah pipe smoking is becoming increasingly popular in many parts of the world and is characterized by the passing of tobacco smoke through water prior to inhalation (World Health Organisation (WHO), 2005).

According to the WHO (2005), hookah pipe smoking originated nearly four centuries ago, in the Eastern Mediterranean and Arabic counties but was outdated, until its re-emergence in the 1980s. The tobacco used to smoke the hookah pipe did not have any additives, but "Ma'ssell" was currently introduced, which is a mixture of tobacco, molasses, consists of a flavoured or fruit extract (Tamin, Al-Sahab, Akkary, Ghanem, Tamim, El - Roueiheb, Kanj, Afifi, Tamim, Al - Shab, 2007). A factor contributing to the dramatic spread of hookah pipe use, is the smell of flavoured tobacco smoke used in smoking hookah (Smith-Simone, Maziak, Ward & Eissenberg, 2008). According to the American Lung Association (2007) there are a wide variety of flavours, such as apple, blackberry, cappuccino and mint, which provide smokers with a pleasant smoking experience, because of the sweet smell and smooth taste of the sweetened tobacco. However, according to WHO (2008) tobacco consumption contributes to

5.4 million deaths globally, and an expected rise of more than 8 million deaths a year by 2030. Studies done by Groenewald, Vos, Norman, Laubscher, van Walbeek, Salojee and Sitas (2007) show the use of tobacco is a leading cause of death in South Africa. According to Groenewald et al., (2007) tobacco smoking causes approximately 41,632 to 46,656 deaths annually in South Africa, followed by hypertension, unsafe sex practices and sexually transmitted infection, with tobacco smoking ranked third highest. Furthermore, according to Groenewald et al., (2007) and World Bank (1999) with the current pattern of tobacco smoking, an estimated 500 million people alive today will die of tobacco use, with more than half of this population being teenagers and children. Similarly, these findings show that approximately seven out of every ten people living in low and middle-income nations will die by 2020 due to smoking, with more than 80% of tobacco deaths in developing countries, by the year 2030 (Mackay & Eriksen, 2002; World Bank, 1999).

Research suggests that the perception that hookah pipe smoking is not harmful is because of lack of knowledge and the belief that smoke gets filtered in the water, and there is no clarity whether this belief is global, or different according to demographic and population characteristics (Ward, Weg, Relyea, Debon & Klesges 2006; Shihadeh, Azar, Antonios & Haddad, 2004; Primack, Sidani, Agarwal, Shadel, Donny & Eissenberg, 2008; Jackson & Aveyard, 2008; Kiter, Ucan, Ceylan & Kilinc, 2000). Second-hand smoke (SHS) from hookah pipe tobacco use produces a similar level of air pollutants as cigarettes and poses a serious health risk to those exposed (WHO, 2007).

A study conducted on the prevalence of hookah pipe smoking amongst secondary school students, in a disadvantaged community in Johannesburg, South Africa, reported that sixty percent (60%) of study participants use the hookah pipe including twenty percent (20%) of participants that smoke hookah pipe daily (Combrink, Irwin, Laudin, Naidoo, Plageron &

Mathee, 2010). However, studies done by Theron, Schultz, Ker and Falzone (2010), in Pretoria, South Africa, concerning carboxyhaemoglobin (COHb) levels in hookah pipe and cigarette smokers, show during a single hookah pipe session, that hookah pipe smokers have a significantly higher increase in blood COHb levels than those who smoke cigarettes.

During the last 49 years of research, nearly 4,800 chemical compounds have been identified in cigarette smoking, including 69 carcinogens, several of which are tumour promoters or co-carcinogens (Sajid, Akhter, & Malik, 1993; Shihadeh & Saleh 2005). Research shows further, that health professionals and researchers are concerned about hookah pipe smoking amongst youth (Spear & Miyauchi 2005). Although multiple health risks have been associated with this type of tobacco use research reporting of health effects of hookah pipe smoking is limited (Noonan & Kulbok, 2008).

Research by Sajid, Akhter, and Malik, (1993); Shihadeh and Saleh (2005) shows that hookah pipe smoke contain high levels of toxic compounds, including carbon monoxide, heavy metals, and cancer-causing chemicals. These include carbon monoxide (CO), “tar” and myriad carcinogenic polycyclic aromatic hydrocarbons (PAH) (Sajid, Akhter, & Malik, 1993; Shihadeh & Saleh 2005). Studies furthermore indicate that hookah smoke contains significantly higher quantities of toxic heavy metals like arsenic, nickel, cobalt, chromium, lead and so on as compared with cigarette smoke (Shahadeh, & Saleh, 2005). The results of chemical data research on selected constituents of hookah smoking, as compared with those of mainstream cigarette smoke, indicate that hookah smoke of various fruity flavours, tastes, and aromas may be more harmful than disease causing cigarette tobacco smoke (Maziak, Ward, Afifi Soweid, & Eissenberg, 2004).

The first tobacco law in South Africa (Act 83, 1993) was implemented in 1995 with health warnings on packets, regulated smoking in public places, prohibited tobacco sales to those

younger than 16 years and some regulated advertising. Although the South African government has implemented legislative action in discouraging tobacco use by increasing taxation and banning of advertising, tobacco consumption still remains a public health concern (Groenewaldt et al., 2007). The South African Tobacco Control policy does not include hookah pipe smoking, prohibiting hookah pipe smoking in public places and indoor places, prohibiting tobacco sales to those younger than 16 years or increasing taxation on hookah pipe tobacco, as in the case of cigarette tobacco use. Internationally there is a widespread belief that to smoke the hookah pipe is relatively safe (Shahadeh & Saleh, 2005). Clearly, smoking the hookah pipe may not necessarily be considered a health risk in South Africa. Thus young people may not necessarily be aware of the health risks of smoking the hookah pipe. The purpose of this study was therefore to compare male and female university students' knowledge, risk perceptions and behaviours concerning hookah pipe smoking.

## **1.2 Theoretical Framework**

The study is guided by the Observational Learning Theory proposed by Albert Bandura (1969) that suggests that an individual can obtain behaviours by simply watching them being performed by another person. Social learning theorists, Bandura (1969) and Bandura and Walters (1963), conducted several experiments which demonstrate that both adult and child can learn behaviour through observational learning. For example, when a child sees an adult behaving aggressively towards a doll, they can describe or imitate the behaviour spontaneously or on request at a later stage when they have the opportunity. Further studies conducted by Cook, Hodes and Lang (1986), found when monkeys watched other monkeys respond with fear to an unfamiliar object, they learned to respond in a similar way.

The process of learning is thus by observing models and later imitating them. According to Spiegler (1983), observational learning can have four possible effects on the observers. For

example: (1) New behaviours can be acquired by watching a model (2) A model may serve to elicit particular behaviours providing observers with cues to engage in the behaviours (3) Behaviours that are inhibited because of anxiety or other negative reactions may be performed after they are observed (4) Behaviour may become inhibited in the observer if the model's similar behaviour resulted in aversive consequences. In relation to the current study, the observer needs to be able to follow or imitate the process used by the individual that smokes the hookah pipe. Observational learning theory is used in this study because the theory describes how a participant accomplishes new behaviours by means of observing and imitating another person.

### **1.3 Problem Statement**

Studies suggest that the use of the hookah pipe started as a cultural phenomenon (WHO, 2005). Today the use of the hookah pipe has become a social phenomenon as with cigarette smoking. The studies conducted with the hookah pipe use, were mainly focused on the prevalence and health risks of the hookah pipe (Knishkowsky & Amitai, 2005). Despite these challenges, studies conducted abroad provide sufficient evidence that using the hookah pipe is a health risk (Chaouachi, 2006; Hadidi & Mohammed, 2004). In South Africa, studies concerning hookah pipe use are under-researched. A study conducted by Combrink, et al (2010) in South Africa, concerning prevalence of hookah pipe smoking amongst school children, indicates that 60% of the participants were smoking the hookah pipe. These statistics are concerning, since there seems to be a lack of knowledge and awareness of the health risks of using the hookah pipe. If school children are unclear as to the health risks involved in smoking the hookah pipe, could the same be said for students? The purpose of this study was therefore to compare male and female university students' from different race

and religion, knowledge, risk perceptions and behaviours of hookah pipe use at the University in the Western Cape.

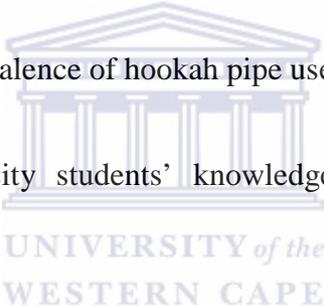
## **1.4 Aim and objectives of the study**

### **1.4.1 Aim of the study**

This study aims to compare the knowledge, risk perceptions and behaviours of male and female university students using the hookah pipe.

### **1.4.2 Objectives**

The objectives of the study were to:

- 
- Determine the prevalence of hookah pipe use by university students;
  - Determine university students' knowledge and perceptions of using the hookah pipe;
  - Compare male and female university students' knowledge, perceptions and behaviours of using the hookah pipe

## **1.5 Research questions**

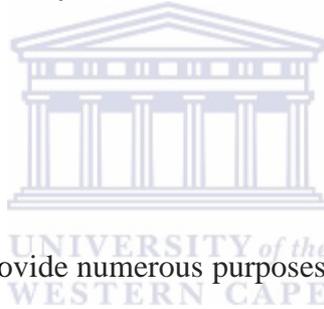
- What are university students' knowledge and risk perceptions of using the hookah pipe?
- How prevalent is the use of the hookah pipe amongst university students?
- Do male and female university students differ in their knowledge, risk perceptions and behaviours in using the hookah pipe?

## **1.6 Methodology**

A quantitative methodological approach was used for the study. A quantitative paradigm is a quantification of constructs, whereby the quantitative researcher believes that the best or only way of measuring the properties of phenomena (for example the attitudes of the individuals towards a certain topic), is the quantitative measurement (Babbie & Mouton, 2009: 49). According to Bless, Higson-Smith and Kagee (2006), a quantitative design would require statistical descriptions and inferences and would try to prove or disprove hypotheses for resultant relationships between the variables of the study. In this study, the quantitative methods were used to describe the knowledge and risk perceptions and behaviours of the use of the hookah pipe amongst university students. This study therefore used a cross-sectional comparative research design.

## **1.7 Significance of the study**

Insights gained from this study provide numerous purposes and anticipates contributing to the decrease of hookah pipe use in several of ways, such as education about the harmfulness of smoking hookahs, and policies to limit its use should be implemented to prevent the spread of this new form of tobacco use. The further nature of this study is to support a greater understanding of the interacting risk factors and the consequences that it has on the well-being and/or health of the individual. The study contributes to the intensity of the contemporary knowledge of hookah pipe use by youth and young adults. If this risk factor is identified, the focus would be on preventive procedures, and findings could be helpful to guide suitable questions for surveys and questionnaires in conducting future quantitative research.



## **1.8 Definitions of terms**

Some regularly used terms and phrases will be defined for the purpose of this study.

### **Hookah pipe**

A hookah or waterpipe is a single or multi stemmed instrument for smoking tobacco in which the smoke is cooled and filtered by passing through water (WHO, 2005).

### **Nicotine**

An alkaloid (antitrogen containing chemical) made by the tobacco plant or produced synthetically (Spear & Miyauchi, 2005).

### **Smoking session**

The hookah pipe smoking session is the length of time taken to smoke the hookah pipe (Shihadeh & Saleh, 2005).



### **Passive Smoking**

Passive smoking is defined as the involuntary inhalation by a non-smoker of a combination of diluted side stream smoke and mainstream smoke. Usually this occurs in a closed environment, but it can be a threat in an open environment as well (Knishkowsky & Amitai, 2004).

### **Addiction**

“Addiction may be defined as a process whereby a behaviour, that can function both to produce pleasure and to provide relief from internal discomfort, is employed in a pattern characterized by (1) recurrent failure to control the behaviour (powerlessness) and (2)

continuation of the behaviour despite significant negative consequences unmanageability)” (Goodman, A,1990).

## **Observational Learning Theory**

The observational theory suggests that an individual can obtain behaviours by simply watching them being performed (Bandura & Walters, 1963).

## **Health Risks**

A disease precursor associated with a higher than average morbidity rate. Disease precursors include demographic variables, certain individual behaviours, familial and individual histories and certain physiologic changes.

## **1.9 Layout of the thesis**

### **Chapter 1: Introduction**

In this introductory chapter, the context of this study was introduced, along with the motivation and the aim of the study, background, rationale and theoretical framework of the study. The objectives that were formulated from the research problem are introduced in this chapter.

### **Chapter 2: Literature review**

Relevant literature concerning the historical context of hookah pipe smoking, disease and illness, addiction risks, second-hand smoke, knowledge and perceptions, myths, social influences, chemical compounds, international and national prevalence and the South African legislation framework concerning tobacco and hookah pipe smoking, is presented in this chapter. This chapter then concludes with the theoretical framework.



### **Chapter 3: Methodology**

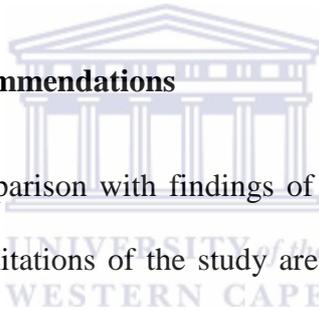
This chapter outlines the research methodology of the study including the procedures that contribute to the findings in the following chapter. In this chapter, the data collection, instrument used, study measure sampling, the data analysis, and the discussion of ethical considerations are presented.

### **Chapter 4: Results**

This chapter provides the results of statistical analyses, including the reliability and validity of measuring instruments. Descriptive quantitative results are analysed using Statistical Package for Social Science (SPSS version 20) and presented.

### **Chapter 5: Discussion and recommendations**

The results of the study, in comparison with findings of previous studies, are discussed in detail. The shortcomings and limitations of the study are examined as well as implications and recommendations for future research.



## CHAPTER 2

### REVIEW OF THE LITERATURE

#### 2.1 Introduction

In this chapter the relevant literature pertaining to pertinent issues under investigation in the study will be presented. The historical context of hookah pipe smoking is outlined as well as the definitions of relevant terminology. Research studies are discussed in relation to topics including knowledge, attitudes, and beliefs concerning hookah pipe smoking. Following this, the theoretical framework is explored in this chapter. For simplicity of reading, within this report ‘narghile’, ‘shisa’, ‘hubbly-bubbly’, ‘goza’ and ‘waterpipes’ are synonyms referring to the hookah pipe.

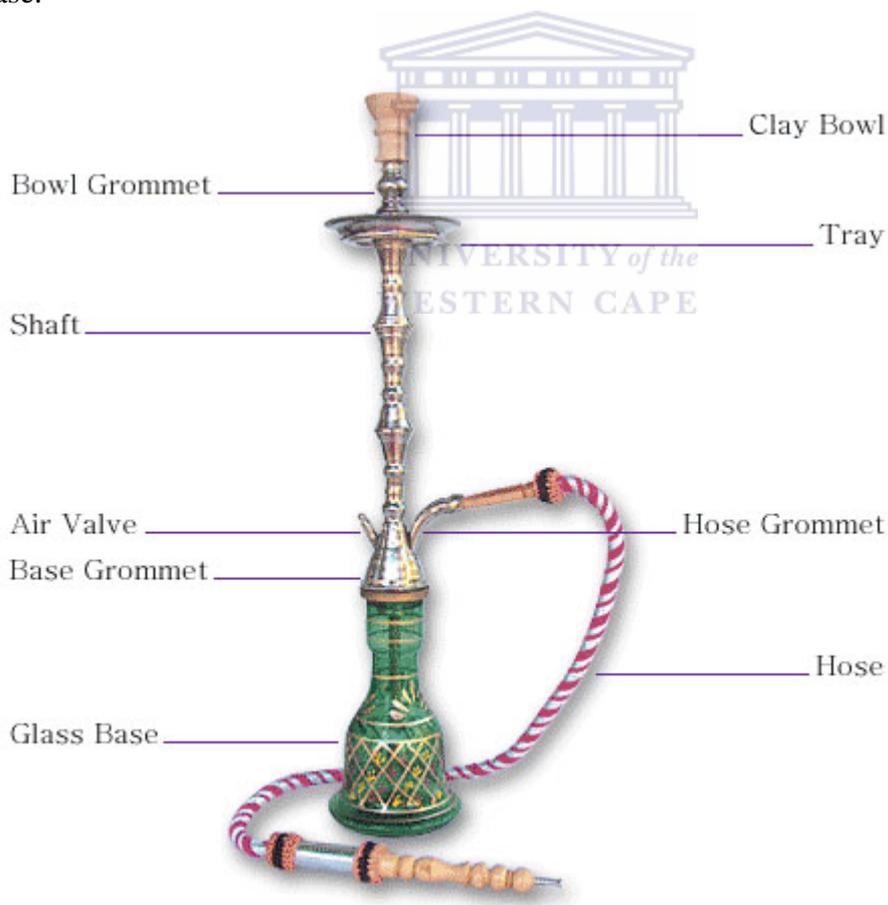
#### 2.2 Historical context of hookah pipe smoking

The hookah pipe or water pipe was invented in India by a physician during the reign of Emperor Akbar who at that time ruled from the year 1556 -1605, where an individual would smoke it as part of a culture (WHO, 2005). A hookah pipe is used to smoke tobacco and other substances and is seen as being purportedly less harmful, because of the perception that the smoke first passes through water which give the user the impression that it is harmless. While *hookahs* is the most frequent word used amongst English speakers, other terms used include *narghile or nargile, goza, ghalyun and hubble bubble* (Maziak, et al, 2004; Radwan, et al. 2003; Shafagoj & Mohammed, 2003; Zahran, et al., 1985).

Hookah pipes see (Figure 2.1) come in different designs, sizes, materials and colours, but the typical hookah has the following components (1) A bowl where the tobacco is placed and heated usually with burning embers or charcoal; (2) A vase, or smoke chamber that is

partially filled with water; (3) A pipe or stem connecting the bowl to the vase by a tube that carries the smoke down into the water, and a hose with a mouthpiece through which smoke is drawn from the vase (Knishkowsky & Amitai, 2005; Maziak, Ward et al.; 2004).

According to Asotra (2006), as the smoker inhales the tobacco, smoke is sucked down from the bowl and then bubbles up through the water into the air of the smoke chamber and then through the hose to the smoker. The water in the vase cools the smoke, and filters out some of its tar and particulates. Most smoking sessions last from 45-60 minutes, but they can continue for several hours (Knishkowsky & Amitai, 2005). At the end of a smoking session, the polluted water is cast away and the hookah vase refilled for the next user or users, which is not always the case.



**2.1 Figure of a typical hookah pipe**

- Bowl – holds the shisha.
- Tray – catches any ash that may fall from the coal that heats the shisha when starting to burn it.
- Stem/shaft – smoke from the burning shisha travels down the stem.
- Air valve – brings air into the water pipe which pushes smoke through the water into the hose.
- Vase /glass base - filled with water which filters the smoke.
- Hose – attaches a mouthpiece to the water pipe.

After originating in India, hookah pipes then spread to Persia, Afghanistan and the Middle East, Turkey and Africa (Chattopadhyay, 2000; Maziak, et al.; 2005; Wolfram, et al.; 2003). According to Chaouachi (2006), people at first smoked opium and hashish, but during the late 16<sup>th</sup> and early 17<sup>th</sup> centuries, they became much more familiar with the introduction of hookah pipe tobacco from America and the opening of multiple public coffee houses and hookah bars. In the early 1990's Egyptian tobacco companies introduce "Maassel", a specially prepared mixture that contains sweet fruity flavour and mild odorous smoke which has helped to attract new hookah users internationally (Maziak, et al., 2004; Parvaz, 2005; Primack, Aronson & Agarwal, 2006;; Rastam, et al., 2004).

According to Maziak, et al (2004), maassel known as "shisha" in the USA, consists of about 30% of crude cut tobacco fermented with about 70% of honey, molasses, and the pulp of different fruits. It provides a pleasant odour when heated slowly with burning charcoal and comes in a mixture of flavours including apple, strawberry, rose, mango, cappuccino, banana, peach, lemon, orange, mint and liquorice. In recent years, hookah bars, cafes and restaurants

have become popular social gathering places for young smokers and their friends and their members have dramatically increased (Asorta & Koch, 2005).

### **2.3 Hookah pipe: Disease and illness risks**

Studies conducted concerning health hazards of hookah pipe smoking indicate that hookah pipe use has an even higher risks than any other forms of tobacco consumption, increasing the risk of developing cardiovascular disease, pulmonary illness, cancers, and the spreading of communicable diseases (Al Mutairi, Shihab-Eldeen, Mojiminiyi, & Anwar, 2006; Mohammad, Kayak, & Mohammad, 2008; El-Setouhy et al., 2009; Noonan & Kulbok, 2009). Health problems associated with hookah pipe use include lung, oral and bladder cancer, and cancer of the esophagus and stomach (Bedwani, et al.; 1997; El- Hakum and Uthman 1999; Gunaid, et al.; 1995; Gupta, et al.; 2001, Lubin, et al.; 1992). Similarly, studies done by Al-Kubati, al`Absi, Fisher and Al-Kubati (2006) indicate that hookah pipe smoking causes acute increase in 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). According to Brannon and Feist (2007) their study indicates that more people die from smoking than from any other causes, and the vast majority of smoking related cancer deaths are from lung cancer. Also implicated in deaths from several other cancers are lip, oral cavity, pharynx, oesophagus, pancreas, larynx, trachea, urinary bladder, kidney and leukaemia. Moreover, a study done by Sepetdjia et.,al (2008), indicates that the amount of polycyclic aromatic hydro carbons and carbon monoxide (CO) are the primary components of tobacco smoking implicated in cancers (A group of diseases characterized by the presence of new cells that grow and spread beyond control) and respiratory health issues (Monzer, Sepetdjian, Sliba, & Shihadeh, 2008). A hydrocarbon is a carcinogen causally linked to lung cancer and other respiratory ailments (Lyon, 2008). Furthermore, a study done by El- Hakim and

Uthman (1999) reports 2 primary cases of lip carcinoma that is associated with hookah pipe smoking. The initial case is a 23 year old man who had smoked hookah pipe tobacco twice per day, for 3 years; with the second case a 60 year old man who had smoked hookah pipe tobacco as well, twice per day for 20 years (El- Hakim & Uthman 1999). Furthermore, studies done by Al jarrah, Ababneh and Al-Delaimy (2009), show an increased risk of transmittal of infections, such as herpes simplex is cause by sharing of mouth pieces. Their studies shows further exposure of friends and families to second-hand smoke (SHS) is a clinical and public health concern. Other health risks include nicotine dependence (Shihadeh et al.; 2004) and communicable infections like tuberculosis (TB), herpes, mononucleosis (kissing disease) and hepatitis which is transmitted through the sharing of the same mouthpiece. Research indicate the site and pattern of cell injury in the oral and respiratory tracts is expected to be different for those smoking hookah pipes in comparison with those smoking cigarettes (Medhat, et al 2002). Similarly, studies done by Prignot et al (2008) report that sharing of a hookah pipe is a contributing factor to the spreading of tuberculosis, when infected individuals share a mouthpiece with non-infected individuals. This finding highlights the concern over viruses and bacteria that are transmitted in the course of oral secretions. Mouthpieces are traditionally made from amber, with the myth that amber protects the individual against the transmittal of infectious diseases, with the more contemporary mouthpieces constructed out of metal or wood (Prignot, Sasco, Palet, Gupta & Aditama, 2008). According to Munckhof, Konstaninos, Wamsley, Mortlock and Gilpin (2003) the humid closed hose might act as a source of tuberculosis infection among hookah pipe smokers, and the common use of one hookah pipe amongst a click who lack the understanding of cough-like symptoms and expectoration, is a potential risk factor for cross-infection. Poor sanitation, inadequate cleaning of hookah pipes and lack of public health oversight, raise concern of infectious disease spread (Munckhof et al., 2003). Even though, in

India, a person not sharing a mouthpiece might be accused of insulting those around him, this is a cause of great concern (Hussain, 2011). Additionally, hookah bars are not required to sterilize or replace the hookah pipe mouthpieces after use and there is strong evidence that exposure to hookah pipe smoking is as harmful as the exposure to cigarette smoking, if not more harmful (Al jarrah, Ababneh & Al-Delaimy 2009; Chaaya, Jabbour, et al.; 2004).

Due to the increased levels of carbon monoxide (CO), regular hookah pipe smokers have the risk of experiencing long-term health problems that include neurological damage, and in the most severe cases, of carbon monoxide poisoning, which can either lead to a coma or death (Lord, 2012). A study conducted by the United Kingdom Department of Health and Tobacco Control Collaborating Centre (2009), found that one session of hookah pipe smoking shows that carbon monoxide levels have increased approximately five times higher than the amount of a single cigarette, with high levels of carbon monoxide that lead to brain damage and unconsciousness. Similarly, a study done by Lord (2012), at a Jewish Hospital in Louisville, KY., on a case of an emerging adult male who was brought into the hospital after collapsing during spring (2011), his symptoms indicated carbon-monoxide poisoning, although the doctors could not determine the source. After thorough investigation by Henry Spiller, the director of the Kentucky Regional Poison Centre, the anonymous Jewish male patient was treated by doctors at the hospital for hyperbaric oxygen chamber and has recovered (Lord, 2012).

### **2.3.1 Hookah pipe: Addiction risks**

According to the Centers for Disease Control and Prevention, (2005) irritation from exposure to tobacco juices increases the risk of developing oral cancers, with the irritation of tobacco juices most likely to be greater amongst hookah pipe smokers than pipe or cigar smokers, because hookah pipe smokers practise with or without inhalation frequently and for longer

periods. Unlike smoking of cigarettes, hookah pipe smoking is associated with infectious diseases, and possibly a predisposition toward use of psychoactive substances, (Medhat et al., 2002). Studies done by Theron, Schultz, Ker, and Falzone (2010), concerning carboxyhaemoglobin (COHb) levels in water-pipe and cigarette smokers in South Africa, show during the first 5 minutes of hookah pipe smoking a significantly higher increase of carboxyhaemoglobin levels (a toxic form of haemoglobin that results from carbon monoxide inhalation), in the blood of those that smoke hookah pipe than a single cigarette smoking session. Research indicates smoking hookah pipe is not a safer alternative to cigarette smoking (Ward, Weg, Relyea, Debon & Klesges, 2006). However, according to Shihadeh and Saleh (2005), compared to cigarette smokers, hookah pipe smokers have about 36 times the amount of nicotine and a higher concentration of heavy metals. According to Illinois Department of Public Health (2009), smokers can lower their own exposure and the exposure of their families by stopping smoking. Similarly, studies conducted show that hookah pipe smoking has the tendency to attract individuals who are considered to be of low risk of tobacco consumption (Primack, Fertman, Rice, Adachi-Mejia, & Fine, 2010). Even though smoking is causally associated to coronary artery disease, stroke, and lung disease, many people continue to smoke because of having a nicotine addictive nature (WHO, 2005, Shafagoj & Mohammed, 2002).

### **2.3.2 Hookah pipe: Second-hand smoke risks**

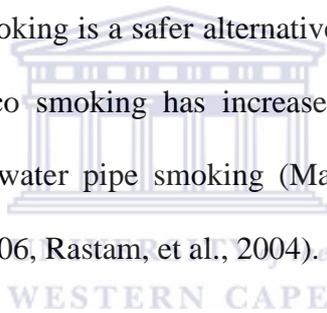
Second hand smoke (SHS) is described as a by-product of active smoking, and consists of exhaled mainstream smoke that has been exhaled by the smoker, and side stream smoke (smoke drifting from the burning tip of the cigarette) ( Otto, Steinemann & Wallace, 2006). According to WHO (2007), SHS from hookah pipe tobacco use produces a similar level of air pollutants as cigarettes, and poses a serious health risk to those exposed. Studies show SHS

smoke represents a substantial preventable public health risk to individuals who might be exposed to it, even if the risk is comparatively small (Otto, Steinemann & Wallace, 2006). Exhaled carbon monoxide (CO) levels examined by Bacha et al (2007) from clients at hookah pipe cafes in Lebanon, showed that hookah pipe smokers' CO levels increase 300% in comparison with 60% in clients who are cigarette smokers. Furthermore, the second hand smoke (SHS) produced by hookah pipe smoking is a health hazard to non-smokers due to the CO levels (Maziak, Eissenberg, Rastam, Hammal, Asfar, Bachir, Fouad & Ward, 2004). Moreover, literature indicates that carbon monoxide (CO) has a 200-300 times greater affinity for haemoglobin than does oxygen (Bacha, Salameh, Waked & Saliva, 2007). The health risk for pregnant women and second-hand smokers is as dangerous as with cigarette smoking (DiFranza & Lew, 1996; Nuwayhid, et al., 1998; Tamim, Musharrafieh, et al.; 2003). These include low birth weight, low Apgar scores, perinatal disorders and respiratory distress for unborn children, as well as ear and upper respiratory infection, asthma and sudden infant death syndrome for children (DiFranza & Lew, 1996; Nuwayhid, et al., 1998; Tamim, Musharrafieh, et al.; 2003). Similarly, studies indicate further, when pregnant women smoke, that smoking could be consider as SHS with reverence to the foetus; that is why literature indicates it is one of the most important causes of poor pregnancy outcomes of active smoking pregnant women (Anderson & Cook 1997).

#### **2.4 Hookah pipe: Knowledge and Perceptions**

The health effects of the hookah pipe are still under studied, but there is a perception that as smoke is drawn through water the filtration process removes dangerous particles in the smoke (Hussain, 2011). However, in the light of this statement, it is not clear if this perception is global, according to the demographics and the characteristics of populations (Shihadeh, Azar, Antonios & Haddad, 2004). Similarly, a study done by (Jackson & Aveyard, 2008 ) reports

that, despite knowing the dangers of hookah pipe smoking, more than 90% of hookah pipe users think that it is less addictive than cigarette smoking. Furthermore, university students interviewed in Birmingham, England, and Toronto, Canada on their beliefs on hookah pipe smoking, reported that they did not think intensely about the health risk associated with hookah pipe use and argued that if no warning is noticeable, smoking the hookah pipe, is a safer alternative as cigarette smoking (Jackson & Aveyard, 2008). Studies done by Roskin and colleagues, find that the perception of students at a British university that because the route of hookah pipe tobacco smoke is different to cigarette smoke when entering the lungs, it is less harmful. This study shows that there were no national or local campaigns alerting people about negative health effects associated with hookah tobacco smoking. The students thus thought that hookah pipe smoking is a safer alternative (Jackson & Aveyard, 2008). The prevalence of water pipe tobacco smoking has increased worldwide, in part because of misconceptions about safety of water pipe smoking (Maziak, et al., 2004; Parvaz, 2005; Primack, Aronson & Agarwal, 2006, Rastam, et al., 2004).



#### **2.4.1 Hookah pipe: Myths**

Lack of communal awareness about the probable health hazards has led to the common misperception that hookah pipe use is harmless (Hussein, 2011). Studies conducted in Egypt, Israel, and Syria have found that in general, people know little about its health effects and believe that it is less harmful than cigarette smoking (Maziak, Fouad, et al.; 2004; Israel, et al.; 2003; Varsano, et al.; 2003; Ward, Eissenberg & Rastam, et al.; 2006). Common misperception amongst hookah users is that they will not suffer any unpleasant consequences if they smoke infrequently rather than on a daily basis like most cigarette smokers (Asfar, et al.; 2005; Chaaya, et al.; 2004; Israel, El- Setouhy, et al.; Koch, 2005; Lewin, 2006; Putnam, 2001; Ward, et al.; 2006)

There is little motivation to refrain from hookah pipe smoking since this form of tobacco smoking is perceived to be not dangerous and not addictive because it is reinforced by the fruity flavours of the preparations and the belief that water filters the hazardous elements during a hookah pipe smoking session (Hussain, 2011). The manufacturing of maassel provides tobacco with a fruity flavour and often is packaged with fruit displays on the cartons, making the product seem as though it is as healthy as the fruits that it displays (Primack, Aronson & Agarwal, 2006; Maziak, et al., 2004; Parvaz, 2005; Rastam, et al., 2004).

Individuals that perceive cigarette smoking as a method of weight loss believe that hookah pipe tobacco has the same effect, and that hookah pipe use is associated with diet (Mandil, Hussein, Omer, Turki & Gaber, 2007). However, the smoothness of the fruity-flavoured tobacco smoke is equated with less harm as well. For example, literature indicates that in the Eastern Mediterranean Region, the package is branded as being 100% natural, making the product seem more suitable, and perhaps even a healthy method of smoking (Mandil, Hussein, Omer, Turki & Gaber, 2007). According to Primack, Sidani, Agarwal, Shadel, Donny and Eissenberg, (2008) in the USA, misconceptions about safety exist due to the lack of conformity and general lack of regulation of package labelling. Furthermore, other contributing factors such as the lure of fruity- flavoured smoke, easy access and affordability and the associated social aspect of hookah smoking, also have led hookah pipe users to believe that hookah tobacco is a safer alternative to other forms of tobacco consumption (Hussain, 2011).

However, due to the labelling, it is not uncommon to see maassel packaging stating that the product contains “zero” tar. Martin (2010) describes tar as the toxic chemicals found in cigarettes. Similarly, in a study conducted in San Diego at hookah bars, Aljarrah and

colleagues (2009), find that patrons 17-35 years of age perceive hookah pipe smoking as less harmful than cigarettes, primarily because of the belief that the water bowl filters out the harmful influence. Furthermore, studies demonstrate that consumers believe that the hazardous chemicals in the smoke are filtered by the water before inhalation. In contrast to this view, literature shows approximately 5% of the nicotine of hookah tobacco dissolves in water (Maziak, Rastam, Ibrahim, Ward & Eissenberg, 2008). Therefore the users' perception is based on nicotine's water solubility and the belief that nicotine is dissolved in water (Hussain, 2011).

#### **2.4.2 Hookah pipe: Peer and Social Influences**

The practice of hookah pipe tobacco smoking has spread to women and youth in the Eastern Mediterranean Region, although it is customary among men (Mandil, Hussein, Omer, Turki & Gaber, 2007). Factors contributing to youth smoking include peer pressure and social norms that are associated with tobacco smoking (Hussain, 2011). Due to its social acceptance, its novelty and availability in numerous appealing flavours and its relatively low cost, hookah pipe smoking has greatly increased amongst youth and emerging adults (Hussain, 2011). According to studies done by Kinishkowsky and Amitai (2005), sharing a hookah after meals in some families is perceived as normal behaviour. Furthermore, a study conducted by Al-Naggar and Saghir (2011) amongst Malaysian University male and female students, indicated the factors that influenced hookah pipe smoking amongst students are; sex, race, age, and income. However, their study indicates further that gender and the income of the family were significantly associated with hookah pipe smoking amongst university students, with females having an average of 0.87 points lower than their male counterparts ( $p=0.001$ ), which mean that hookah pipe smoking are higher amongst males. (Al-Naggar & Saghir, 2011). Summarily, studies conducted by Eissenberg et al., (2008), Smith-Simone et

al., 2008a and Primack et al., (2008; 2010) indicated that race, younger age and male gender influence the practice of hookah pipe smoking significantly. With Maziak et al., (2004) who reported that hookah pipe smoking were a common practice amid older and male students. Furthermore, a study conducted in Egypt by Labib et al., (2007) concerning perception of hookah pipe smoking, show that 74% of female students believed that hookah pipe smoking was less harmful than smoking cigarettes. Therefore the uptake and trend in hookah pipe smoking is spreading among people across ages and national boundaries. (Hussain, 2011). In a Health, Environment and Development study conducted by Combrink et al., (2010) amongst grade 10 secondary school learners in Johannesburg, South Africa, their findings indicated the most common reason for hookah pipe smoking is due to the absence of recreational activities, peer pressure, relaxation, addiction, and that these learners perceived hookah pipe smoking as a safer alternative to cigarette smoking.

## **2.5 Hookah Pipe: Chemical Compounds**

Research done by the WHO (2008) declared tobacco smoking as the single most preventable cause of death and disability in the USA. On the other hand, the USA, Mexico, Peru, Guyana, Argentina, Uruguay, Poland, Nigeria, South Africa, Jordan and Sri Lanka each reported that between 20% and 29% of youth is smoking tobacco (WHO, 2008). In developing countries, due to the low purchase price, traditional production and use, and lack of awareness of the negative health consequences, smoking of tobacco is often more prevalent (Hussain, 2011).

According to WHO (2008), against all the positive progression in healthcare, tobacco remains the number one factor adversely affecting the health of humanity. However, literature indicates that approximately 84% of the world's 1.3 billion smokers reside in developing countries (WHO, 2008). Further studies indicate that amongst youth who smoke, approximately 25% smoke their first cigarette before the age of 10 years (Hussain, 2011).

The misconception of its harmlessness when compared to cigarette smoking is due to the limited knowledge of the chemical composition of hookah pipe tobacco smoking (Salem, Shallouf, Meserga & Nosir, 1977). Furthermore, compared with a single cigarette, hookah pipe tobacco smoke yields 20 times the total polycyclic aromatic hydrocarbons and 50 times the heavy hydrocarbons (Sepetdjia, Shihadeh & Saliba, 2008).

According to Al Rashidi, Shihadeh and Saliba (2008), chemical analyses for aldehydes (molecules that are quite aggressive to the respiratory mucous membranes), in hookah pipe smoke, show that one hookah pipe smoking session produces many times the aldehydes that are found in cigarettes. This therefore raises concern that hookah pipe smoking might lead to respiratory diseases that are associated with cigarette smoking.

Literature indicates in a study done by WHO (2007) that an average cigarette smoker takes in 8-12 puffs, and inhales approximately 0.5 to 0.6 litres of smoke over five to seven minutes. However, it is estimated that a hookah pipe smoker might take as many as 20-200 puffs in one night, with each puff equalling about 1 litre of smoke per hookah pipe session (Theron, Schultz, Kera & Falzone, 2010). More smoke means higher levels of nicotine, carbon monoxide and other chemicals (Theron et al., 2010).

Studies done by Monzer (2008) concerning the analyses of chemicals emitted from the hookah pipe with and without the charcoal, demonstrate that approximately 90% of the carbon monoxide and 95% of the polycyclic aromatic hydrocarbons (PAHs) is generated from the charcoal. According to the Illinois Department of Public Health (2009), a polycyclic aromatic hydrocarbon is a group of chemicals that occur naturally in coal, crude oil and gasoline. Furthermore, one of the greatest sources of exposure to PAHs is breathing these chemicals in tobacco smoke (Monzer, 2008). According to Shihadeh (2003) compared to 450 degree Celsius for cigarette smoking, the burning temperature of tobacco for hookah pipe

use is about 900 degree Celsius, which could produce different types and levels of harmful chemicals and tar. Similarly, a study done by El- Nachef and Hammond (2008) indicates that carbon monoxide (CO) is a highly poisonous substance produced by the incomplete burning of gas and liquid petroleum gas (LPG). Levels over an average hour of hookah pipe smoking sessions exceed the environmental standard (United States Environmental Protection Agency, 2010) of 35 ppm.

Furthermore, studies done by the American Lung Association (2007), report that analysis of the smoke from using the hookah pipe, indicate that the smoke contains significant levels of nicotine, tar, heavy metals and various other toxicants. Similarly, these findings are confirmed in another study done by Eissenberg and Shihadeh (2009), relative to cigarette smoking, that hookah pipe smoking is associated with a higher carbon monoxide (CO) output of 23.9 ppm vs 2.7ppm and COHb levels of 3,9% vs 1,3%;  $p < 0,001$ ), with similar blood nicotine levels and more exposure to smoke.

In a South African study, literature indicates that similar results are found, in which higher levels of baseline carboxyhaemoglobin (COHb ) are reported amongst hookah pipe smokers than in individuals who smoke cigarettes (481,7% vs 39,9%;  $p < 0,001$ ). (Theron, Schultz, Kera & Falzone, 2010; 100:122-4). Due to the increase of CO levels, studies indicate that an individual is at risk of carbon monoxide poisoning and hypoxemia (low level of oxygen in the bloodstream) (Pierson & Kacmarek 1992). Nausea, headaches, and blurred vision are symptoms of CO poisoning (Scochat & Lucchesi, 2010). Furthermore, studies done by WHO (2007) indicate that carbon monoxide has approximately a 6-hour half-life in room air, signifying the potential for greater hallucinating effects on the body. While hookah pipe smoking is perceived as being less harmful than cigarettes, data suggest that hookah pipe

smoking contains similar harmful agents, and has similar addictive potential to cigarettes (Jackson & Aveyard, 2008).

Studies done by Knishkowsky and Amitai (2005) show adolescents that smoke hookah often mix tobacco shisha with substances like marijuana or hashish, and the water in the pipe is replaced with alcohol. Similarly, the available evidence indicates that hookah pipe smoking might be as toxic as cigarette smoking and might predispose hookah pipe users to similar adverse health outcomes. However, data on the perception of risk of hookah pipe smoking compared to cigarette smoking is limited, and varies from region to region (Al Rashidi, Shihadeh & Saliba, 2008).

The concentration of tar in a cigarette determines its rating. For example: *high tar cigarettes contain at least 22 milligrams (mg) of tar, medium-tar cigarettes range from 15mg to 21mg and low-tar cigarettes from 7mg or less tar.* Therefore, such a statement is deceptive because tar is produced only when the product is burned, and such labelling leads users to believe that the product is a safer alternative to cigarette smoking.

## **2.6 Hookah pipe: Prevalence**

### **2.6.1 International prevalence**

Research indicates that 4.9 million people die annually worldwide due to tobacco related diseases. However, studies indicate that this number might increase to 10 million within the next 20 to 30 years, of which 70% would most likely occur in developing countries (WHO, 2007). Furthermore, tobacco use is considered to be the second major cause of death worldwide, and is presently accountable for the death of one in ten adults worldwide. It is estimated before the age of 65, one in two long-term smokers will die due to tobacco-related diseases (Sances, Carlin & Enz, 2002). However, in the Eastern Mediterranean Region

hookah smoking is a traditional method of tobacco use and ever since the 1990s hookah smoking has become more popular and is spreading into Europe, North America, USA, Australia and South Africa, along with the rapid increase of hookah restaurants and bars (Maziak, et al, 2004). Part of the reason for the spread and acceptability of hookah smoking, is that it is widely perceived as being less addictive, less harmful and cleaner than cigarette smoking (Asfar, Ward, Eissenberg & Maziak, 2005).

Hookah pipe smoking is gaining popularity in the United States amongst non-Arab individuals, due to the influx of Arabs who use this as a cultural method of smoking (Baker & Rice, 2008; Jamil, Elsouhag, Hiller, Arnetz & Arnetz, 2010). According to Jamil et al., (2009), their study shows that hookah pipe smoking is highly prevalent among Arab Americans. However, research on the effect of hookah pipe smoking in the household by family members indicates an increased risk of hookah pipe smoking (Tamim et al., 2007; Weglicki et al., 2008). Furthermore, similar findings concerning prevalence of hookah pipe smoking indicate that hookah pipe smoking ranges from about 6% to 34% amongst adolescents from the Middle East, 5-17% amongst American adolescents and approximately 10% to 20% amongst American university students (Maziak, 2010; Eissenberg & Shihadeh, 2009). A Canadian Youth Smoking Survey (2006) conducted, showed that approximately 7% of Canadian adolescents ranging from grade 7-12, with an age group of 13-18 years, have never tried hookah pipe smoking, with about 3% of them claiming that they smoked hookah pipe during the past 30 days (Dugas et al., 2010). However, other surveys on hookah pipe smoking indicate cigarette tobacco smoking and the use of other substances such as drugs, marijuana and alcohol consumption are predisposed factors for individuals to become regular hookah pipe smokers (Knishkowsky & Amitai 2005). According to Knishkowsky and Amitai (2005), adolescents that smoke hookah often mix hookah pipe tobacco with marijuana or hashish and some replace the water that is in the vase with alcoholic beverages. A similar

study, done by Smith-Simone et al., (2008), indicates that young adults smoke tobacco with drugs such as Spice. Studies indicate further the reasons why hookah pipe smoking is increasingly popular; these include the misperceptions about its harmlessness (such as hookah pipe smoking is less addictive compared to cigarette smoking, smoke travels through water with the belief that harmful constituents are filtrated), easy accessibility and availability (such as hookah pipe tobacco is sold to children under the age of eighteen years), odour of different flavoured tobacco (such as mint, grape, orange, apple etc.) and because of social gatherings and its social acceptability (Knishkowsky & Amitai, 2005; Ward, 2007; Watad et al., 2009; WHO, 2010).

The extent to which hookah pipe use is harmful depends on the extent and frequency of use, and there is wide variation in the content of the different brands of hookah tobacco, just like the different brands of cigarette tobacco (Chaouachi, 2006; Hadidi & Mohammed, 2004). Despite these challenges, studies provide sufficient evidence that hookah pipe use is not a safe alternative to cigarette smoking. Hookah smoke has been found to contain high concentrations of carbon monoxide (CO), nicotine, “tar”, and heavy metals (Kiter, et al.; 2000; Knishkowsky & Amitai, 2004; Shafagoj Mohammed, Hadidi, 2002; Shihadeh 2003; Shihadeh&Saleh, 2005). Similarly, according the World Health Organisation (WHO, 2007), the problem is that hookah users tend to inhale far more smoke than cigarette smokers

Research studies done by Maziak, et al. (2004) found that 63% males and 30% females have ever used a hookah pipe. Of these past users 26% males and 5% females continued to use the hookah pipe. Prevalence studies regarding hookah pipe use, found that 27% of participants indicate that they have used hookah pipes. Furthermore, 23% of the samples indicate that they started smoking at the age of 14 years while 40% started at the age 18 years. Hookah pipe users are twice as likely as non-users to be smoking cigarettes as well (Hill-Rice, et al.,

2003, Primrack, Aronson & Agarwal, 2006). Additionally, these participants who did not smoke cigarettes but smoke the hookah pipe are eight times more likely to experiment with smoking cigarettes (Hill-Rice, et al., 2003). A concern, if young people start smoking tobacco at an early age, is that they are more likely to become addicted to nicotine than those who start later (Hill- Rice, et al.; 2003; Primrack, Aronson & Agarwal, 2006). Additionally, Tamim, et al., (2003) found that 31% males and 23% females use hookahs on a weekly basis at university. A study done by Tamim, Al-Sahab, Akkary, Ghanem, Tamin, El-Roueiheb, Kanj and Afifi, 2007, at a university in Beirut, found that 31% males and 23% females use the hookah pipe on a weekly basis as compared to a Syrian university where half of the students have ever smoked a hookah pipe, and a quarter of the students are using the hookah pipe currently (Maziak, Eissenberg, Rastam, Hammal, Asfar, Bachir, Fouad & Ward, 2004).

Studies done by Asorta and Koch (2005) indicate that in the U.S.A, the estimated number of establishments allowing the use of hookah pipe ranges from 300-1000. The media have also helped to boost the large-scale expansion of hookah pipe use by promoting this practice. U.S.A. newspaper reporters portray hookah pipe use as a *new fashion*, and that the use of the hookah is safe to use by youth, although some of them do warn about its possible health effects (Briggs, 2005; Edds, 2003; Hillery, 2005; Koch, 2005; Kozlowski, 2006; Parvaz, 2005; Spear, 2005).

It is estimated internationally that 100 million people use the hookah water pipe to smoke tobacco everyday (Wolfram, et al.; 2003). The past decade has seen a remarkable rise in the popularity of hookah pipe use amongst young people living in the Middle East, South West Asia, Africa, Europe, Canada, U.S.A. and South Africa (Maziak, et al.; 2004; Knishkowsky & Amitai 2005). The reason why hookah pipe use is so popular, is that hookahs and the tobacco

mix used to smoke them, are easy accessible and available to anyone and everyone (Maziak, et al., 2004).

### **2.6.2 National prevalence**

According to World Health Organisation (2008), tobacco consumption contributes to 5.4 million deaths globally, and an expected rise of more than 8 million deaths a year by 2030. Studies done by Groenewald, Vost, Norman, Laubscher, van Walbeek, Saloojee and Sitas (2007) shows the use of tobacco is a leading cause of death in South Africa. According to Groenewald et al., (2007) tobacco smoking causes approximately 41,632 to 46,656 deaths annually in South Africa, followed by hypertension, unsafe sex practices and sexually transmitted infection. Tobacco smoking ranks third highest. Furthermore, according to Groenewald et al., 2007 & World Bank (1999) with the current pattern of tobacco smoking, an estimated 500 million people alive today will die of tobacco use, with more than half of this population being teenagers and children.

A Health, Environment and Development study conducted by Combrink, Irwin, Laudin, Naidoo, Plagerson and Mathee (2010) amongst grade 10 secondary school learners in Johannesburg, South Africa, found the most common reason for hookah pipe smoking is due to the absence of recreational activities, peer pressure, relaxation, addiction and that these learners perceived hookah pipe smoking as a safer alternative to cigarette smoking. This study indicates further the prevalence of hookah pipe smoking amongst secondary school students. In a disadvantaged community in Johannesburg, South Africa, it was reported that sixty percent (60%) of study participants use the hookah pipe, with twenty percent (20%) of participants that smoke hookah pipe daily (Combrink, et al. 2010)

Similarly, a study conducted by Theron et al., (2010) concerning carboxyhaemoglobin levels in water-pipe and cigarette smokers, at the Tshwane University of Technology, Pretoria,

South Africa, shows the mean baseline COHb levels are 2.9% for the fifteen cigarette smokers and 1.0% for the fifteen water pipe smokers, with a level increase by a mean of 481.7% in water-pipe smokers as opposed to a 39.9% for cigarette smokers.

## **2.7 Hookah pipe: Legislation Framework - Substance abuse and Tobacco Control Act in South Africa**

### **2.7.1 Substance abuse policy**

The Prevention and Treatment of Drug Dependency Act (No.20 of 1992) has made provision for the Central Drug Authority (CDA), with the South African National Drug Master Plan (2006-2011) that sets out the state's national policies in the quest to develop a drug-free society with its fight against substance abuse. However, these policies do not include hookah pipe substance abuse, the new fashion of flavoured tobacco that has emerged in the country, being used by young and old. According to the South African National Drug Master Plan (2006-2011), the substances most frequently used in this country can be divided into three categories: (1) Extensively used substances such as alcohol, tobacco, cannabis and cannabis-mandrax (white pipe), with mandrax (methaqualone) that is seldom used on its own; (2) Moderately used substances such as crack cocaine, cocaine powder, heroine, speed, LSD (lysergic acid diethylamide), hashish, methamphetamine and ecstasy; (3) Infrequently used substances such as opium, Rohypnol (flunitrazepam), ketamine, Wellconal, methcathinone (khat). Furthermore, the most common substance being used in South Africa is alcohol, followed by the second most common drug of choice, cannabis, used alone or in combination with other drugs, with no reference to hookah pipe use that seem to be the new drug of choice amongst young and old.

## 2.7.2 South African Tobacco Control Act

South Africa is a leader in tobacco control in the African continent, in which all tobacco advertising and smoking in public place were banned during 1999. Due to loopholes that were exploited over the years by the tobacco industry, an amendment to the law was made. The South African Tobacco Products Control Act of 1993 was implemented in 1995, with health warnings on tobacco packets enforced by the law. In 1999, advertising and sponsorship were banned and penalties for transgressors and restrictions at the point of tobacco sales were added to the Act. As stated in the Government Gazette of 21 August 2009, Parliament has proclaimed that two Acts amended in the country's tobacco control laws are in operation.

According to the South African Registry (2004), studies done by CANSA show, apart from HIV/AIDS, tobacco is rated the second highest health concern in South Africa. The first tobacco law in South Africa (Act 83, 1993) was implemented in 1995 with health warnings on packets, regulated smoking in public places, prohibited tobacco sales to those less than 16 years and some regulated advertising.

- Tobacco Products Control Amendment Act 12, 1999 (came into force 2001)
- Banned all advertising and promotion and sponsorship
- Banned smoking in public places except in specially designated areas
- Penalties for transgressors
- Restrict sale of tobacco products at point of sale.

Tobacco Control Act, (Act 23 of 2007, Section 3 (2)).states the following:

*Every manufacturer of a tobacco product shall provide such information about the product and its emissions to the Minister and the public as may be prescribed, in the prescribed manner and within the prescribed time.*

*Act 63 of 2008, Section 3 (1)(b) A commercial communication between a tobacco manufacturer or importer and its trade partners, business partners, employees and share holders, must contain no other information except for factual information about the tobacco product, its characteristics, its availability or price, pictures of the tobacco products, the component parts and their packaging.*

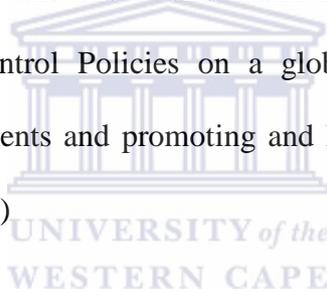
*Act 63 of 2008, Section 3(6), no person shall package or label a tobacco product in any way that is false, misleading, deceptive or likely to create any erroneous, deceptive or misleading impression about its characteristics, properties, health effects, toxicity, composition, merit, safety, hazards or emissions, including any term, descriptor, trade mark, figurative or other sign that directly or indirectly creates the impression that a particular tobacco product is less harmful than another tobacco product.*

The Acts were passed by Parliament in 2007 and 2008. These amendments now offer better protection to non-smokers and ensure that it is now more difficult for cigarette manufacturers to cause children to become addicts. It strengthens the existing law on smoking in public places. Young children will be better protected from the harms of second hand smoking (SHS), like asthma, wheezing or bronchitis. SHS is extremely harmful to all who are exposed to it and the protection of all people from SHS, especially children, is a basic human right. However, a question of considerable importance to policy makers and the health community is to determine which sections of the Tobacco Control Act the population adheres to. Furthermore, recent research on the health consequences of hookah pipe smoking gave their

recommendations to the World Health Organisation (WHO, 2007), in which it stated that “waterpipes” should be subjected to the same regulations as cigarettes and other tobacco products, and that waterpipes and waterpipe tobacco should contain health warnings on which the WHO (2005), issued an Advisory Note on Waterpipe Tobacco Smoking, that states as follows:

*“Waterpipe smokers and second-hand smokers (are) at risks for the same kinds of disease as are caused by cigarette smoking; including cancer, heart disease, respiratory disease and adverse effects during pregnancy.”*

The World Health Organization and the World Bank have described and evaluated an extensive array of Tobacco Control Policies on a global level, that includes taxation, restricting or banning advertisements and promoting and limiting in public places (Roemer 1993, Prabhat and Chaloupa 1999)



Even though the developed countries have controlled the use of hookah pipes through strong legislation, research indicates that no such laws are properly enforced in developing countries, especially in a developing country such as South Africa, where studies on hookah pipe use are still under search. The extent to which hookah pipe smoking has penetrated our society is difficult to establish since very little work has been done.

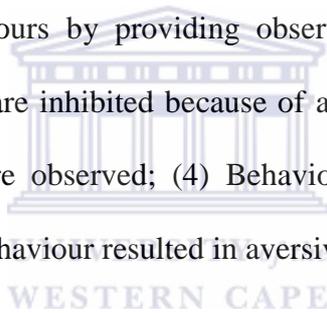
A broader understanding of possible reasons why the use of hookah pipe smoking, especially in South Africa, is increasing is due to social influences, lack of knowledge and understanding of the health hazards concerning the myths of hookah pipe tobacco. Albert Bandura’s (1982, 1986) Observational Learning Theory (OBS) states that most human behaviour is learned through observation of a model. Perhaps observational learning theory

could provide an understanding of how an individual adapts to “*learned behaviour*” and would then smoke the hookah pipe.

## **2.8 Observational learning theory**

Observational learning theory, also known as social learning theory, accounts for a great deal of learning in both animals and humans. According to Bandura (1982, 1986), observational learning occurs when an organism response is influenced by the observation of others, who are called models. The following section looks at observational theory, which suggests that an observer attends to and stores mental representations of a model’s behaviour and the consequences thereof. When the observer sees the model’s response lead to a constructive outcome, the observer’s tendency to produce the modelled response is strengthened. However, many learning theorists once supposed that all aspects of behaviour are explained in terms of ecological determinants. According to Smith (2002, p.81), the role of adults allows “for a gradual shift in the balance of towards the child taking initiatives and having responsibility”. Smith suggests further that it is through both language and verbal and non-verbal communications that children are allowed access into its culture and are therefore influenced by the environment. According to Rogoff et al., (1993), “learning to coordinate understanding and effort is inherent in observation and participation in social activity because, without some shared understanding, communication and shared activity could not proceed”. The observational learning theory suggests that an individual can obtain behaviours by simply watching them perform. According to Bandura (1969) and Bandura and Walters (1963), well-known social learning theorists, they quote several experiments that demonstrate that research participants, both adults and children, learn behaviour through observation learning. For example, when children see an adult behaving aggressively towards a doll, they can describe or act out the behaviour spontaneously or on request at a later stage even though

they have the opportunity to imitate behaviour. Bandura further suggests that observational learning occurs when an organism's response is influenced by the observation of others who are called models (1998). However, according to Bandura (1986) observational learning is the process of learning by observing a model and duplicates a skill, process, task or strategy that is demonstrated via the model, of which the model might not even be aware of serving as an instrument of learning to its observer. Further Cook, Hodes, and Lang (1986), found when monkeys watch other monkeys respond with fear to an unfamiliar object, they learn to respond in a similar way. The process of learning is by observing models and later imitating them. According to Spiegler (1983), observational learning can have *four possible* effects on the observers. (1) New behaviours can be acquired by watching a model; (2) A model may serve to elicit particular behaviours by providing observers with cues to engage in the behaviours; (3) Behaviours that are inhibited because of anxiety or other negative reactions may be performed after they are observed; (4) Behaviour may become inhibited in the observer if the model's similar behaviour resulted in aversive consequences.



Observational learning could thus be described as the accomplishment of new behaviours by means of observing. According to Solomon, Bamossy & Askegaard (1999), observational learning is a type of cognitive learning that occurs when individuals observe the actions of others and note the reinforcement they receive for their behaviours. According to Solomon et al., (1999, 70), this type of learning is a very complex process, the individual needs to store his or her observation in memory so that at a later stage this information helps the individual to guide their own behaviour. This process of imitating the behaviour of others is called modelling. For example, in the current study of hookah pipe and nicotine use, the observer needs to be able to follow or imitate the process of hookah pipe use by watching or observing the individual that is smoking (Hussain, 2011).

Furthermore the individual's values, beliefs and interest might also play an important role in performing the process of smoking the hookah pipe (Kinishkowsky & Amitai, 2005). According to Bandura (1986, 1997), observation of models can also raise observers' self-efficacy of personal beliefs about their capabilities to learn or perform behaviours at designated levels. Schunk (1987), suggests in order to determine whether similarity in competence between model and observer is essential, it is important to distinguish different types of learning purposes. Furthermore, in situations involving the learning of skills or new behaviours, children tend to emulate competent peers, although modelled competence is necessary for individuals to learn correctly. For example, research indicates that hookah pipe smoking is typically practised in groups, using the same mouthpiece that is passed from person to person (Hussain, 2011)

Nevertheless, Bandura (1963) states that individuals become accustomed with their behaviour and/or attitudes to what is going on around them, and they have a tendency to imitate what they see being done by those individuals who have the power to influence them. For example, hookah pipe smoking was first used in countries such as Pakistan and India, mainly smoked by elderly people living in the villages; however, in the past few years hookah pipe smoking has increased in urban areas of the subcontinent (Hussain, 2011).

Another factor adding to hookah pipe popularity is its social acceptability as compared to cigarettes and its portrayal is a symbol of modernization of cultural heritage (Kinishkowsky & Amitai, 2005). As compared to cigarette smoking it is readily acceptable and has become part of social gatherings. Similarly, adolescents and teenagers are very sensitive to social pressure and might start smoking because their friends, siblings or their parents are smoking (Milton et al.; 2004). According to Bandura (1998) the individual's characteristic patterns of behaviour

are shaped by the models that they are exposed to. In this aspect, the term model in observational learning refers to the person whose behaviour is observed by another.

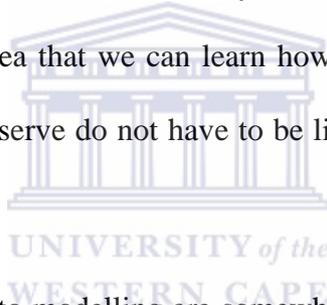
According to Bandura (1998), observational learning has proven valuable in explaining complex human behaviours, although animals can also learn through observation. (For example: through observation the English titmouse has learned how to break into containers to steal milk from its human neighbours). Furthermore, Bandura (1998) has identified four key processes which he esteems to be very critical in observational learning, with the first two processes, namely attention and retention that highlight the importance of cognition in this type of learning.

- **Attention.** To learn through observation, you must pay attention to another person's behaviour and its consequences.
- **Retention.** You may not have occasion to use an observed response for weeks, months, or even years. Hence, you must store a mental representation of what you have witnessed in your memory.
- **Reproduction.** Enacting a modelled response depends on your ability to reproduce the response by converting your stored mental images into overt behaviour.
- **Motivation.** Finally, you are unlikely to reproduce an observed response unless you are motivated to do so. Your motivation depends on whether you encounter a situation in which you believe that the response is likely to be rewarding.

What this illustrated for Bandura (1998) was the importance of modelling in social cognitive theory. In one of his earlier articles, Bandura (1963) acknowledges that some behaviour is indeed the result of direct training or conditioning of some form. He feels that certain things, personality patterns for example, come from modelled behaviour, usually the behaviour of

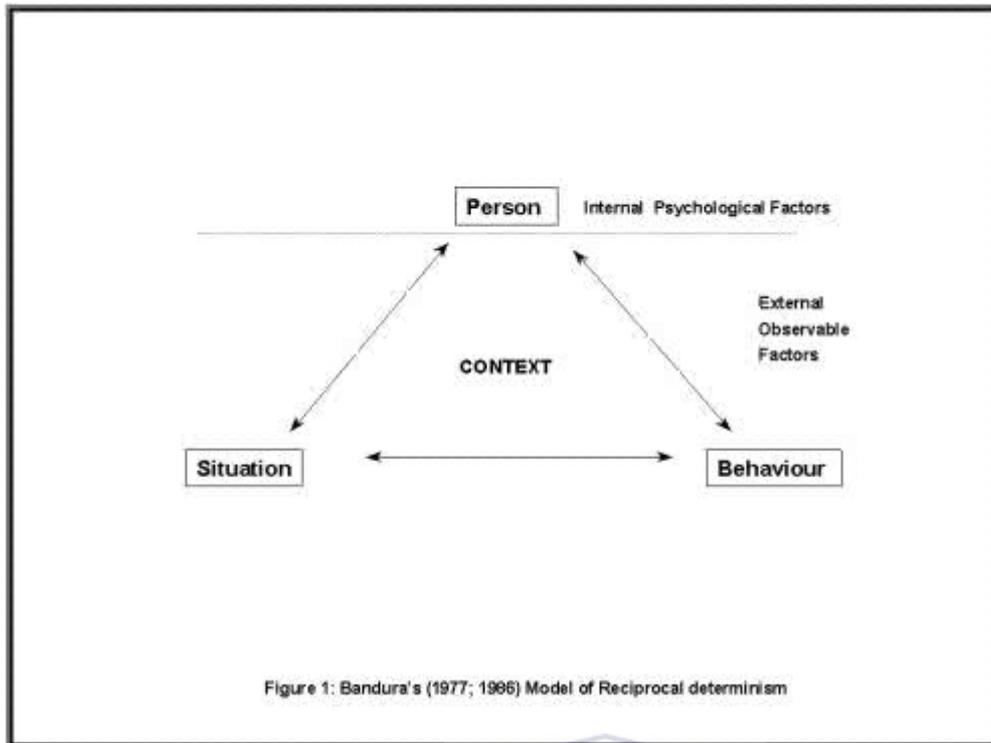
the parents. He gives the example of a parent hitting a child as punishment for things like bullying or fighting with peers. The purpose of the punishment is to decrease the aggressive behaviour, but in fact, the act is teaching the child other forms of aggression to imitate.

This form of modelling is not restricted to parents, however. Bandura repeated the blow-up doll experiment (1963) to have children watching videos, some with human models and some with cartoon characters, with videos portraying similar behaviour to the earlier mentioned example. Bandura had other groups this time; some videos were extended to let children see the aggressor being punished as a consequence of bad behaviour. Bandura observed the same pattern of behaviour was displayed by viewers who did not see the extended videos, but observed a decrease in the undesirable behaviour by children who saw the consequences of the action. This reinforced the idea that we can learn how to act based on our observations alone and that the subjects we observe do not have to be live models but can be abstractions of reality.



From one perspective, responses to modelling are somewhat concrete; individuals mimic the modelled behaviour very closely as in the case of aggressive behaviour. From an alternate perspective, responses to modelling are quite abstract; individuals can transpose information they have gained from one modelled scenario and apply it in different areas.

Bandura proposes a form of what he terms reciprocal determinism (Figure 2.2) which is tri-modal interplay between the individual, behaviour, and the environment. Essentially, what Bandura is trying to illustrate with this model is that we are not simply reactive organisms but that we have the ability to actively alter our environment and our behaviour (1998).



**Figure 2.1**

In considering the dynamics between the individual and behaviour, behaviour depends on elements such as the individual's expectations or goals. Similarly, behaviour can be conditioned, thus controlling the individual. Individual achievement can be hindered by environmental inputs such as socioeconomic factors; these effectively limit the individual's access to certain developmental opportunities. However, just as the environment affects individuals, so too can individuals affect their environment; According to this theory, observational learning is a process that happens intentionally or unintentionally, which means that one engages in a certain behaviour being aware or not aware.

In contrast to Bandura's observational learning theory, he furthermore propose a social cognitive theory that assumes that humans have some capacity to exercise limited control over their lives. That is, they use their cognitive processes for self-regulation. According to Bandura (1986, 1997, 2001), he suggests that human action results from an interaction of behaviour, environment and personal factors. For example, individuals, due to peer pressure

turn to hookah pipe smoking to “fit in” with the group they are socializing with. Another example of behaviour is a cultural factor that includes smoking of hookah pipe after meals, the father with the son etc. Bandura therefore referred to this interactive triadic model as reciprocal determinism. The concept of reciprocal determinism can be illustrated by a triangle, with behaviour, environment and personal factors occupying the three corners of the triangle and each having some influence on the other two. For example, the father having control of his son; due to their cultural belief, it is a norm for the father to pass the hookah pipe to his son after having a meal, or in the Indian culture it is an insult if an individual does not share the same hookah pipe mouthpiece during a hookah pipe smoking session.

## **2.9 Conclusion**

In this chapter, the study focuses on knowledge, perception, behaviours and health hazards of hookah pipe smoking amongst young adults. From the literature in this chapter, it is clearly visible that more research concerning hookah pipe smoking and its hazards are under researched and that more research in these fields is necessary. Furthermore, this chapter focuses on Albert Bandura’s observational learning theory which suggests that an individual can obtain behaviours by simply watching them perform. Similarly, concerning nature versus nurture, studies on learning demonstrate clearly that the environment has enormous power in shaping behaviour. Therefore learning theorists believe that *all* aspects of behaviour could as a result be explained in terms of environmental determinants. The research methodology is examined in the next chapter.

## CHAPTER 3

### METHODOLOGY

#### 3.1 Introduction

This chapter outlines the methodological approach used in this study. It starts with clarifying the aim and objectives of the study. The methodology is explained in terms of the sampling method, measurement instrument, data collection procedure and data analysis used in the research process. Ethical considerations concerning conducting this study are also discussed.

#### 3.2 Aim and objectives of the study

The aim of this study was to compare the knowledge, risks perceptions and behaviours of male and female university students using the hookah pipe.

The objectives of the study were to:

- Determine the prevalence of hookah pipe use by university students;
- Determine university students' knowledge and risk perceptions of using the hookah pipe;
- Compare male and female university students' knowledge, risk perceptions and behaviours of using the hookah pipe

#### 3.3 Research methodology and design

A quantitative methodological approach was used for the study. A quantitative paradigm is a quantification of constructs, whereby the quantitative researcher believes that the best or only way of measuring the properties of phenomena, such as the attitudes of the individuals towards a certain topic, is the quantitative measurement (Babbie & Mouton, 2009). In this

study, the quantitative method was used to describe the knowledge, behaviour and risk perceptions of the use of the hookah pipe amongst male and female university students. According to Babbie and Mouton (2001), a research design is a structured framework or blueprint of how the researcher intends to solve the research problem. This study makes use of a cross-sectional research design. This design does not attempt to change behaviour or conditions, but measures things as they are (Hopkins, 2000). According to Peck, Olsen & Devore (2001) in cross-sectional studies, variables of interest in a sample of subjects, are examined once and the relationships between them are determined that allow room for further exploration and research. This study was therefore a cross-sectional study, conducted in the Faculty of Community and Health Sciences with the assumption that students studying in this faculty would be aware of the potential health risks in hookah pipe smoking.

### **3.4 Population and sample**

The population for this study was students studying in the Faculty of Community Health Sciences at the University of the Western Cape (approximately 3500 students). First year students are required to attend the interdisciplinary modules offered in the faculty. As these classes are fairly large, two of three classes were randomly selected for students to participate in this study. A final self-selected sample of 388 participants voluntarily participated in this study. The final sample included 250 (64%) females and 138 (36%) males with a mean age of 22.2 years. Approximately 50% of the sample identified themselves as Coloured followed by 40% Black African, 6% Whites and 4% Indians. One hundred and fifty-four (40%) of the respondents stated that they smoked a hookah pipe. Of these users, 60 (43.5%) were males and 94 (38.4%) were females. The mean age for first-time hookah pipe smoking was 15.7 years.

### **3.5 Research instruments**

Data was collected with a self-administered questionnaire. Specific items regarding hookah pipe use were taken from the College Health Behaviour Survey, which was developed at the University of Missouri in Columbia, USA (2010-2011), to construct a questionnaire for this study. The questionnaire for the study consisted of three sections. Section 1 consisted of demographic information such as gender, race, age and religion of the participant (4 items). Section 2 consisted of 14 items which examine the general knowledge, behaviours and perceptions regarding hookah pipe use. This section included questions such as: “*Where are hookah pipe smokers most likely to smoke the hookah pipe?*”, and “*Does one get less nicotine from an hookah pipe than a cigarette?*” The responses are mainly indicated as “yes” and “no”. Section 3 had 25 items, which examined the perceptions of health risks regarding the use of the hookah pipe. This section’s responses are on a 5-point and 3-point Likert scale. The 5-point Likert scale ranges from 1 = strongly agree to 5 = strongly disagree. The 3-point Likert scale ranges from 1 = agree to 3 = disagree. Examples of items include: “*Sharing the hookah pipe is not harmful to one’s health.*” and “*Hookah pipe smokers become more addicted the more they smoke.*”

### **3.6 Pilot study and results**

A pilot study is a preliminary test of a questionnaire or interview schedule which helps to identify problems and benefits associated with the design (Balnaves & Caputi, 2001). Permission to conduct the study was granted by the Senate of Higher Degrees Committee. Subsequent steps were taken to obtain permission from the Dean and Department Heads of the Faculty of Community and Health Sciences, in order to access the participants. A scheduled meeting was arranged with the lecturers in order to establish a suitable time and venue permitting accessibility to the students, in lecture halls either before or after lectures as

prior arranged. The pilot study was conducted in order to determine the validity and the reliability of the instrument, for data collection. The questionnaire was piloted with a sample of 72 volunteering students from the Faculty of Community and Health Sciences that were required to attend lectures, thus improving the potential for a high response rate. The pilot study thus provided an opportunity to enhance the questions for clarity of meaning. The purpose of the study as well as its aims and objectives and ethical considerations of the study, were explained to the students before the questionnaires were administered. The pilot study was also used to establish appropriate seating arrangements and to estimate an average time for the completion of the questionnaires.

The students who participated in the study were not promised remuneration but participated voluntarily. Students were informed that participation in the study is voluntary and they were also asked to complete a consent form (see appendix A). Opportunities concerning withdrawal from this study at any given time were explained to them. The questionnaires were self-administered. After the completion of the questionnaires, the respondents were asked to give feedback concerning the content and nature of the study. The completion of the questionnaire and the consent forms was approximately 15 minutes per individual. Contactable references of the researcher and supervisor were made available to the participants if they needed to contact the researcher and supervisor. If there were any queries concerning the questionnaire or any unclear questions the respondents had the opportunity to relate them to the researcher.

Language usage and sentence construction in the survey were simple and easy to comprehend. In addition the study was fair in that the students were randomly selected from the first year levels, varying in culture, race, language and age and therefore allowing

everyone a fair opportunity to participate and bring forth their attitudes in relation to the study. All questionnaires were collected after being completed.

### **3.6.1 Changes made to the pilot**

The questionnaire and research process were maintained and modified after the data was selected. The important modification that resulted from the pilot was related to the Likert scale used. The modifications were necessary so that it was easier for the participants to understand, because they were not clear with the points of the Likert scale (see Appendix B). Section 1 consisted of demographic information such as gender, race, age and religion, of the participant. Section 2 consisted of items which examined the general knowledge, behaviours and perceptions regarding hookah pipe use. The items were used to assess current hookah pipe smoking. This section included questions such as: *Where are hookah pipe smokers most likely to smoke the hookah pipe?* and *“Does one get less nicotine from an hookah pipe than a cigarette?”* The responses were dichotomised as “yes” and “no”. Section 3 examined the perception of health risks regarding the use of the hookah pipe. The responses in this section were on a 5-point and 3-point Likert scale. The 5-point Likert scale ranged from 1 = strongly agree to 5 = strongly disagree. The 3-point Likert scale ranged from 1 = agree to 3= disagree. Examples of items included: *“Sharing the hookah pipe is not harmful to one’s health,”* *“Hookah pipe smokers become more addicted the more they smoke.”* A pilot study was conducted to assess the reliability of the instrument, prior to the main study. The questions assessed whether the participants had acquired knowledge, and what their risk perceptions and behaviours were concerning hookah pipe smoking.

### **3.6.2 Application of the instrument**

This study used a cross- sectional design and was conducted at the University of the Western Cape, in the Faculty of Community and Health Sciences with the assumption that students

who study in this faculty would be aware of the potential health risk of the hookah pipe, a relatively new form of smoking device amongst the students. Students from all ages, races and religions participated in this study. Two of three of these classes were randomly selected to participate in the study, as these students were required to attend the interdisciplinary modules being offered at the faculty, with these classes being relatively large in number, which provide potential for a high response rate. Permission to conduct the study was obtained by Higher Degrees and Senate Higher Degrees Committees and consequent steps were introduced to further seek permission from the Dean and Heads of Departments to conduct the study. The same procedures were followed when piloting the main study and it was easier to collect the data by being in the lecture rooms before the lectures commenced.

### **3.7 Data collection for the main study**

The process of data collection for the main study followed the format of the pilot study. Participants for the study were first year students randomly selected from the Faculty of Community and Health Science, males and females, smokers and non-smokers, from all ages, races and religions. The data collection technique used in the main study was through a self-administered questionnaire. According to Babbie and Mouton (2001), a questionnaire is a set of relevant questions for gathering information from individuals, which is unique to individuals, while ensuring ethical issues like maintaining participants' privacy. Due to the changes made from the pilot study, the process of administering the questionnaire was quicker for the current study.

### **3.8 Data analysis**

This study was interested in comparing male and female university students' knowledge, risk perceptions and behaviour concerning hookah pipe use, and was therefore positioned within a quantitative research design in an attempt to obtain objective measurable data, that could be

statistically analysed. The data analysis is a descriptive process that involves making sense of the text by preparing the data for analysis, through understanding the data and by representing the data, and by interpreting the larger meaning of the data (Creswell, 2003). The data were entered, coded, cleaned and analysed by means of the Statistical Package in the Social Sciences (SPSS version 20). Descriptive statistics provided information describing the data including frequencies, means, and standard deviations. Comparisons between users and non-users and male and female were conducted by means of **cross tabulations**.

### **3.9 Validity and reliability**

Validity and reliability are the most important criteria to ensure that the research instrument is adequately evaluated (Polity, Beck & Hungler, 2001). However, according to Babbie and Mouton (2001:119-122), validity is the extent to which an empirical measure accurately reflects the real meaning of the concept being considered, and it is also used to estimate the true reflection of the results. Furthermore, they describe reliability as the quality of the measurement method that suggests that the similar data would be collected by means of questionnaires every time and frequently to the same objects. The questionnaire for the pilot was pre-tested, and based on the results from the pilot study the research instrument was considered suitable for the purposes of the main study. This was in accordance with the development of the instrument for the College Health Behaviour Survey.

### **3.10 Ethical considerations**

The self-administered questionnaire was anonymous and information concerning the study was kept confidential. Ethical approval from the Research Ethics Committee of the University of the Western Cape, and informed consent from the participants was obtained prior to the study. The primary ethical emphases of this study were issues of confidentiality, anonymity and consent. It was vital that the students were aware and that they completely

understood the nature of the study. The questionnaires were completely anonymous, so there was no way to connect a particular student's response with a particular response sheet. The students were informed of their right to omit the demographic section of the questionnaire if they felt it was too intrusive, although the importance of the information was emphasised.

According to Sdorow and Rickabaugh (2002), in keeping with the ethics of psychological research, the following ethical guidelines were applied in this study:

**3.10.1 Informed consent:** To ensure that participants have the right to know what the research entails, and what is required of them in terms of their participation. The participants also need to know how the study might affect them. The participants need to be informed about the risk and benefits of their participation and that they are free as to terminate their participation of the study if they choose to do so without obligation. Confidentiality of information and reporting of results were explained and those who wilfully participated in the study were provided with a copy of the consent form and written consent was obtained from each participant.

**3.10.2 Confidentiality:** Every attempt was made by the researcher to keep all information collected in this study strictly confidential. If any publication results from this study, anonymity will be kept.

**3.10.3 Anonymity:** Is connected with confidentiality. Researches uses numbers to data obtained from the participants, to ensure data being kept anonymous.

**3.10.4 Risk of potential harm to the subjects:** The participants in this study were encouraged to access the on-going counselling and support at their disposal should the psychological, emotional, and physical need arise. This could be done by arranging appropriate referral to counselling or medical centres.

### **3.11 Conclusion**

The procedure used for this study was effectively described and defined. To achieve the main aims and objectives for the study, a cross-sectional design was used for this research study. Furthermore, the research processes were presented in this chapter. The pilot studies, the main study, including the changes made as a result of the pilot were also outlined in this chapter. The results of the study are presented and explored in the next chapter.



## CHAPTER 4

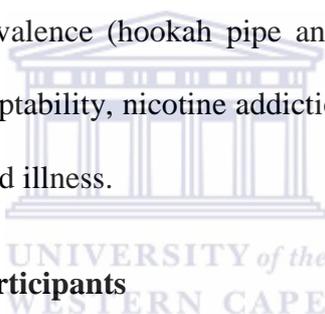
### RESULTS

#### 4.1 Introduction

This chapter presents the results of the data analysis for this study. The Statistical Package for Social Sciences 20 (SPSS) was used to analyse the data. Descriptive information regarding gender, race, age and religion are presented in this chapter. This chapter also presents information of male and female users and non users, concerning behaviour, risk perceptions and knowledge about hookah pipe and cigarette use. Furthermore, this chapter focuses also on factors such as, smoking prevalence (hookah pipe and cigarette smoking), reasons for hookah pipe smoking, social acceptability, nicotine addiction, second hand smoking, dangers of hookah pipe use and disease and illness.

#### 4.2 Characteristics of the participants

**Table 4.1** presents the demographic characteristics of participants. These characteristics include gender, race and religion.



**Table 4.1: Demographic distribution of participants**

Variable		Total Sample		Users		Non-Users	
		n=388	%	n=154	40%	n=229	60%
<b>Gender</b>	Male	138	35.6	60	43.5	78	56.5
	Female	250	64.4	94	38.4	151	61.6
<b>Race</b>	Black	153	40.1	41	27.3	109	72.7
	Coloured	189	49.5	88	47.1	99	52.9
	Indian	17	4.5	11	64.7	6	35.3
	White	22	5.8	12	54.5	10	45.5
<b>Religion</b>	Hinduism	20	5.3	14	70.0	6	30
	Judaism	14	3.7	5	35.7	9	64.3
	Islam	44	11.7	35	79.5	9	20.5
	Christianity	286	75.9	95	33.7	187	66.3
<b>Age</b>		<i>M</i>	<i>SD</i>				
		22.2	5.04				
<b>Age at first use</b>		15.69	4.05				

The results in Table 4.1 show that there were more females (250 [64%]) than males (138 [36%]) who participated in the study. The results indicate that the majority of participants identified themselves as Coloured (189 [50%]) followed by Black African (153[40%]); White (22 [6%]) and Indian (17 [5%]) respectively. According to religion, the majority of the participants identified their religion as Christianity (286 [75.9%]) followed by Islam (44 [11.7%]), Hinduism (20 [5.35%]) and Judaism (14 [3.7%]). Forty percent (40%) of the participants used the hookah pipe. More males (60 [43.5%]) than females (94 [38.4%]) use the hookah pipe. According to Race, Indians (11 [64.7%]) are the majority of hookah pipe users, followed by White (12 [54.5%]), Coloured (88 [47.1%]) and Black (41[27.3%]). Religion shows more Islam (35 [79.5%]) users, followed by Hinduism (14 [70.0%]), Judaism (5 [35.7%]) and Christian (95 [33.7%]) hookah pipe users. The mean age of the participants

of this study was ( $M = 22.2$ ;  $SD = 5.04\%$ ). The age when participants first used the hookah pipe ( $M = 15.69$ ;  $SD = 4.05\%$ ).

### 4.3 Smoking prevalence of participants

Tables 4.2 and 4.3 show the smoking behaviour of participants. Smoking behaviour includes the prevalence of smoking cigarettes and the hookah pipe.

**Table 4.2: Smoking prevalence**

Variable	Total Sample		Male		Female	
	n=388	%	n=138	%	n=250	%
<b>Smoking</b>	123	31.9	50	36.5	73	29.3
<b>Cigarette Smoking</b>	70	18.5	29	21.2	41	16.9
<b>Hookah pipe smoking</b>	154	40.2	60	43.5	94	38.4
<b>Hookah pipe and cigarette smoking</b>	62	16.1	23	16.8	39	15.8

The results in Table 4.2 show that 31.9% (123) of the sample smoked, with more males (50[36.5%]) than females (73[29.3%]) smoking. Those who smoked cigarettes consisted of 18.5% (70) of the sample with more males (29[21.2%]) than females (41[17%]). In terms of hookah pipe smoking (154[40.2%]), more males (60[43.5%]) than females (94[38.4%]) smoked the hookah pipe. With regards to hookah pipe and cigarette smoking (62[16.1%]), more males (23[16.8%]) than females (39[15.8%]) smoked both the hookah pipe and cigarettes.

**Table 4.3: Hookah pipe smoking according to race**

Variable	Total Sample		Male		Female		
	n=154	%	n=138	%	n=239	%	
<b>Hookah pipe smoking</b>	Black African	41	26.8	19	46.3	22	53.7
	Coloured	88	57.5	29	33.0	59	67.0
	White	12	7.8	7	58.3	5	41.7
	Indian	11	7.2	5	45.5	6	54.5

Table 4.3 indicates that the majority of participants according to ethnicity were self-identified Coloured participants (88 [57.5%]) with the majority of this group being female (59[67.0%]). This difference between male and female groups was similar for Black Africans and Indian groups. In the White group, more males (7 [58%]) than females (5 [41.7%]) smoked the hookah pipe.

**Table 4.4: Hookah pipe and cigarette smoking behaviour according to race**

Variable	Total Sample		Male		Female		
	n=378	%	n=137	%	n=241	%	
<b>Hookah pipe and cigarette smoking</b>	Black African	21	34.4	10	47.6	11	52.4
	Coloured	29	47.5	9	31.0	20	69.0
	White	4	6.6	3	75.0	1	25.0
	Indian	7	11.5	1	14.3	6	85.7

Table 4.4 suggests that Coloured females [20(69.0%)] had higher smoking rates than any of the other ethnic groups, and higher than males in terms of smoking both cigarettes and the hookah pipe. This was followed by Black females 11(52.4%); Indian females 6 (85.7%) and White females 1(25.0%). In terms of males, Black males 10(47.5%) had the highest smoking

rate, following by the Coloured males 9(31.0%); White males 3(75%) and Indian males 1(14.3%).

**Table 4.5: Hookah pipe smoking behaviour according to religion**

Variable	Total Sample		Male		Female		
	n=372	%	n=132	%	n=240	%	
<b>Hookah pipe smoking</b>	<b>Christianity</b>	95	62.1	39	41.1	56	58.9
	<b>Hinduism</b>	14	9.2	6	42.8	8	57.2
	<b>Judaism</b>	5	3.3	3	60.0	2	40.0
	<b>Islam</b>	35	22.9	10	28.6	25	71.4

Tables 4.5 shows that Christian males (39[41.1%]) and Christian females (56[58.9%]) are the majority in terms of smoking the hookah pipe, followed by Islamic males (10[28.6%]) and females (25[71.4%]), Hindu males 6(42.8%) and females (8[57.2%]) and Judaism males (3[60.0%]) and females (2[40.0%]). However, more Islamic females (25[71.4%]) than males (10[28.6%]) smoked the hookah pipe.

**Table 4.6: Hookah pipe and cigarette smoking behaviour according to religion**

Variable	Total Sample		Male		Female		
	n=374	%	n=131	%	n=243	%	
<b>Hookah pipe and cigarette smoking</b>	Christian	44	71.0	16	69.6	28	71.8
	Hinduism	4	6.5	2	8.7	2	5.1
	Judaism	2	3.2	1	4.3	1	2.6
	Islam	11	17.2	3	13.0	8	20.5

The results in Table 4.6 concerning hookah pipe and cigarette smoking behaviour show that more Christian males 16(69.6%) and Christian females (28[71.8%]) smoked both the hookah pipe and cigarettes than any of the other groups in the sample.

#### 4.4 Reasons for using the hookah pipe

Tables 4.7 to 4.13 show the possible reasons for smoking the hookah pipe. These reasons include relaxation, weight control and social acceptability.

**Table 4.7: For the purpose of relaxation**

**Smoking the hookah pipe helps people to relax \* Do you smoke the hookah pipe**

			Users	Non-users	Total
<b>Male</b> <b>n=135</b>	Smoking the hookah pipe help people to relax	Agree	23 63.9%	13 36.1%	36 26.7%
		Not sure	16 50.0%	16 50.0%	32 23.7%
		Disagree	20 29.8%	47 70.2%	67 49.6%
<b>Female</b> <b>n=242</b>	Smoking the hookah pipe help people to relax	Agree	46 74.2%	16 25.8%	62 25.6%
		Not sure	26 35.6%	47 64.4%	73 30.2%
		Disagree	21 19.6%	86 80.4%	107 44.2%

When asked whether smoking the hookah pipe helps people to relax more female users (46[74.2%]) than male users (23[63.9%]) agreed. The majority of male non-users (47[70.2%]) disagreed with that smoking the hookah pipe helped people to relax.

**Table 4.8: For the purpose of weight loss****Smoking the hookah pipe helps people stay thin \* Do you smoke the hookah pipe**

Gender		Users	Non-users	TOTAL
<b>Male</b> <b>n=137</b>	Smoking the hookah pipe helps people stay thin	16 26.70%	11 14.30%	27 19.70%
		8 13.30%	11 14.30%	19 13.90%
		36 60.00%	55 71.40%	91 66.40%
<b>Female</b> <b>n=241</b>	Smoking the hookah pipe helps people stay thin	17 18.30%	27 18.20%	44 18.30%
		28 30.10%	41 27.70%	69 28.60%
		48 51.60%	80 54.10%	128 53.10%

Results in Table 4.8 shows that the majority of male non-users [55(71.40%)] disagreed with the perception that smoking the hookah pipe results in weight loss. For users, more males [36 (60%)] than females [48(51.6%)] disagreed that the hookah was used for weight loss.

**Table 4.9: For the purpose of being attractive  
Smoking the hookah pipe is unattractive \* Do you smoke the hookah pipe**

Gender			Users	Non-users	Total
Male n=135	Smoking the hookah pipe is unattractive	Agree	8 13.30%	47 62.70%	55 40.70%
		Not sure	22 36.70%	10 13.30%	32 23.70%
		Disagree	30 50.00%	18 24.00%	48 35.60%
Female n=242	Smoking the hookah pipe is unattractive	Agree	21 22.30%	80 54.10%	101 41.70%
		Not sure	30 31.90%	37 25.00%	67 27.70%
		Disagree	43 45.70%	31 20.90%	74 30.60%

Table 4.9 shows that more males [30 (50%)] than females [43 (45.7%)] considered smoking the hookah pipe to be attractive. The majority of male non-users [47 (62.7%)] considered smoking the hookah pipe to be unattractive.

**Table 4.10: Social acceptability: Spaces to smoke the hookah pipe**

		At home	On Campus	Restaur ant	Party	Friend's house	All of the places indicated	Total
Male n=135	Users	4 6.8%	14 23.7%	1 1.7%	8 13.6%	2 3.4%	30 50.8%	n=59 100%
	Non-users	7 9.0%	12 15.4%		7 9.0%	11 14.1%	41 52.6%	n=78 100%
Female n=242	Users	13 13.8%	29 41%		5 5.3%	7 7.4%	40 42.6%	n=94 100%
	Non-users	6 4.0%	36 24.2%		13 8.7%	9 6.0%	85 57.0%	n=149 100%

Table 4.10 shows the possible spaces the hookah pipe is smoked. Although the majority of participants indicated all places asked, the hookah pipe was smoked the most on campus out of all the spaces indicated. The majority of hookah pipe smokers on campus was female users [29 (41%)].

**Table 4.11: Social acceptability of hookah pipe smokers**

		<b>Where I live</b>	<b>When I drink alcohol</b>	<b>When I'm in a social setting</b>	<b>After meals</b>	<b>Total</b>
Male n=135	Users	15	8	32	2	57
		26.5%	14.0%	56.2%	3.5%	100.0%
	Non-users	6	13	38	5	62
		9.8%	21.0%	61.5%	8.2%	100.0%
Female n=242	Users	15	10	56	5	86
		17.5%	11.6%	65.2%	5.8%	100.0%
	Non-users	18	36	141	18	213
		8.5%	17%	66.2%	8.5%	100.0%

Table 4.11 indicates that the majority of female users (56[65.2%]) compared to male users (32[56.2%]) agree that the hookah is mainly smoked when in a social setting. More male users (15[26.5%]) than female users (15[17.5%]) indicated that they smoke the hookah pipe where they live. More male users (8[14%]) than females users (10[11.6%]) drank alcohol when smoking the hookah pipe.

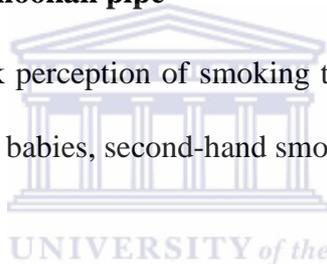
**Table 4.12: Social acceptability: Frequency of hookah pipe smoking**

		Daily	Once a week	Every 2 weeks	Once a month	Irregular	Total
Male n=135	Users	42 70%	10 16.8%	1 1.8%	1 1.8%	6 10%	60 100%
	Non-users	58 75.30%	13 7%	2 2.6%	1 1.5%	3 5%	77 100%
Female n=242	Users	66 70.2%	16 17%	3 3.2%	2 2.2%	7 7.5%	94 100%
	Non-users	118 78.2%	18 12%	7 4.6%	1 0.8%	7 4.6%	151 100%

Table 4.12 indicates the frequency of hookah pipe smoking. The majority of participants indicated that they smoke the hookah pipe daily.

#### 4.5 Risk perception and the hookah pipe

Tables 4.13 to 4.24 show the risk perception of smoking the hookah pipe. These statements include safety of children, unborn babies, second-hand smoke and dangers of smoking.

**Table 4.13: Is it safe for children to smoke the hookah pipe?**

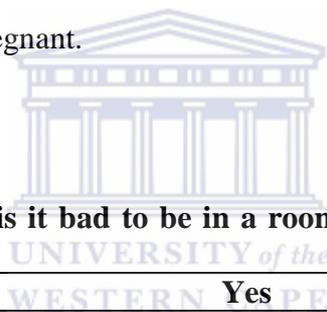
		Yes	No	Not sure	Total
Male n=135	Users	16 27.6%	28 48.5%	14 24.5%	58 100%
	Non-users	7 10%	55 70.5%	16 20.5%	78 100%
Female n=242	Users	23 25.5%	49 53.8%	19 21%	91 100%
	Non-users	27 18%	98 65.5%	25 6.8%	150 100%

Table 4.13 shows that the majority of participants indicated that smoking the hookah pipe was unsafe for children. However, 27,6% of males users and 25.5% of female users perceived the hookah to be safe for children. Similar responses for not being sure about the safety for children were indicated.

**Table 4.14: If a pregnant women smokes hookah pipe, can she harm her baby?**

		Yes	No	Not sure	Total
Male n=135	Users	33 55%	8 13.5%	19 31.8%	60 100%
	Non-users	43 55.2%	5 6.5%	30 38.5%	78 100%
Female n=242	Users	51 54.5%	12 12.8%	31 33%	94 100%
	Non-users	86 57.8%	10 6.8%	53 35.6%	149 100%

Table 4.14 shows that the majority (more than 50%) of participants indicated that a pregnant woman could harm her baby if she smoked the hookah pipe when pregnant. However, just over 30% of participants were unsure if a pregnant woman could harm her baby if she smoked the hookah pipe when pregnant.

**Table 4.15: If I do not smoke, is it bad to be in a room where people are smoking the hookah pipe?**

		Yes	No	Not sure	Total
Male n=135	Users	22 36.7%	17 28.3%	21 35%	60 100%
	Non-users	41 52.6%	14 18%	23 29.5%	78 100%
Female n=242	Users	31 33.3%	37 39.8%	25 27%	93 100%
	Non-users	76 52.1%	23 15.8%	47 32.2%	146 100%

Table 4.15 shows males and females were similar in their responses. More non-users (just over 50%) than users (just over 30%) agreed that being in a room where the hookah pipe is smoked is a risk. Between 27% and 35% of responses were unsure as to the risk of being in a room where the hookah pipe is being smoked.

**Table 4.16: An occasional cigarette is more dangerous than smoking the hookah pipe to my health**

		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
Male n=135	Users	12 20%	16 26.7%	13 21.7%	12 20%	7 11.7%	60 100%
	Non-users	6 7.7%	14 17.9%	31 39.7%	10 12.8%	17 21.8%	78 100%
Female n=242	Users	7 7.6%	17 18.5%	33 36%	23 25%	12 13%	92 100%
	Non-users	19 12.7%	24 16%	39 26%	30 20%	38 25.5%	150 100%

Table 4.16 indicates that more male users (28[21%]) than female users (24[10%]) agree that an occasional cigarette is more dangerous than smoking an hookah pipe. The majority of respondents were unsure (31[39.7%]).

**Table 4.17: The dangers of hookah pipe are exaggerated**

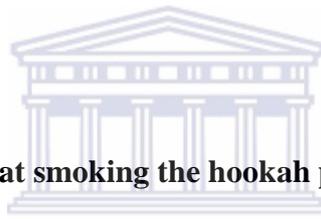
		Agree	Not sure	Disagree	Total
Male n=135	Users	29 48.3%	21 35%	10 16.7%	60 100%
	Non-users	9 11.7%	9 11.7%	30 40%	77 100%
Female n=242	Users	44 47.3%	29 31.2%	20 21.5%	93 100%
	Non-users	20 13.2%	89 60%	42 27.8%	151 100%

Table 4.17 that the majority of respondents agree that the dangers of the hookah pipe are exaggerated. More female users (44[47.3%]) than male users (29[48.3%]) believe the dangers are exaggerated. Sixty percent of female non-users were unsure.

**Table 4.18: Occasional hookah pipe smoking is not harmful to one's health**

		Agree	Not sure	Disagree	Total
Male n=135	Users	21 35%	25 41.7%	14 23.5%	60 100%
	Non-users	15 19.2%	32 41%	31 39.7%	78 100%
Female n=242	Users	35 37.2%	31 33%	28 29.8%	94 100%
	Non-users	22 14.6%	67 44.5%	62 41.1%	151 100%

Table 4.18 shows that the majority of the respondents were unsure as to occasionally smoking an hookah pipe. More users than non-users agreed that smoking the hookah pipe occasionally was not harmful. Specifically, more female users (35[37.2%]) than male users (21[35%]) agreed.

**Table 4.19: There is no proof that smoking the hookah pipe causes lung cancer, heart disease and lung disease**

		Agree	Not sure	Disagree	Total
Male n=135	Users	19 31.8%	32 53.5%	9 15%	60 100%
	Non-users	31 39.7%	41 52.6%	22 7.7%	n=94 100%
Female n=242	Users	36 38.3%	44 46.8%	14 15%	94 100%
	Non-users	54 36%	83 55.3%	13 8.7%	n=150 100%

Table 4.19 shows that the majority of the respondents were unsure as to the proof that smoking an hookah pipe causes cancer, lung and heart disease. However, more female users (36[38.3%]) than male users (19[31.8%]) agreed that there was no proof that smoking an hookah pipe causes cancer, lung and heart disease.

**Table 4.20: Hookah pipe smokers become more addicted the more they smoke**

		Agree	Not sure	Disagree	Total
Male n=135	Users	24 40%	15 25%	21 35%	60 100%
	Non-users	51 66.2%	22 28.6%	4 5.2%	77 100%
Female n=242	Users	28 29.8%	28 29.8%	14 40.4%	94 100%
	Non-users	71 47%	65 43%	15 10%	151 100%

Table 4.20 indicates that male non-users (51[66.2%]) believed that the more someone smokes the hookah pipe, the more addicted that person would be to the hookah pipe. More female users (14[40.5%]) than male users (21[35%]) disagreed with this statement.

**Table 4.21: Each inhalation of hookah smoking has an effect on the body**

		Agree	Not sure	Disagree	Total
Male n=135	Users	20 35%	20 34%	19 32.2%	59 100%
	Non-users	45 57.7%	26 33.5%	7 10%	78 100%
Female n=242	Users	31 33%	32 34%	31 33%	94 100%
	Non-users	75 50%	54 36%	21 14%	150 100%

Table 4.21 shows that male (19[32.2%]) and female users (31[33%]) were similar in their disagreement that hookah smoking has an effect on the body. The majority of male non-users (45[57.7%]) agreed.

**Table 4.22: Hookah pipe smoking takes years off a smoker's life**

		<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Total</b>
Male n=135	Users	18 30%	24 40%	18 30%	60 100%
	Non-users	26 33.5%	36 46.2%	6 20.5%	78 100%
Female n=242	Users	24 25.5%	28 29.8%	42 44.7%	94 100%
	Non-users	39 25.8%	85 56.3%	27 18%	151 100%

The results in Table 4.22 displays that that majority of respondents were unsure regarding the impact of hookah smoking. Female users (42[44.7%]) disagreed that smoking the hookah pipe takes years off a smoker's life as compared to any of the other groups.

**Table 4.23: Hookah pipe smokers can quit easily**

		<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Total</b>
Male n=135	Users	28 46.8%	17 28.5%	15 25%	60 100%
	Non-users	12 15.6 %	27 35.1%	38 50%	77 100%
Female n=242	Users	54 57.5%	24 25.5%	16 17%	94 100%
	Non-users	27 18%	79 52.5%	45 30%	151 100%

Table 4.23 shows that more users than non-users agree that hookah pipe smokers can quit easily. However, 50% of male non-users disagreed.

**Table 4.24: Smoking a hookah pipe is not as addictive as smoking cigarettes**

		<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Total</b>
Male n=135	Users	34 56.7%	6 10%	20 33.5%	60 100%
	Non-users	17 22.1%	31 40.5%	29 37.8%	77 100%
Female n=242	Users	56 59.6%	14 15%	24 25.5%	94 100%
	Non-users	28 18.7%	75 50%	47 31.5%	150 100%

Table 4.24 shows that the majority, which were female users (56[59.6%]), perceived that smoking the hookah pipe was not as addictive as smoking cigarettes. More non-users (almost 50%) than users were unsure.

#### 4.6 Knowledge concerning the hookah pipe

Tables 4.25 to 4.32 present the knowledge participants may have regarding the hookah pipe.

**Table 4.25: Smoke inhaled from hookah pipe contains harmful chemicals**

		<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Total</b>
Male n=135	Users	23 38.5%	24 40%	13 21.8%	60 100%
	Non-users	43 55.1%	32 42%	3 3.8%	78 100%
Female n=242	Users	32 35%	37 39.5%	25 26.6%	94 100%
	Non-users	68 45%	74 50%	9 6%	151 100%

Table 4.25 suggests that more non-users than users agreed that smoke inhaled from an hookah pipe contains harmful chemicals.

**Table 4.26: Tobacco toxins are filtered out by the water in the hookah pipe**

		<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Total</b>
Male n=135	Users	23 38.5%	26 43.5%	11 18.3%	60 100%
	Non-users	26 33.5%	44 56.5%	8 10.5%	78 100%
Female n=242	Users	45 48%	36 38.5%	13 13.8%	94 100%
	Non-users	36 23.8%	102 67.5%	13 8.6%	151 100%

Table 4.26 shows that more female users (45[48%]) than male users (23[38.5%]) believe that tobacco toxins are filtered out by the water in the hookah pipe. In general, the majority of the participants were not sure.

**Table 4.27: Hookah pipe smoke contains nicotine**

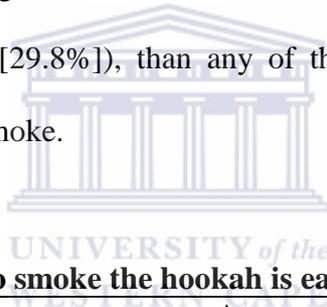
		<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Total</b>
Male n=135	Users	20 33.3%	26 43.5%	14 23.5%	60 100%
	Non-users	32 41%	42 53.8%	4 5.2%	78 100%
Female n=242	Users	30 32%	46 50%	18 19.2%	94 100%
	Non-users	52 34.4%	92 62%	7 4.6%	151 100%

Table 4.27 indicates that more non-users than users agree that hookah pipe smoke contains nicotine. Specifically, more female users (30[32%]) than male users (20[33.3%]) believed that hookah pipe smoke contains nicotine.

**Table 4.28: Hookah pipe smoking can be harmful to those exposed to second hand smoke**

		Agree	Not sure	Disagree	Total
Male n=135	Users	19 31.7%	28 46.7%	13 21.6%	60 100%
	Non-users	35 44.9%	39 50%	4 5.1%	78 100%
Female n=242	Users	26 27.8%	40 42.6%	28 29.8%	94 100%
	Non-users	68 45%	69 45.8%	14 9.5%	151 100%

Table 4.28 suggests that the majority of participants were unsure in terms of the harmful effects of being exposed to second-hand hookah pipe smoke. More male users (19[31.7%]) than female users (26[27.8%]) agreed that second-hand smoke from the hookah pipe was harmful. More female users (28[29.8%]), than any of the other groups, disagreed to the harmful effects of second-hand smoke.



**Table 4.29: Tobacco mix used to smoke the hookah is easily available**

	Agree	Not sure	Disagree	Total
Users	66 45%	40 26%	48 31.2%	154 100%
Non- users	37 16.6%	61 27.5%	125 56.2%	229 100%

Table 4.29 suggests that more users (66[45%]) than non-users (37[16.6%]) agreed that tobacco mix used to smoke the hookah pipe is easily available.

**Table 4.30: Does one get less nicotine from a hookah pipe?**

		<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Total</b>
Male	Users	29 48.5%	13 21.7%	18 30%	60 100%
	Non-users	15 20%	24 32%	36 48%	75 100%
Female	Users	37 39.5%	27 28.8%	30 32%	94 100%
	Non-users	22 15%	37 25%	89 60.2%	148 100%

Table 4.30 indicates that male users (29[48.5%]) more than female users (37[39.5%]) agreed that the hookah pipe has less nicotine. The majority of female non-users (89[60.2%]) compared to all the other groups disagreed.

**Table 4.31: Hookah pipe is a cheaper and safer alternative to cigarette smoking**

		<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Total</b>
Male	Users	33 55%	16 26.8%	11 18.5%	60 100%
	Non-users	18 23.2%	28 36%	32 42%	78 100%
Female	Users	59 63.5%	18 19.5%	16 17.2%	93 100%
	Non-users	34 22.7%	45 30%	71 47.5%	150 100%

Table 4.31 suggests that more female users (59[63.5%]) when compared to all other groups believed that the hookah pipe is a cheaper and safer alternative to cigarette smoking.

**Table 4.32: Knowledge concerning health risks of hookah pipe smoking**

What do you think a typical hookah pipe smoker will develop?		Total Sample	Users	Non-users
Male	Heart disease	43.10%	33.98%	50.03%
	Lung cancer	50.56%	40.67%	58.08%
	Lung disease	49.60%	42.17%	55.25%
Female	Heart disease	42.39%	31.59%	49.24%
	Lung cancer	49.88%	38.45%	56.96%
	Lung disease	50.32%	37.59%	58.41%
What do you think the chances are that you will develop?		Mean		
Male	Heart disease	36.18%	30.22%	40.72%
	Lung cancer	36.96%	29.57%	42.58%
	Lung disease	37.92%	30.89%	43.27%
Female	Heart disease	35.23%	28.30%	40.43%
	Lung cancer	38.97%	36.02%	41.86%
	Lung disease	37.81%	31.51%	42.93%

In Table 4.32 participants were asked what they think the chances are that a typical hookah pipe smoker will develop heart disease, lung cancer and lung disease. The participants were also asked what they think their chances would be to develop heart disease, lung cancer and lung disease. The results suggest that in general participants believed that the average hookah smoker had almost 50% chance of developing heart disease, lung cancer and lung disease. This result was similar for males and females. Their own chances of developing these conditions were less than 40%. This was similar for male and females. The risk perception for developing one of the diseases was lower for users than non-users. When comparing the diseases, more male users than female users believed that the average hookah pipe smoker would develop lung disease rather than lung cancer and heart disease. However, female users believed that there was a 38.45% chance that an average hookah pipe smoker would develop lung cancer rather than lung and heart disease.

## CHAPTER 5

### DISCUSSION, RECOMMENDATIONS AND CONCLUSION

#### 5.1 Introduction

This chapter presents a discussion of the findings of the study. Furthermore, these findings are examined in relation to the aims and objectives of the thesis that integrates with research in Chapter 2. This chapter elaborates on the perception, knowledge and behaviour of hookah pipe users, both male and female, amongst university students. The limitations of the study are discussed, followed by recommendations for future research.

#### 5.2 Prevalence of hookah pipe smoking

There are world wide 4.9 million deaths annually due to tobacco smoking diseases. A major concern of the World Health Organization (WHO, 2007) is that the number of tobacco related deaths may increase to 10 million in the next 20 to 30 years. The hookah pipe is considered a form of tobacco smoking and is becoming an increasing health risk especially since it is deemed to be socially acceptable (Baker & Rice, 2008; Jamil, Elsouhag, Hiller, Arnetz, & Arnetz, 2010). Approximately 100 million people, globally, use the hookah water pipe to smoke tobacco (Wolfram, et al.; 2003). A marked increase in hookah pipe use has occurred amongst young people living in the Middle East, South West Asia, Africa, Europe, Canada, U.S.A. and South Africa (Maziak, et al.; 2004; Knishkowsky & Amitai 2005). The prevalence rates are however variable.

The results of the current study indicate that 40% of the sample was hookah pipe users. International research suggests that the highest prevalence rates for hookah pipe use are amongst school children in Middle Eastern countries and among university student groups of

Middle Eastern descent in Western countries (Akl, et al 2011). The percentage of hookah pipe smokers in this study was higher than the 18.6% prevalence in the study by Senkubuge, et al. (2012) but lower than the 60% prevalence in the Combrink et al. (2010) study, both conducted in the northern provinces of South Africa. The age of onset for hookah pipe smoking in this study was 15.7 years, which is comparable with other studies (Combrink, et al., 2010; Hill-Rice, et al., 2003, Primrack, Aronson & Agarwal, 2006). As expected, when comparing males (43.5%) and females (38.4%), generally more males than females smoked the hookah pipe in the current study. Similar results were found in previous research (Maziak, et al., 2004). Furthermore, this study also found that hookah pipe smoking was more prevalent among Coloured females. This finding was similar for tobacco smoking presented in the South African Youth Risk Behaviour Survey 2008 conducted by the Medical Research Council (Reddy, et al., 2010). Their results indicated that the Western Cape Province (36.7%) has a significantly higher prevalence of current tobacco smoking and current frequent tobacco smoking (14.6%) than the national average of 21.0% and 5.8% respectively. Furthermore, Coloured females were one of the groups identified as having higher prevalent tobacco smoking rates.

Since hookah pipe smoking is prevalent in places such as cafés, restaurants and campuses the assumption for this study that this would be similar for this study. However, the results in this study only indicated 1% for prevalence in a restaurant. Although the majority of participants indicated all the places stipulated in the questionnaire where students would most likely smoke the hookah pipe, smoking the hookah pipe on campus was the next likely space to smoke the hookah pipe. Of the users smoking on campus, almost 50% of females compared to almost 25% of males were smoking on campus. Similar results were found in previous studies (Primack, et al., 2009; Varsano, et al., 2003).

Another concern indicated in this study is the prevalence of smoking in the family home. Even though fewer than 10% of users indicated that they smoked in their homes, 18% of female and 27% of male users indicated that they smoked the hookah pipe where they live. This space could include their family homes. Varsano, et al., (2003) indicates that a quarter of children smoke with their parents. Furthermore, previous studies suggest that the effect of family members smoking the hookah pipe in the family home increases the risk for other non-users, in the family, to smoke the hookah pipe (Tamim et al., 2007; Weglicki et al., 2008). Smoking the hookah pipe in the family is a concern as this finding could suggest that smoking the hookah pipe in the family is permissible. The concerns include that early exposure to hookah pipe smoking could encourage early onset of hookah pipe smoking amongst children and youth. Family members who smoke the hookah pipe could initiate and be supporters of early onset of hookah pipe smoking amongst children and youth. Furthermore, early exposure could create an early entry into and increase in nicotine addiction. A supporting South African study regarding concerns with exposure and use of the hookah pipe amongst children is the study conducted by Combrink et al, (2010) amongst grade 10 secondary school learners in Johannesburg. Specifically in the study, there were high prevalence rates of use, the mean age of current hookah pipe users was 16.3 years, while the majority had started using the hookah pipe between the ages of 13 and 15 years.

The prevalence of hookah smoking could be due to the social acceptability and the non-prohibition of the tobacco policies in South Africa. Studies show that tobacco is the leading cause of death in South Africa. (Groenewald, et al., 2007). In South Africa, tobacco smoking causes approximately 41,632 to 46,656 deaths annually (Groenewald et al., 2007). Thus if the hookah pipe becomes the more desirable mode of smoking tobacco, the prevalent rates could increase with possible increased tobacco related deaths. According to Primack, et al., (2008), the new trend of hookah pipe smoking, provides students with a sense of being popular,

which seems to be a gateway of attraction. Martinasek (2011) proposes that college students are a very vulnerable population, particularly when trying to experiment with hookah pipe smoking, due to its social acceptability, and it serves as a gateway to foster relationships and meeting new friends. Of concern, it seems then that young people, specifically, students may not necessarily be aware of the dangers of hookah pipe smoking.

### **5.3 Knowledge and risk perception**

An assumption of this study was that university students, particularly students in the Health Sciences, would be more knowledgeable regarding the health risks of using the hookah pipe. For the current study, the majority of users of the hookah pipe believed that the dangers of hookah pipe smoking were exaggerated and an occasional use of the hookah pipe was considered not to be harmful for the current study. Additionally, users believed that the hookah pipe is less harmful than smoking a cigarette and is therefore less addictive. This belief could be due to the perception that the smoke from the hookah is filtered through water. The results of the current study are supported by findings in previous research both internationally and nationally. For example, studies conducted by Chaaya, et al., (2004); Shihadeh, (2003); Senkubuge, et al., (2012) and Ward, et al., (2007), indicate that hookah pipe smoking is perceived to be less harmful and less addictive than cigarette smoking due to the process of water filtration that is thought to deliver less nicotine. This was found amongst university students as well. Similarly, Hussain (2011) found that there is a perception that the water filtration process removes dangerous particles in the smoke. In contrast, research done by Ward, et al., (2007), shows that approximately 5% of the nicotine dissolves in the water and hookah pipe smokers increase the length of smoking. Furthermore, Theron et al., (2010) found that carboxyhaemoglobin (COHb) levels for hookah pipe and cigarette smokers show that hookah pipe smokers have a significantly higher increase of COHb levels in their blood

than those of cigarette smokers. Studies indicate that smoking the hookah pipe and cigarette smoking share similar health risks, with more carbon monoxide, similar nicotine and more smoke exposure in smoking the hookah pipe (Eissenberg, & Shihadeh, 2009; Shihadeh, & Saleh, 2005).

In addition to the belief that the water filtration lessens the harmful effects of the hookah pipe, there is the belief that the fruity flavoured tobacco is considered a natural quality which provides a false sense of health to the user (Prignot, et al., 2008). This idea could lead to the belief that this form of tobacco use is a safer method of tobacco consumption than that of cigarette smoking (Grekin & Ayna, 2008). The fruity flavoured tobacco is packaged with fruit displays on the cartons, making the product seem as though it is as healthy as the fruits that it displays (Primack, Aronson & Agarwal, 2006; Maziak, et al., 2004; Parvaz, 2005; Rastam, et al., 2004). This could then possibly add to the risk perceptions of the hookah pipe not being harmful.

There is sufficient research, which highlights the health risks involved in smoking the hookah pipe. These health risks include amongst others, the risk of developing cardiovascular disease, pulmonary illness, cancers, and the spreading of communicable diseases (Al Mutairi, Shihab-Eldeen, Mojiminiyi, & Anwar, 2006; Mohammad, Kayak, & Mohammad, 2008; El-Setouhy et al., 2009; Noonan & Kulbok, 2009). Health problems associated with hookah pipe use include lung, oral and bladder cancer, and cancer of the esophagus and stomach (Bedwani, et al.; 1997; El- Hakum and Uthman 1999; Gunaid, et al.; 1995; Gupta, et al.; 2001, Lubin, et al.; 1992) as well as cardiovascular disease and respiratory problems (Jabbour, El- Roueibeh & Sibai, 2003; Kiter, et al.; 2000). When students in the current study were asked regarding their perceptions about developing a long term illness. The results in this study suggest that participants generally believed that the average hookah pipe smoker

had 50% chance of developing heart disease, lung cancer and lung disease. The results between male and female respondents were similar, with their own chances of developing these conditions being less than 40%. Lung cancer and lung disease was the illness with the highest perceived risk, compared with heart disease with a slightly lower perceived risk. Additionally, more male than female users believed that the average hookah pipe smoker would develop these illnesses.

Clearly, there is an increase worldwide, in the prevalence of smoking the hookah pipe which could be due to the misperception of its safety (Primack, Aronson & Agarwal, 2006; Maziak, et al., 2004; Parvaz, 2005; Rastam, et al., 2004). What would then be of concern is the associated behaviour and possible reasons for using the hookah pipe.

#### **5.4 Behaviour of hookah pipe smokers**

In the current study, the behavioural indicators of hookah pipe use raise concerns. The majority of hookah pipe smoking occurred on a daily basis, which is much higher than the findings of international studies (Ghafouri, Hirsch, Heydari, Morello, Kuo, & Singh, 2011) and local studies (Combrink et al., 2010). This study also confirmed the easy accessibility of the tobacco used in the hookah pipe, as found in previous research (Akl et al., 2011; Maziak, 2004). When considering the reasons for hookah pipe smoking, 60% of male users indicated that smoking the hookah pipe could control weight loss, almost 50% of female users believed smoking the hookah pipe aided in relaxation and 50% of male users considered smoking the hookah pipe to be attractive. International studies suggest that hookah pipe smoking provides university students a form of relaxation and socialization (Maziak, Eissenberg, et al., 2004) and this could then increase the social acceptability and use of the hookah pipe. Research shows that smoking the hookah pipe predicts regular and increased cigarette smoking (Aljarrah, Ababneh, & Al-Delaimy, 2009).

## 5.5 Relating to theory

The result of this study fits into the theoretical framework of the study. In this study, Albert Bandura's Theory of Observational Learning (Bandura, 1969; 1996) was used to investigate the influence of intrapersonal and interpersonal factors on the aim of hookah pipe smoking amongst university students that suggests that an individual can obtain behaviours by simply watching them perform. Of concern is the smoking of the hookah pipe in the family home (Kinishkowsky & Amitai, 2005). Based on observational learning theory, children will model behaviours they are exposed to in their environments. Hookah pipe smoking in this study has become socially acceptable because of the belief that hookah pipe smoking occurs within the family home, making it more attractive for the individual to practise this new trend of tobacco consumption in other spaces outside the family home and social settings. Similar research on the effect of hookah pipe smoking, in the household by family members indicates an increased risk of hookah pipe smoking (Tamim et al., 2007; Weglicki et al., 2008). As with this current study, according to studies done by Kinishkowsky and Amitai (2005), sharing a hookah after meals in some families is perceived as normal behaviour. The uptake and trend in hookah pipe smoking is spreading among people across ages. Theoretically, the assumption could be that irregular users and non-cigarette smokers will gradually become regular and more frequent users based on the belief that hookah pipe smoking will be less harmful to their health.

Observational Learning Theory guides this research based on the combination of intrapersonal constructs (knowledge and attitudes) and interpersonal constructs (influence of peers and others), both of which influence the intention for hookah pipe smoking, even though it varies between individuals. According to Bandura (1969) and Bandura (1996) and Walters (1963), several experiments demonstrate that participants, both adult and child, can learn behaviour through observational learning. However, it is evident in this study that the

model also assumes that intentions will display reasonable and systematic decisions based on personal as well as social influences that correspond with the individual's attitude towards the behaviour. Furthermore, the behaviour of individuals is most likely to be influenced and shaped by their surroundings and the people that they are socializing with. Although this theory has not yet been used in a hookah pipe study, in contrast to this theory, the theory of reason action was used in a similar study by Primack, et al., (2008) to understand the influences of hookah pipe smoking amongst U.S. college students, which examined the relationship between harm perception, dependence, peer acceptance and popularity as associated with the occurrence of hookah pipe smoking. However, studies done by Smith-Simone et al., (2008) although not using theory of reasoned action as in the current study, explored psychosocial risk profiles of hookah pipe smoking, using attitudes and beliefs that were derived from cigarette smokers. Along with the practice of hookah pipe smoking, university students may have obtained their perception of this new trend of tobacco consumption as a safer alternative to cigarette smoking due to its origin. However, studies done by Asfar, et al., (2005), of U.S.A college students concerning beliefs, knowledge, and attitudes, suggest these determinants are often shaped by cultural attributes that may differ amongst inhabitants, as the U.S. becomes more ethnically diverse. In South Africa, culture may also play a key role in understanding hookah pipe use.

## **5.6 Limitations of the study**

There are known limitations to this research that deserves mentioning. The study sample was drawn only from full-time students at one university in the Western Cape. The study was conducted during a morning lecture making it impossible for part-time students to participate. Other limitations to the study included students who may be unaware of hookah pipe smoking and employees of the university. Furthermore, participants comprised only a portion

of the students invited. Of the participants who chose to participate, there remains the limitation of social popularity and self-reporting, both of which have the tendency to adjust the results.

## **5.7 Recommendations**

Due to the fact that hookah pipe studies in South Africa are still under research, recommendations for future hookah pipe studies are needed, especially in the Western Cape where it has become a new trend amongst individuals of all ages. However, educating lecturers, parents and university students about the health hazards of hookah pipe smoking may help individuals in deciding whether they should or should not smoke the hookah pipe. Further research is needed to determine the prevalent patterns and health risks of hookah pipe smoking and its relationship to nicotine use amongst individuals. Tobacco prevention programmes need to focus attention on hookah pipe smoking in order to further dispel the myth that hookah pipe smoking is a safe alternative to cigarette smoking. The main focus of prevention programs must be on decreasing the myths concerning hookah pipe smoking and cigarette smoking, by clarifying the addictiveness as well as the association with communicable diseases and other health hazards. Furthermore, despite all limitations, this study seeks to provide guidance in developing prevention and intervention programs specifically focused on hookah pipe smoking, which might help in decreasing the prevalence of hookah pipe smoking with its risk of developing nicotine addiction and disease in young and old.

## **5.8 Conclusion**

There are approximately 100 million daily hookah pipe smokers globally. Although this study was conducted with a small sample of university students at one university, it provides key findings in terms of the perceptions and behaviours regarding hookah pipe smoking by

university students in South Africa. This is the first known study comparing males and female hookah pipe use in the Western Cape and possibly South Africa; Coloured females are a high risk group for hookah pipe smoking; indicators of daily hookah pipe smoking are concerning; highlights the prevalent spaces of use – especially on campus; the hookah pipe is considered to be less harmful and less addictive than cigarette smoking; considered socially acceptable and is smoked in the family home. These findings highlight the need for further research to determine the extent of hookah pipe smoking at other universities and within the public arena in South Africa.



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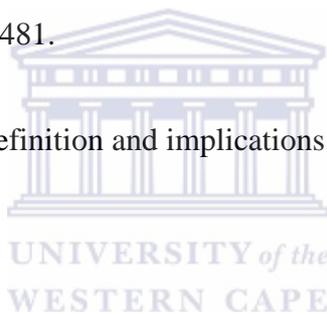
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## Appendix A

### CONSENT FORM

**Dear participants,**

My name is Karin Daniels and I am a Masters student in Child and Family Studies, in the Social Work Department, situated at the University of the Western Cape. I have a particular interest to conduct a research study concerning the relationship between hookah pipe smoking and nicotine addiction in adolescents and young adults. This study would require students in the Faculty of Education to participate voluntarily in the research process. The purpose of the study is aimed at examining the effects of hookah pipe smoking on the well-being of adolescents and young adults.

a. **Consent form for participants:**

I understand the information provided to me and hereby provide permission for the researcher to involve me as a participant in completing the research questionnaire. I acknowledge that the information generated from this will be used for academic and research purposes.

I acknowledge that whilst participating in this research that I am entitled to the following rights:

1. Not to respond to any questions that may cause me personal harm and suffering.
2. To have the purpose of the research study explained to me prior to the commencement of the study.
3. To withdraw as a participant during the duration of the research and during the publishing of the final research project.
4. To have my identity protected during the duration of the research and during the publishing of the final research report.

I also acknowledge that my participation is completely voluntary and that I was not compelled by the researchers to participate. I also acknowledge that I have not been offered or expect any monetary compensation for participating in this research.

Signature of Acknowledgement: .....

**Researcher's details**

For any further enquiries, the following persons may be contacted in relation to the study:

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**Research student:** Karin Daniels ([daniels.karin8@gmail.com](mailto:daniels.karin8@gmail.com))

**Thank you for your participation!**



**Appendix B:**

**QUESTIONNAIRE**





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