

THE EXTERNAL VALIDITY OF THE SOUTH
AFRICAN SUBSTANCE USE CONTEXTUAL RISK
INSTRUMENT: PREDICTIVE VALIDITY

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2017

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A Thesis Submitted in Partial Fulfilment of the
Requirements for the Degree of Masters in Psychology in
the Faculty of
Community and Health Sciences, University of the
Western Cape
UNIVERSITY of the
WESTERN CAPE

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The financial assistance of the National Research Foundation (NRF) towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the NRF.

DECLARATION

I Declare That:

THE EXTERNAL VALIDITY OF THE SOUTH AFRICAN SUBSTANCE USE CONTEXTUAL
RISK INSTRUMENT: PREDICTIVE VALIDITY

Is my own work, that all the sources I have used or quoted have been indicated and acknowledged by means of complete references, and that this work has not been submitted previously in its entirety, or in any part, at any other higher education institution for degree purposes.

KBester

Kyle Bester

March 2017



ACKNOWLEDGMENTS

“Do not conform to the pattern of this world, but be transformed by the renewing of your mind.

Then you will be able to test and approve what God’s will is—his good and perfect will” (Romans 12:2).

Though only my name appears on the cover of this dissertation, a great many people have contributed to its production.

I dedicate this paper to my biological mother Tania Ronelle Bester, who always pushed me to do my best. Though, you passed from this earthly realm, I will always push forward and onward, just like you taught me. Aunty Velma (Mum), who adopted me, I can never repay you for the financial, emotional and spiritual support you provided me throughout the period you raised me. I will forever be thankful for your efforts and unconditional love. I owe my gratitude to all those individuals who have made this dissertation possible. Most importantly, none of this would have been possible without the love and patience of my family (Craig; Charnay; Carlisle; Jonathan & Mr Thomas). To my Military Psychological Institute family (Col. Hartzenberg & Maj. Maine), you have been a constant source of friendship, concern, support and strength, your inputs have not gone unnoticed. Thank you to my partner and best-friend Danille Elize Arendse for all the support, patience and love throughout the entire dissertation process. I dedicate this paper to you as well.

My deepest gratitude is to my supervisors, Dr. Maria Florence and Miss Serena Isaacs. I have been amazingly fortunate to have two supervisors who gave me the freedom to explore on my own and at the same time the guidance to recover when my steps faltered.

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KEYWORDS/PHRASES

External Validity

Predictive Validity

Validity Theory

Discriminant Validity

Discriminant Functional Analyses

Sub-Scales

Substance Use

Users and Non-Users

Adolescents

SASUCRI

Initial Validation

Ecological systems theoretical framework

Person Process Context Time Model



ABSTRACT

The purpose of the present study was to gather further external validity evidence towards the validity argument for an instrument designed to measure individual and contextual factors associated with adolescent substance use in low socio-economic status communities in the Western Cape, South Africa. The South African Substance Use Contextual Risk Instrument (SASUCRI) measures adolescents' subjective experiences of their own psycho-social and their communities' functioning. The present study uses secondary data analysis in order to further evaluate its external validity. Both content and structural evidence for the instrument has been gathered in the larger study in which the present study is located. Validity theory was used as the theoretical framework for the gathering of the different types of evidence in support of the validity argument for this instrument. The study employed non-probability purposive sampling to select schools from three education districts from which twenty-six schools were selected where the sample total was N=1959. English and Afrikaans versions of the instrument were administered to English- and Afrikaans home language, school-going adolescents, aged 12 to 21 years. All ethical standards were maintained throughout the research process. External evidence procedures were conducted using Discriminant Function Analysis (DFA) to evaluate the extent to which the instrument could discriminate between substance using and non-using adolescents. The DFA revealed that nine SASUCRI sub-scales totals can act as significant predictors to substance use among adolescents based on the predictive validity of sub-scales.

CHAPTER ONE: INTRODUCTION

1.1. Introduction to Substance Use

Adolescence is a developmental period in a young person's life where they experience various forms of stress through life challenges. Berk (2013) postulates that peer relationships begin to take precedence over relationships with parents and caregivers during this period. It is also a period in which experimentation with substances is most likely to occur (Berk, 2013). Substance use poses a risk for later psychological and physical health complications for adolescents (Morojele, Parry & Brooke, 2009). Substance abuse is posing a major threat to the public health sphere both nationally and internationally (Spoth *et al.*, 2006). In addition, adolescent substance use in South Africa is a major concern as there is an increase of young people consuming illicit substances such as alcohol, tobacco and cannabis (Morojele, Parry & Brooke, 2009). Research done in the past two decades has shown that drug-culture has evolved in alarming ways (Plüddemann *et al.*, 2008). Despite the barrage of information linking substance use to the adolescents, it should be noted that there is a lack of research and instrumentation that focus on adolescent substance use from a preventative point of view. Carney (2014) notes that several measuring tools have been developed for adolescent substance use, but they have generally been used in health care settings. She notes that there has been limited research conducted on the application of these tools specifically from a community perspective (Carney, 2014).

The National Institute of Drug Abuse (2014) reported that lifetime substance use and dependence has been estimated to start during adolescence and young adulthood. According to Plüddemann *et al.* (2010) substances in South Africa, more specifically in the Western Cape, are predominantly consumed by individuals under the age of 20 with almost half of the total number being adolescents. According to the South African Community Epidemiological Network on Drug Use (SACENDU, 2014), in a biannual report compiled by the Alcohol and Drug Research Unit of the Medical Research Council it was reported that the majority of patients younger than 20 years were

males (82%). Adolescents from a Coloured¹ community within the Cape Town region constituted 70% of these adolescents and a slight increase in proportions of Black/African patients was noticed in the 2014 period (Dada *et al.*, 2014). Van Heerden *et al.* (2009) report that the issue regarding substance use in South Africa has long received the interest of many scholars, organisations and researchers. Substance use along with its data linking to a context such as the Western Cape highlights some alarming points such as the increase in substance use related disorders as well as the upsurge of adolescent substance use (Hamdulay & Mash, 2011). As a result this points to the need to develop measuring instruments that are considered to be valid, and effective in detecting those at risk of and actively using substances (Babor *et al.*, 2007). By detecting those at risk, one is able to differentiate between adolescents who are and those who are not at risk for substance use (Babor *et al.*, 2007; Carney, 2014).

According to the United Nations Office On Drugs And Crime (2004, 2014) South Africa has by far one of the largest markets for illicit drugs and it can be stressed that drug trafficking has increased over the years. Furthermore, alcohol is one of the dominant substance's that are abused by adolescents in South Africa with lifetime prevalence rates between 25% and 40% (Nyabadza & Hove-Musekwa, 2010). Plüddemann *et al.* (2010) stated that in 2006, 40% of cases admitted to treatment centres in the Western Cape had Methamphetamine as their main drug of choice. During the July-December period of 2014, it was reported that 35% of patients younger than 20 years are being treated for the abuse of cannabis or methamphetamine (SACENDU, 2015). Methamphetamine as a primary drug of abuse is reported to be the highest in the Western Cape (SACENDU, 2015). The aforementioned drug of choice is stated to be used most among patients under the age of twenty years (SACENDU, 2015). The proportion of drug abuse decreased slightly from 39% in 2014 to 35% (SACENDU, 2014, 2015). Plüddemann *et al.* (2010) corroborates the statement made by Hamdulay and Mash (2011), which posits that methamphetamine distribution,

¹ The traditional racial category 'Coloured' will be used within the present study. Note, that it is a derogatory racial term used in the Apartheid time period. The present study will use it for a specific purpose to indicate the prevalence patterns and possibility for contextual influences.

along with its consumption is one of the major contributors to the high prevalence rate of illicit substance consumption and abuse.

Furthermore, illicit drugs such as cocaine and methamphetamine have become more readily available and accessible to adolescents (UNODC, 2004). Substance use among adolescents in South Africa is a debilitating issue that plagues many communities, though structural factors such as absolute poverty and unemployment make substance use issues particularly difficult to manage in marginalised and poorer communities (Morojele *et al.*, 2009). Substance use among adolescents may have significant health risks and may escalate into experiencing social issues, such as a decline in academic performance along with notable changes in peer group or present maladaptive behaviours (The National Child Traumatic Stress Network, 2008). Substance use among adolescents is also a major contributing factor to crime, violence, intentional and unintentional injuries, increase in risky sexual behaviour and possibly HIV infection, as well as an increased rate of scholastic problems (Morojele *et al.*, 2009). According to Collins (as cited in National Advisory Committee On Drugs & Safety, 2004), young individuals' first experiences with substances frequently involve alcohol and tobacco, which can frequently be obtained in the home or be bought from local shops, while illicit substances are most commonly obtained through peers. Iranpour *et al.* (2015) suggest that substance use prevention among adolescents requires the understanding of underlying causes. Stone, Becker, Huber and Catalano (2012) recommend that, in order to gain an understanding of the root cause of substance use among adolescents, one should first determine the association between risk and protective factors. Iranpour *et al.* (2015) highlight that individual and family factors, school conditions, peer groups, and the community play crucial roles in the use of alcohol, tobacco, and other types of substances.

1.2. Measurement and Validity Issues Related to Substance Use Research

Globally, research interest in the usefulness and effectiveness of substance abuse prevention has increased (Bukoski & Leukefeld, 1991; Gottfredson, Kearley & Bushway, 2008). Bukoski and

Leukefeld (1991) believe that, as a result of the growing interest in substance use, more emphasis has been placed on the rigour of methods employed in studies, but also the quality and suitability of data analysis procedures used. Iranpour *et al.* (2015) indicate that the use of substances is a growing public health issue especially among adolescents. Furthermore, there is also a lack of valid and reliable measuring instruments that focus on factors that have an impact on low socio-economic status communities (Florence, 2014; Iranpour *et al.*, 2015). Recent research has paid very little attention to the reasons for, and factors affecting, the use of substances as a specific community-related problem (Brook, Morojele, Pahl & Brook, 2006; Flisher *et al.*, 2003; Parry *et al.*, 2004).

Florence (2014) believes that, most of the research conducted emphasised the role of tertiary prevention. Greenfield (2010) states that tertiary prevention refers to an intervention that aims to decrease the severity and discomfort connected with a disorder. Mrazek and Haggerty (1994) suggest that the reduction of symptoms in tertiary prevention can only take place through the rehabilitation of the acute and chronic difficulties of a disorder. Doyle (2006) defines tertiary prevention as an attempt to terminate problematic behaviour and to minimise the negative effects through treatment. Thwala (2005) suggests that most psychometric instruments in the substance abuse area were developed to screen at a tertiary level. Ruiz and Strain (2011) highlight that brief self-reports and interviews are often used to assess for substance use among adolescents, which contribute to the screening done at a tertiary level. Furthermore, it is noted that there are considerably less studies on instrumentation that have focused on substance use of adolescents from a preventative viewpoint. Screening is considered to be the first step in identifying whether an adolescent has an issue with substance use, therefore the use of measuring tools is considered to be crucial for the correct classification of risk of substance use problems (Winters & Kaminer, 2008). The detection of adolescents who are identified as substance users can be regarded as valuable in making decisions about the intervention strategies (Carney, 2014; Winters & Kaminer, 2008). Moreover, little is known about the effects of contextual factors on substance use behaviour among South African adolescents (Carney, 2014; Florence, 2014,). Additionally, studies that do examine

these factors, do not measure these from the subjective perspectives of the adolescent. Relatively few studies have been conducted in South Africa on contextual factors that contribute to substance use (Carney, 2014; Florence, 2014). However, many of these studies do assess risk and protective indicators such as gender, race and age (Flisher *et al.*, 2003), as opposed to the more malleable factors that can be addressed in interventions.

1.3. Overview of Main Study and Rationale

The larger study within which the present study is located focused on exploring the impact of contextual factors on substance use among adolescents in a low socio-economic status community in the Cape Metropole. Ultimately the larger study aims to identify whether there is an explicit difference between adolescents who use substances and those who do not, with regard to subjective experiences of individual and contextual factors. The literature emphasised a need for an instrument that will be able to measure the contextual factors that are associated with adolescent substance use in low socio-economic status communities such as in the Western Cape (Dew *et al.*, 2007). The SASUCRI was specifically developed to highlight these contextual realities from a subjective point of view of adolescents (Florence, 2014). The SASUCRI was developed within the ecological systems theoretical systems framework. The SASUCRI also serves as a means to identify at-risk youth and communities in which there are risk factors present. The initial validation study gathered content, structural and external evidence in support for the SASUCRI.

The present study aims to contribute to the validity argument for the SASUCRI. It will contribute specifically to the external validity evidence by exploring the predictive validity of the instrument. The initial validation study did not present convincing external evidence towards the validity argument for the SASUCRI and has thus recommended that this be further investigated using DFA (Florence, 2014). The SASUCRI sub-scale totals will be analysed to determine whether these factors can be considered predictors of substance use among adolescents. The ecological systems theoretical framework of Bronfenbrenner (2005) will also be employed in the present study to examine how the SASUCRI sub-scales function within a specific system.

Please refer to Figure 1 which illustrates the flow of information between the various phases of the larger study and this research study. The present study will locate itself in phase 3 as indicated in the diagram.

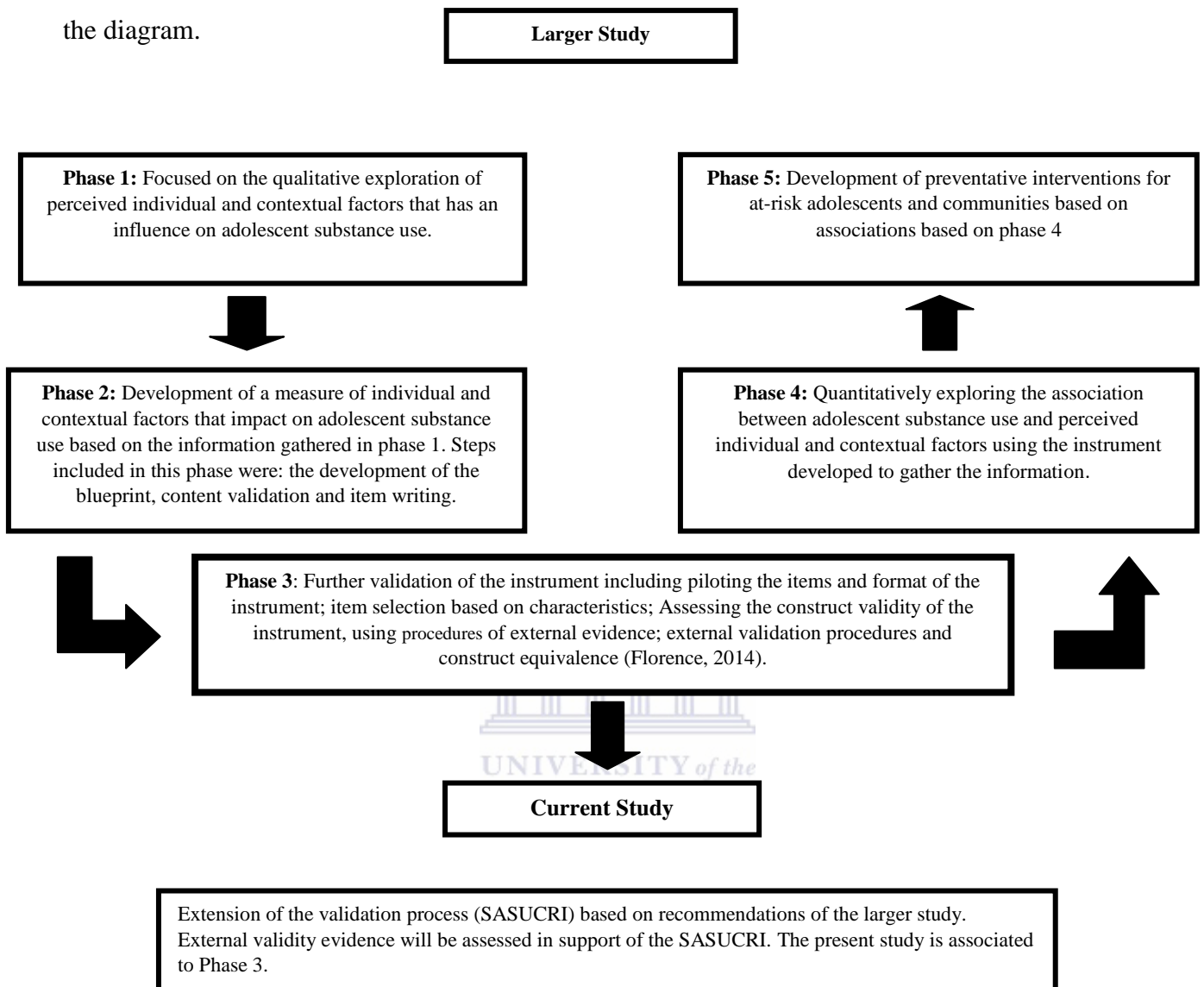


Figure 1: Diagram illustrating the flow of information between the various phases of the larger study and this research study. Note that this research study will locate itself in phase 3.

1.4. Aim of Study

The aim of the present study is to assess the predictive validity of the SASUCRI by exploring the extent to which scale totals predict substance use amongst adolescents.

1.5. Hypotheses

H₀: The SASUCRI sub-scales do not significantly predict substance use among adolescents.

H₁: The SASUCRI sub-scales significantly predict substance use among adolescents.

1.6. Summary of Chapters

1.6.1. Chapter One (Introduction to the present study) provided an overview of the phenomenon of substance use, with emphasis on adolescent substance use in low socio-economic status communities. An outline of the background of the study was provided along with the rationale, aims and hypotheses of the study.

1.6.2. Chapter Two (Instrument Validation) offers a discussion of the relevant literature that relates to the aims of the study. Moreover, it highlights the literature relating to the aspect of external validity. Further, chapter Two will also provide a detailed explanation of the theoretical framework, namely the validity argument which the present study has adopted. This section not only provides a detailed explanation but also explains the appropriateness of the validity argument for the present study.

1.6.3. Chapter Three (Measuring the Factors Associated with Adolescent Substance Use) provides a discussion on the ecological systems theoretical framework and its application to the present study. The ecological systems theoretical framework will be utilised as the present study's theoretical framework, and will assist in the discussion in later sections, which will focus on viewing the SASUCRI sub-scales in these systems.

1.6.4. Chapter Four (Methodology) consists of a comprehensive account of the quantitative methods, in line with the psychometric test theory, that have been employed for the present study. The methodological framework has been explained in this section. Furthermore, a detailed description of the participants, procedure that was followed, data collection method and the data analysis method is provided, followed by an overview of the ethical considerations that were taken into account while conducting the present study.

1.6.5. Chapter Five (Findings) provides the main results and findings of the study. The chapter looks at the results yielded from the analysis that was utilised within the present study, namely DFA. Moreover, emphasis will be placed on the predictive validity of the SASUCRI by exploring the extent to which sub-scale totals predict substance use among adolescents.

1.6.6. Chapter Six (Discussion and Conclusion) will present a comprehensive discussion on the findings of the present study. The chapter looks at the findings and discusses them within the theoretical application of the ecological systems theoretical framework to determine which sub-scales can explicate the contextual realities of adolescents.



CHAPTER TWO: INSTRUMENT VALIDATION

2.1. Introduction to Literature on Instrument Validation

The previous chapter highlighted the significance of substance use among adolescents under the age of twenty years. Chapter One introduced literature on substance use, which is understood as a contextual issue within the South African context (Dew, Elifson & Dozier, 2007; Florence, 2014). The SASUCRI frames substance use as a contextual problem and measures a broad range of ecological systems from the subjective perspective of the adolescent. An instrument similar to the nature of the SASUCRI that is valid for a South African sample of adolescents has not been identified in the literature. Therefore, the aim of the present study is to assess the predictive validity of the SASUCRI by exploring the extent to which the sub-scale totals predict substance use, as a result validity theory was used to guide the procedure to assess for external validity evidence of the instrument throughout the present study. This chapter will review the most relevant literature on instrument validation and will include South African and international studies that have explored predictive validity.

2.2. Arguments on External Validity Evidence

The concept of validity as described in the literature has changed over time to become a broad and rather complex issue (Wolming & Wikström, 2010). Historically, test validity theory in the social sciences accepted different “types” of validity (e.g., content validity, criterion validity). However, contemporary validity theory posits that test validity is a unitary concept (Reeves & Marbach, 2016). This would imply that validity does not exist in separate forms, but rather that these different aspects form part of a larger validity argument. For this reason, different forms of evidence are required, which need to be focused on the following characteristics namely: test content; response processes; internal structure; relation to other variables; and consequences of testing. Clark and Watson (1995) term the process of validity as continuous to accentuate that there is no clearly defined beginning or end. It has been argued that internal validity is the precedence for research

(Calder, Phillips & Tybout, 1983). However, in an applied discipline such as test development, the purpose of instrument development includes the aspect of improving the psychometric properties of the instrument. It is important that psychometric work focuses on external validity evidence (Steckler & Mcleroy, 2008). External validity refers to the degree to which the results of an empirical investigation can be generalised to and across individuals, settings, and times (Bracht & Glass, 1968). Burns and Grove (1999, p. 191) concur with the description of Steckler and Mcleroy (2008) by underlining that external validity is “the extent to which the results can be generalised beyond the sample used in the study”.

According to Kitto (2006), procedures of validity evidence as emphasised by Messick (1989, 1995), refer to the external patterns of correlations accounted for by the construct. Messick (1989) asserts that these procedures of validity evidence consist of the traditional criterion-related validity (concurrent and predictive validity) as well as traditional aspects of construct validity (convergent and discriminant validity). Furthermore, convergent validity indicates the extent to which a measure correlates effectively with other measures with which it is theoretically predicted to correlate. Discriminant validity signifies the extent to which the measure does not correlate with constructs with which it is not theoretically expected to correlate (Foxcroft & Roodt, 2009; Messick, 1995). Campbell and Fiske (1959) revealed that discriminant validity can be assessed by comparing the amount of variance of a construct along with other shared constructs. To establish discriminant validity, one needs to show that measures that are not related are in reality not linked at all (Raykov, 2016; Zaid & Berteau, 2011). Therefore, if the constructs do not correlate with each other, it would contribute to the discriminant function (Campbell & Fiske, 1959).

Campbell and Fiske (1959) created the multitrait-multimethod (MTMM) matrix as an approach to examine the construct validity of an instrument. Figueredo, Ferketich and Knapp (1991) suggest that the MTMM classifies convergent and discriminant validity evidence for comparison of how a measure relates to other measures (Figueredo, Ferketich & Knapp, 1991). Discriminant validity is an important property of psychological scales that are generally examined in the framework of the

multitrait-multimethod approach (Schweizer, 2014). According Campbell and Fiske (1959) the MTMM approach can be understood as the investigation into several concepts (traits) and the employment of multiple methods to establish discriminant validity.

Validity evidence based on associations with other variables is focused on “the relationship of test scores to variables external to the test” (American Educational Research Association; American Psychological Association & National Council on Measurement in Education, 2014, p.14). The collection of this form of validity evidence (external) focuses on examining how certain test scores are connected to measures of the same or similar constructs but also measures the distinct and different constructs (Reeves & Marbach, 2016). Foxcroft and Roodt (2009) refer to concurrent validity as the operationalisations ability to distinguish among groups which it can theoretically differentiate between. In addition, predictive validity highlights the ability of operationalisation to predict what it should theoretically be able to predict (Foxcroft & Roodt, 2009). For example candidates scoring high on an aptitude test with regard to a particular skill should perform well in the related profession. If there is a high correlation between the scale score and the criteria, this serves as evidence of predictive validity (Florence, 2014). Predictive validity refers to the ability of operationalisation’s to predict what it should theoretically be able to predict (Foxcroft & Roodt, 2009). A good example of predictive validity can be seen in the study conducted by De Bruin *et al.* (2005). The study investigated whether scores on intelligence tests and personality questionnaires were able to predict performance in adult basic education and training. The findings of the study showed that non-verbal intelligence tests can be a predictor of performance (De Bruin *et al.*, 2005).

The types of validity evidence as pointed out by Reeves and Marbach (2016) suggest that such evidence relates to how scores relate to other variables as would be theoretically expected. For example, Sirum and Humburg (2011) developed a self-report instrument named the Experimental Design Ability Test (EDAT), which purports to measure experimental design skills. If another self-report instrument is introduced to purport experimental design skills such as the EDAT then it is suggested that scores can either correlate highly with an existing measure of experimental design

ability (convergent). On the other hand, if scores are derived from a self-report instrument that is less correlated or uncorrelated with scores from a measure of experimental design ability then it can be considered as a form of discriminant validity. Nehm and Schonfeld (2008) collected discriminant validity evidence by relating scores from both the Conceptual Inventory of Natural Selection (CINS) and the Open Response Instrument (ORI), which both purport to assess the understanding of concepts relating to natural selection, and a geology test of knowledge about rocks.

Messick (1989) suggest that the impetus of group comparison studies is to test the hypotheses about the inconsistencies in scores across groups that are theoretically projected to perform differently on a specific scale. The focus being placed on comparison studies can assist in providing external evidence, specifically if relationships among groups are compared, adding either to the convergent or discriminant validity. Moreover, research conducted by Van Heerden and Roodt (2007) highlight the role analyses have in correlational studies. Correlational studies are generally utilised to test whether there is a connection between scores and external variables (concurrent and predictive) or among scores and outcomes from other measures that may measure similar (convergent) or different (discriminant) constructs (Florence, 2014). The next section of this chapter will focus on validity theory and how it can be applied to the development of a psychometric instrument.

2.3. Validity Theory

The validity of measurement is of paramount importance in psychology and the behavioural sciences. A crucial indicator of psychometric quality, validity is the bottom line of measurement in these disciplines (Raykov, 2016). A widely accepted informal definition of validity characterises it as the degree to which an instrument indeed measures what it purports to evaluate (Borsboom, Mellenbergh & Van Heerden, 2004). Cronbach and Meehl (1971) highlight that until the middle of the twentieth century an instrument was regarded as valid for whatever it correlated with. The focus was on the instrument as a whole and only criterion-related: therefore emphasis was placed on the correlation between the instrument scores and the criterion variable (Cronbach & Meehl, 1971). The

emphasis was also on content validity of an instrument, which is said to be an assessment of the entire content domain that is being measured (Goodwin, 2000). However, it was found that these procedures of validity are difficult to assess if the constructs are challenging to define, as it is frequently the case with social constructs (Florence, 2014). Validity can be regarded as an integrated evaluative judgment of the degree to which experiential evidence and theoretical foundations support the adequacy and suitability of interpretations (Messick, 1990). Cronbach (as cited in Messick, 1989) substantiates the statement made by suggesting that validity is not a single property of the test or assessment per se, but rather that it contains the meaning of test scores. Messick (1995) also suggest in his later work that validity is not a property of the test or assessment as such, but rather of the meaning of the test scores.

Additionally, test scores form part of a function not only of the items or stimulus conditions, but also of the persons responding as well as the context of the assessment. In particular, what needs to be valid is the meaning or interpretation of the score; as well as any implications for action that this meaning entails (Cronbach, 1971). Messick (1995) postulates that the extent to which score meaning and action implications hold across persons or population groups and across settings or contexts is a persistent and perennial empirical question. Consequently, this is said to be the key reason why validity should be considered as an evolving process and a continuous process (Messick, 1995; Sireci, 2007). Validity is about the inferences, interpretations, actions, or decisions that are based on a test score and not the test itself. It refers to the degree to which all of the accumulated evidence supports the intended interpretation of test scores for the proposed purpose (Messick, 1995; Sireci, 2007). Moreover, validity is concerned about whether the inference one makes is appropriate, meaningful, and valuable given the individual or sample with which one is dealing and the context in which the test user and individual/sample are working. Therefore, one cannot separate validity from the sample or the context in which, the information was obtained.

According to Messick (1989) there are six procedures of validity evidence. Firstly, the content validity procedure of validity evidence which highlights the construct relevance and representativeness. Secondly, the structure demands that the internal structure of the instrument has to be consistent with the internal structure of the construct domain. Third, the external factors can be understood as the extent to which the relationship between the instrument score and other measures or behaviours reflect relations within the construct. The fourth aspect is generalisability, which represents coverage of the content and processes of the content domain. The fifth procedure involves the substantive aspect of validity that suggests appropriate domain content and processes. Lastly, consequential aspects of validity denote an accumulation of evidence in support of positive consequences (Messick, 1998).

Messick (1995) maintains that these aforementioned aspects function as general validity criteria for educational and psychological measurements, and that they are set out in The Standards for Educational and Psychological Testing (American Educational Research Association [AERA], American Psychological Association (APA), 1999). Messick (1995) has argued extensively that validity cannot exclusively depend on any one of the aforementioned complementary forms of evidence in separation from the others. These interdependent forms of evidence are collected to contribute towards the construct validity of an instrument. The different processes emphasise the issue of the approximate truth of the conclusion that the operationalisation accurately reflects its construct in various ways (Hubley & Zumbo, 2011). Furthermore, this evidence is integrated into the validity argument to demonstrate the extent to which the instrument is or is not a valid measure of the construct. Procedures are utilised based on whether they yield evidence for or against the validity of the instrument. Though Messick (1994) argues for all these types of evidence it is important to note that the quality of the evidence collected is more significant for the argument than the quantity (Hubley & Zumbo, 2011).

According to Messick (1989) not all the procedures mentioned above can be employed in every validation study or even every group of studies. Only relevant procedures should be selected to gather evidence for or against the proposed use and interpretation of the instrument. However, the AERA and NCME (1999) suggest that the Standards for Educational and Psychological Testing caution that robust evidence in support of one procedure of validity evidence does not reduce the need for other sources of support, and multiple sources of evidence are preferred. Cook and Beckman (2006) also warn that instruments that demonstrate evidence from limited sources should be used with caution. Another key aspect of construct validation has to do with construct underrepresentation and construct-irrelevant variance. Cook and Beckman (2006) postulate that construct underrepresentation occurs when the measure fails to include important dimensions of the construct whereas construct-irrelevant variance means that variance due to other distinct constructs, variance due to the method used, and unreliable or error variance are also present.

The process of validating an instrument is said to exist mainly to search and gather evidence and then utilise this as a basis for arguments to discount threats to construct validity. Messick (1995) argues that the process is scientific and rhetorical in that it requires evidence and argument. Scientific enquiry and rational argument are combined to justify score interpretation and use (Messick, 1995). A validity argument may call for a revision of the instrument, of the administration of the instrument, or of the theoretical construct underlying the interpretation. If any revisions are made, the instrument must be further validated, thus making the process iterative, an on-going cycle of assessing and revising different aspects of instrument interpretation (Messick, 1995; Sireci, 2007). An instrument can become more and more valid as adjustments are made, but it will never be perfectly valid as validity can never be proven; one can only provide arguments towards validity (Cook & Beckman, 2006). Sireci (2007) concurs by suggesting that additional validity evidence is needed for the so-called high-stakes tests. Cook and Beckman (2006) emphasise that various types of instruments depend more profoundly on certain categories of validity evidence.

Additionally, these mentioned features of validity ensure that all aspects are covered. In validity studies arguments have to be provided for not considering any of these bases. Messick (1990) asserts that validity is an evolving property and validation is a continuing process. It is noteworthy that the present study seeks to improve on the initial validation by assessing the predictive validity of the sub-scales of the SASUCRI. The process of validating an instrument exists to seek and gather evidence and then use this as a basis for arguments to discount threats to construct validity. Moreover, the validity argument may suggest a revision of the instrument, of the administration of the instrument, or of the theoretical construct underlying the interpretation. Cook and Beckman (2006) continue by stressing that if any adjustments are made, the instrument must be further validated, thus making the process iterative, an on-going cycle of evaluating and revising different aspects of instrument interpretation.

Cronbach and Meehl (1955), suggest that validity was traditionally grouped into content, construct and criterion-related validity. Messick (1990) explores the latter concept's validity by stating that it can be introduced by comparing the test scores with one or more external variables (criteria) to provide a direct measure of the characteristic or behaviour that is in question. Drost (2012) continues by highlighting that predictive validity refers to the ability of a test to measure the outcome in the future. This can be done by assessing the strengths of association between the predictor and criterion (Drost (2012)). Drost (2012) suggests that one can assess these strengths of associations by using correlations. Correlations can be understood as a measure of the strength of a relationship between two or more variables (Hauke & Kussowski, 2011). Messick (1990) along with Goodwin and Leech (2003), states that there should be an emphasis on the concepts surrounding validity, which can be obtained in current testing standards and guidelines. These concepts are presented in their classic version to provide a standard against which to assess the importance of changes, such as a shift in the focus of content validity from the sampling of situations to sampling of domain behaviours and a move in construct validity from being in contradistinction to content and criterion validities (Messick, 1990).

2.4. Empirical Studies Focusing on Validity

Messick (1989) noted that it is not advisable to utilise one indicator as a point of comparison. Instead, he suggested that the process employs multi-measures (when instrument scores are compared to different construct scores, but using the same method of measurement) or multi-methods (when instrument scores are compared to different construct scores using different methods of measurement) (Messick, 1989). These methods are utilised to discount threats to validity. Discriminant validity can be regarded as advantageous especially in discounting rival alternatives to construct interpretations. Empirical evidence of these connections can serve as proof for using the scores for the applied purpose (Messick 1998). This section of the literature review will focus on the empirical studies that placed attention on the aspects of validity as highlighted by Messick (1989, 1995) as well as studies that have concentrated on discriminant validity.

2.4.1. International Studies Focusing on Validity Evidence

Zillich, Doucette, Carter and Kreiter (2005) conducted a study that sought to develop and validate an instrument known as the Physician–Pharmacist Collaboration Instrument (PPCI). The main purpose of the study was to develop a conceptual model of collaborative working relationships between pharmacists and physicians. The 27 items of the PPCI was analysed for its factor structure, internal consistency, construct validity, and other psychometric properties. Furthermore, the 27 item PPCI was developed to assess seven themes about professional relationships using Likert scales. The PPCI was mailed to a random sample of (N=1000) primary care physicians. Principal components analysis was utilised to assess the structure and uncover underlying dimensions of the initial instrument. The items were evaluated for inclusion or exclusion into a refined instrument. Moreover, Zillich *et al.* (2005) also assessed the internal consistency by calculating alpha coefficients for each identified factor. The convergent validity was assessed utilising Spearman correlations between the identified factors and a previous measure of collaborative care.

In conclusion of the measurement refinement Zillich *et al.* (2005) used confirmatory factor analysis to evaluate the fit of both versions of the instrument. The findings of the study showed that three hundred and forty usable surveys were returned for a response rate of 34%. Almost 70% of the respondents were male with a mean age of 46 years. The majority of respondents were family physicians in practice (72.1%) in private practice (67.3%). Three unique factors were identified during principal component analysis and utilised in a confirmatory factor analysis (Zillich *et al.*, 2005). The findings of the study indicate that the PPCI (14 item reduced model) has good reliability and validity (Zillich *et al.*, 2005).

The development of a psychometric instrument is regarded as an iterative process (Messick, 1995, Sireci, 2007). This can be seen through the study conducted by Zillich *et al.* (2005) where the MTMM approach was utilised. Therefore, various statistical methods were employed to measure working relationships among medical professionals. External evidence was provided by reassessing the predictive validity of the Implicit Association Test. The findings were similar to the work done by Blanton *et al.* (2009). The statistical methods employed in validating these instruments were different but the theoretical underpinning of providing validity evidence as suggested by Messick (1989, 1995) remains similar. McConnell and Leibold (2001) explored the links between implicit bias and discriminatory behaviour that have been invoked to support strong claims about the predictive validity of the IAT. In that study it was revealed that the inclusion of race IAT scores in regression models reduced prediction errors by only small amounts and the IAT scores did not permit prediction of individual-level behaviours (McConnell & Leibold, 2001). Furthermore, the results were not robust when the impact of rater-reliability, statistical specifications, and outliers were taken into account. The reanalysis of McConnell and Leibold (2001) revealed a pattern of behaviour consistent with a pro-black behavioural bias, rather than the anti-Black bias suggested in the initial validation study. Therefore, it can be stressed that validity is an iterative process, as highlighted in these abovementioned studies.

The study conducted by McConnell and Leibold (2002) focused on the predictive validity of an instrument and used Messick's suggestions of further validating an instrument if any changes are made. The study conducted by McConnell and Leibold (2002) along with Neff and Zule (2002) focused on various factors that may influence the use of substances, but the aspect of providing evidence to assess the predictive validity remains similar, although contrasting statistical methods were employed. Neff and Zule (2002) reported on the predictive validity of a measure of treatment readiness for out-of-treatment drug users tapping into dimensions of perceived problem severity, perceived need for formal treatment, motivation for treatment, and negative attitudes toward treatment was examined using data from a National Institute on Drug Abuse (NIDA) funded HIV outreach intervention in San Antonio, Texas. Furthermore, Neff and Zule (2002) revealed that logistic regression was utilised as an analysis technique to predict substance abuse. Also, six hundred and seventy-three drug users in an HIV outreach intervention participated in the research study where it was reported that treatment readiness dimensions accounted for a 12% increase in variation in "use of any modality" and 14% for "use or attempted service use" (Neff & Zule, 2002). The category "motivation to quit" was a significant predictor of "use of any modality" and both perceived "need for treatment and motivation to quit" as significant predictors of "use or attempted use". In addition, Neff and Zule (2002) reported within their research paper that findings support the significance of the individual's perception of "readiness" to alter substance-abusing behaviour and entry into treatment.

2.4.2. South African Studies Focusing on Validity Evidence

Similarly, to the study conducted by Zillich *et al.* (2005), De Bruin and De Bruin (2011) conducted a study where the main objective was to develop an instrument that is unique to the South African context that one can use to measure learner self-directedness in South African work environments. The researchers fit the responses of 519 participants to 22 items to the Rasch rating scale model (De Bruin & De Bruin, 2011). The Rasch analysis provides three sets of significant results. These are

item parameters, person parameters and item and person fit statistics (De Bruin & De Bruin, 2011). De Bruin and De Bruin (2011) reported that they only retained 13 of the original 22 items. The hierarchy of item locations supported the construct validity of the scale. Hierarchical factor analysis showed the presence of one higher-order factor and three residual first-order factors. The Rasch analysis and the factor analysis suggested that the 13-item Learner Self-Directedness in the Workplace Scale (LSWS) measures a single one-dimensional construct (De Bruin & De Bruin, 2011). One limitation of the study is that the researchers did not replicate the findings in an independent group of participants (De Bruin & De Bruin, 2011). Despite the findings that support construct validity of the scale, recommendations point out that emphasis be placed on the predictive, discriminant and convergent validity of the LSWS.

Ekermans and Herbert (2013) also focused on discriminant and convergent validity of the Psychological Capital Questionnaire 24 (PCQ-24). The PCQ-24 was developed in the USA; however, the questionnaire was introduced into a South African context, specifically in the Western Cape, to measure the construct “psychological capital”. Du Plessis and Barkhuizen (2011) conducted the first study on the application of the PCQ24 within a South African context. It was revealed that the findings were not consistent with the current knowledge base on the psychometric properties of the instrument (Ekermans & Herbert, 2013). The findings of the initial study done on the PCQ24 showed that there is a need to further validate the instrument within a unique South African environment (Du Plessis & Barkhuizen, 2011). The norms of this instrument needed to be adapted to a South African context as this can assist in the inferences drawn from “psychological capital” test scores (Ekermans & Herbert, 2013).

The construct “psychological capital” in this case refers to a higher order constellation of positive psychological components that consists of hope, optimism, self-efficacy and resilience, which may contribute to decreased stress (Ekermans & Herbert, 2013). The study used a cross-sectional survey design. The sample consisted of employees at managerial and non-managerial levels, from a

medium-sized construction company in the Western Cape, South Africa (Ekermans & Herbert, 2013). The study conducted by Ekermans and Herbert (2013) analysed the data by using item analysis, confirmatory factor analysis and exploratory factor analysis to assess for discriminant validity mainly to highlight the integrity of the PCQ-24. The findings provided preliminary evidence of construct and discriminant validity, reliability and significant relations with external validity (Ekermans & Herbert, 2013).

Kader, Seedat, Koch and Parry (2012) conducted a study on the AUDIT and DUDIT in comparison to biomarkers for alcohol and drug use among HIV-infected clinic patients in South Africa. The study conducted did not focus on discriminant validity, instead the authors focused on predictive validity where they evaluated the use of the AUDIT and DUDIT providing valuable and reliable information of alcohol and drug consumption when compared with the use of biomarkers of alcohol in hair and drugs in urine (Kader *et al.*, 2012). The research study used a cross-sectional design. The sample consisted of HIV positive patients that were receiving treatment at an HIV clinic in Kraaifontein, Cape Town. Urine samples were collected and analysed for alcohol, in Fatty Acid Ethyl Esters (Kader *et al.*, 2012). The findings of the AUDIT showed that 41.9% of participants screened positive for harmful drinking and 30.2% of participants on the DUDIT presented positive for having a drug-related issue (Kader *et al.*, 2012). It can be highlighted that there are notable differences between the above-mentioned self-report measures and the SASUCRI. The main difference is that the DUDIT and AUDIT can only measure substance use to establish problematic behaviour, whereas the SASUCRI was designed to predict risk.

2.5. Arguing for the Unitary Concept of Validity

It was proposed that validity should be conceptualised as a unitary concept, namely, construct validity, which refers to the extent to which scores of an instrument can be utilised for the purposes for which it was developed (Messick, 1995; Reeves & Marbach, 2016). Sireci (2007) continues this discussion on validity by emphasising that the unitary conceptualisation of validity has undermined

the importance of content validity in evaluating the utility and appropriateness of tests used in educational contexts. Goodwin and Leech (2003) argue that the traditional notion of validity conceals the unitary nature of validity, whereby it compartmentalises thinking about validity, and explicitly promotes the incorrect notion that all procedures of validity are equal. Sireci (2007) reports that the unitary conceptualisation of validity is philosophically sound and can be applied to virtually any testing program. In addition, Messick (1995) reports that the essence of unified validity is that the appropriateness, meaningfulness and usefulness of score-based inferences are inseparable and that the integrating power derives from empirically grounded score interpretation.

Messick (1995, 1989) suggests that meaning and values are essential to validation. Furthermore, what is required is a method of configuring validity evidence that foresees unnecessary dependence on selected forms of evidence as opposed to supplementary evidence (Messick, 1995). A unified validity framework that meets these requirements differentiates between the two connected features of validity as a unitary concept (Hubley & Zumbo, 2011; Messick, 1989). In addition, Hubley and Zumbo (2011) highlight that one facet to the validity concept is the source of justification of testing that is established on the judgment of evidence supporting the meaning of scores. The second aspect is to observe the outcome of the assessment which can be done through interpretation or in applied use (Hubley & Zumbo, 2011).

2.6. Summary of Literature

Overall, the validity of assessing instruments requires several sources of evidence to build the case that the instrument measures what it is supposed to measure (Kane, 2002; Sullivan, 2011). Determining validity can be viewed as constructing an evidence-based argument regarding how well a tool measures what it is practically intended to do (Sullivan, 2011). The overall findings in the literature demonstrate that validity evidence is crucial in the development of psychometric instruments. For example, the literature has demonstrated that the process of validation is scientific and that it requires evidence and argument (Messick, 1995).

Aspects of validity were discussed in this chapter. International studies conducted by Zillich *et al.* (2005) and Neff and Zule (2013) focused on providing either internal or external validity evidence to their respective studies. The aforementioned studies placed emphasis on the convergent and discriminant validity evidence to investigate the psychometric integrity of the measurement instruments. Similar to international studies, De Bruin and De Bruin (2011) along with Ekermans and Herbert (2013) demonstrated that evidence is required to build on the view-point that validity is a continuing process as evidence can be gathered as a basis for arguing to discount threats to construct validity. Further, emphasis was also placed on findings of external validity evidence for these studies. It is noteworthy that including external validity evidence in a validity argument can be considered as an advantage. External validity can show that the constructs represented in an instrument account for the external pattern of correlations (Florence, 2014).

2.4 Conclusion

The review of the literature assisted in the argument for the validity theory in the present study. In addition, the review of the literature indicates that the process of validation is considered to be ongoing and that scientific evidence is required to make informed decisions about a psychometric instrument. Validity theory along with the concepts of Chapter Three will aid in formulating the discussion regarding the SASUCRI sub-scales in later chapters. The next chapter will focus on the ecological systems theoretical framework and how it informed the development of the SASUCRI sub-scales.

CHAPTER THREE: MEASURING FACTORS ASSOCIATED WITH SUBSTANCE USE

3.1. Introduction to the Ecological Systems Theoretical Framework

Bronfenbrenner is considered as one of the leading world experts in the field of development psychology worldwide. His most important brainchild was the ecological systems theoretical framework, where he defined four concentric systems which are the micro-, meso-, exo- and macro-systems. These systems influence and are in turn influenced by an individual. A fifth system was later added namely the chrono-system to contribute to the aspect of time (Krishnan, 2010). The ecological systems theoretical framework was used as the present study's theoretical framework and played a fundamental role in (not only the development of the SASUCRI) but also understanding how the SASUCRI sub-scales would interact in the present study. Viewing the SASUCRI sub-scales as predictors of substance use also offers the opportunity to consider the contextual realities of adolescents functioning in various systems.

Viewing the findings of the SASUCRI sub-scales from a numerical perspective has little value on its own. However, viewing these sub-scales through the lens of the ecological systems theoretical framework does provide a rich and detailed viewpoint on how adolescents may function within these systems. The ecological systems theoretical framework was employed throughout the steps in the development of the SASUCRI. There were six steps involved in how the ecological systems theoretical framework informed the development of the SASUCRI (Florence, 2014). One of these steps entailed the assessment of external validity evidence. Further, the instrument was designed to capture the contextual realities of adolescents using substances in low socio-economic status communities within this framework. Chapter Four will focus more on how the ecological systems theoretical framework informed the development of the SASUCRI.

The ecological systems theoretical framework and its systems along with various instruments and its suitability to identify adolescents and communities at risk for substance use will be discussed in

this chapter. Therefore, viewing measurement instruments that were adapted for South African use is crucial in understanding the pitfalls of test-use in contexts similar to South Africa.

3.2. Ecological Systems Theoretical Framework

Based on the literature it is clear that there are bidirectional effects of the factors in a child's environment that influence his or her development (Bronfenbrenner, 2005; Paquette & Ryan, 2001).

The ecological systems theoretical framework postulates that a child's biological disposition and environmental factors, along with the interaction between these two components, are able to affect the child's development (Paquette & Ryan, 2001). The role of stress on the quality and context of the child's environment can have a ripple effect in multiple systems (Krishnan, 2010).

Bronfenbrenner (2005) maintains that the child's development and interaction with the environment is perceived to be of a complicated nature. Complexity can arise when the child is developing and maturing physically but also cognitively (Bronfenbrenner & Evans, 2000; Paquette & Ryan, 2001).

The child is positioned in an environment that is constructed of concentric circles of influence with the child as the smallest circle in the centre (Bronfenbrenner, 2005; Paquette & Ryan, 2001).

Further, the child is also positioned within each of the systems, where the systems are connecting within each other (Bronfenbrenner, 2001, 2005; Krishnan, 2010; Lerner, 2002). Influence within a child's environment can be considered as bi-directional in that behaviour can have an impact on the system (Bronfenbrenner, 2001, 2005; Krishnan, 2010; Lerner, 2002). Further, Bronfenbrenner developed his own definition of human development whereby it has been suggested that development is the process through which the person acquires a more extended and valid conception of the ecological environment (Paquette & Ryan, 2001). Based on Kurt Lewin's concepts, Bronfenbrenner developed a conceptual theoretical framework of the social ecology of human development (Bronfenbrenner, 1989; Paquette & Ryan, 2001). This framework is useful in understanding the interaction of systems that influence development and is not considered to be predictive as it highlights the interactions between systems that contribute to an outcome. In addition, Bronfenbrenner (1989) utilised and restructured the formula of development as created by

Kurt Lewin (1935) which allows interaction and development to be perused as a formula of understanding: $D = f(PE)$, individual development (D) is a function (f) of the interaction between person (P) and environment (E).

Bronfenbrenner's concept does provide the framework by establishing a developmental perspective, defining the social contexts for investigation, specifying the need for an inclusive, multidimensional view of these social contexts, and suggesting relationships of the contexts to each other and the developing adolescent. Further, Bogenschneider (1996) reported that adolescent development is considered to be too multifaceted to be researched from a narrow perspective and recommends that the risk, protective and ecological models be amalgamated when researching the effect that these factors may have on maladaptive behaviour. Paquette and Ryan (2001), concur with the notion of factors that are interrelated by stressing that the interaction among factors in the child's physical development and close family/community environment, along with the societal landscape can fuel and steer developmental process. Tension in any one system may have consequences throughout other systems (Paquette & Ryan, 2001).

3.3. Structures of the Ecological Systems Theoretical Framework

Paquette and Ryan (2001), state that Bronfenbrenner's attention was on studying development in the natural setting as opposed to a laboratory setting. He argued that children should be studied in their homes, schools and playgrounds (Krishnan, 2010; Paquette & Ryan, 2001). This focus on an ecologically valid setting initially led to an emphasis on the environmental influences on development, with the introduction of the micro-, meso-, macro-, and exo-system (to be described below) being used to explain the impact that context has on a child's development.

According to Bronfenbrenner and Evans (2000), aspects such as development along with socialisation can be affected by systems of the environment with which a person is interacting. This contains three noteworthy assumptions: firstly, the person is suggested to be an active player, exercising influence on the environment; secondly, the environment is persuading the person to

acclimatise to its conditions and limitations (Bronfenbrenner 1979; Saarinen et.al., 1994); lastly, the environment is comprehended to consist of different size entities that are placed one inside another and, of their reciprocal relationships between the micro-, meso-, exo- and macro-systems. (Bronfenbrenner 1979; Saarinen et.al., 1994)

3.3.1. Micro-System

The micro system is made up of the child's most immediate environment, and involves those individuals in close relationship to the child for a considerable amount of time, such as parents/caregivers and teachers (Berk, 2000). Swick and Williams (2006) believe that this system consists of the child's initial and most intimate learning context, which then becomes the position of reference. Paquette and Ryan (2001), maintain that this system encompasses the interaction between the child and direct sources of contact which involve close relationship. Bronfenbrenner terms this interaction bi-directional influence and points out how such relationships exist on the levels of all environments (Berk, 2000; Paquette & Ryan, 2001). Establishing trust in this system through close relationships such as the family is considered important (Calnan & Rowe, 2005; Florence, 2014). Furthermore, loving relationships can lead to healthy personality development (Calnan & Rowe, 2005; Paquette & Ryan, 2001; Swick & Williams, 2006). Studies conducted have used the ecological systems theoretical framework to explain adolescent problem behaviour where it was established that the quality of parenting can either have a positive or negative influence on adolescent substance use (Brenner, Bauermeister & Zimmerman, 2011; Chuang *et al.*, 2005). Chuang *et al.* (2005) highlighted that parental substance use can be considered a risk factor for alcohol use especially in adolescents, who may model their parents' behaviour.

Interaction within this system is an important key to this theory (Paquette & Ryan, 2001). In a microsystem the bi-directional interactions are considered to be at their strongest and they have a powerful influence on the person. Nonetheless, the interactions on the outer levels can have an influence on inner structures (Paquette & Ryan, 2001). The child's relation to other people in the micro-system is believed to be dyadic and later on the child can handle several interactional

relationships. Thus, indicating that this system is where the person develops important relationships. Kulis *et al.* (2007) suggest that the degree of influence of each environment varies with the age of the child. Younger children are believed to be more susceptible to influence from family and school whereas adolescents are also influenced by their peers and the neighbourhood in which they are developing (Florence, 2014).

3.3.2. Meso-System

The meso-system refers to the relations among the micro-system which the child is part of during a given period of development, such as home, school or child-care facilities, peers and the neighbourhood (Berk, 2000; Boemmel & Briscoe, 2001). The meso-system can also be described as a system of micro-system (Berk, 2000). Paquette and Ryan (2001), substantiate Berk's (2000) description of a meso-system by underlining that this system produces the connections between the child and microsystems, which comprises of connections between the child's teacher and the parents along with the neighbourhood. The interactions between the micro-system infiltrate the child's life in every dimension and can nurture development (Florence, 2014).

The interaction of the micro system within this level is important in understanding the theory. There are several types of interactions that take place in this system. The most basic type of interaction is referred to as the ecological transition, which is when the child moves into an unfamiliar context such as starting school, graduating, and the first job. Each of these transitions has developmental consequences, for example developing independence when away from home for the first time (Berk, 2000). Saarinen *et al.* (1994) accentuates that it is important to see if the influencing factors of socialisation have positive or negative consequences. Boemmel and Briscoe (2001) suggest that various micro-systems can maintain each other. However, the developing person may perceive systems as clashing pressures where behaviour might be influenced (Saarinen *et al.*, 1994).

3.3.3. Exo-System

Boemmel and Briscoe (2001) indicate that the exo-system entails the connection between two settings, at least one of which does not generally involve the individual. This system refers to settings such as the parents' workplace, the school attended by an older sibling or health/educational services in the community (Berk, 2000; Boemmel & Briscoe, 2001). The person may not be directly involved at this level, but it is suggested that he or she can feel the positive or negative forces involved with the interaction of the system (Berk, 2000). The exo-system is regarded as an extension of the meso-system (Berk, 2000). These levels (direct and indirect) can involve significant others or not, and generally involve any institution that makes decisions that can have an effect on family life (Florence, 2014). Carney (2014) suggests that the role of the adolescents' neighbourhood may have an influence on problem behaviours. Living in high-risk neighbourhoods has been found to have an impact on adolescents' behaviours (Carney, 2014; LaVeist & Wallace, 2000). LaVeist and Wallace (2000) indicate that adolescents living in areas with lower socio-economic status may have more access to alcohol. Ennet *et al.* (2006) found that adolescents who had neighbours who consumed substances were more likely to participate in alcohol use.

3.3.4. Macro-System

The macro-system consists of the overarching pattern of micro-, meso-, and exo-system characteristics of a specified culture, sub-cultural level and includes beliefs, norms, customs, political trends, lifestyles, laws and community practices (Berk, 2000; Boemmel & Briscoe, 2001). The macro-system can be thought of as a societal blueprint for a particular culture, subculture, or other broader social context. The impact of larger principles defined by the macro-system has a cascading influence throughout the interactions of all other layers (Berk, 2000; Paquette & Ryan, 2001). Carney (2014) suggests that media and advertising are factors that can assist in explaining adolescents' substance use. Anderson, de Bruijn, Angus, Gordon, and Hastings, (2009) found that exposure to media and alcohol advertising is connected with the likelihood that adolescents will

initiate alcohol use. It was also found there is an increase in consumption in those that are already using alcohol (Anderson *et al.*, 2009; Bronfenbrenner, 1989; 2005). The macro-system influences how, what and where relationships are carried out. The relationships in the macro-system assists in sustaining the balance in an individual's life and can create a structure of beliefs, services and support.

3.3.5. Chrono-Systems

The chrono-system encompasses the dimension of time as it relates to a child's environment. The dimension of time within this theory relies on aspects, such as chronological age, duration and nature of periodicity. Elements within this system can be regarded as external, such as the timing of a parent's death, or internal, such as the physiological changes that occur with the aging of a child (Paquette & Ryan, 2001). Bronfenbrenner (1989) mentioned that the chrono-system is a description of evolution, or stream of individual development of the external systems in time. Bronfenbrenner (1989) came to realise that timing can also have an impact on the development of a child and as a consequence on other ecological systems.

3.4. Application of the Ecological Systems Theoretical Framework

The ecological systems theoretical framework has proved valuable in several studies done in the area of drug abuse (Bogg & Finn, 2009; Goodman *et al.*, 1996; Swick & Williams, 2009). This section of the paper will focus on studies that have used the ecological systems theoretical framework, but also instruments that were adapted to the South African context.

Bogg and Finn (2009) utilised the ecological systems theoretical framework to assess the utility of a series of hypothetical role-based alcohol-consumption scenarios. The study employed scenarios, along with measures of impulsive sensation seeking and a self-report of weekly alcohol consumption. The scenarios and the self-report were administered to a sample of alcohol-dependent and non-alcohol-dependent college-age individuals (N=170). The ecological systems theoretical framework was also implemented by Goodman *et al.* (1996) to evaluate community-based

interventions to prevent substance use. Goodman *et al.* (1996) assessed for the potential to alter risk behaviours in the social and cultural context in which they occur. Another study conducted in the United States of America by Swick and Williams (2006) also used the ecological systems theoretical framework for assessing the implications for working with families that experience stress. The study by Swick and Williams (2009) presented key elements of Bronfenbrenner's perspective and applied it to strategies for effectively assisting families that are experiencing strain. The study looked at specific stressors such as homelessness, violence, and chemical dependence that may be detrimental to the family system (Swick & Williams, 2009).

The developmental family interactional perspective derived from American studies such as the study conducted by Swick and Williams (2009) can be considered less appropriate in a South African context (Brook *et al.* 2006). Brook *et al.* (2006) recommend that the ecological systems theoretical framework can be utilised to describe the associated factors along with revealing how these factors may influence an individual from a South African point of view. It can also be said that interventions use the ecological systems theoretical framework to understand the social behaviour of certain social phenomena (Wechsberg *et al.*, 2008). It can be highlighted that these aforementioned studies have used the aspect of behaviour to investigate the social issues of substance use. Therefore, exploring this in a South African context in terms of an ecological systems theoretical framework could be beneficial as factors can be viewed at the different system (i.e. personal, family, community, cultural, societal, political and historical).

3.5. Measurement Instruments that Have Been Adapted to the South African Context

The existing research conducted by Swick and Williams (2009), who along with Bogg and Finn (2009), highlighted how the ecological systems theoretical framework can be used in a specific context. However, tests that have been adapted for the South African context, but fail to meet the requirement of prevention are: The Youth Risk Behaviour Survey System and the Communities that Care Survey (Morojele *et al.*, 2002; Reddy *et al.*, 2010). These instruments have been included in this section to exhibit that there have been attempts made to search for psychometric instruments

that measure factors associated with adolescent substance use. These instruments were also included to reveal the gap in adapted psychometric instruments that seek to identify at-risk youth. The SASUCRI was designed within a South African context and measures factors that are unique to the population. Prevention can be considered a requirement as it allows for at-risk youth to be targeted and ultimately be provided additional support within their community. Targeting at-risk youth is crucial in the aspect of prevention, which is a focus of the SASUCRI. The SASUCRI also utilises context specific items as can be seen in the questionnaire (see Appendix G). Prevention can be considered important, especially as it can form part of reduction activities to reduce the use of substances (Morgan, 2001). For example, the DUDIT and AUDIT measures substance use to establish problematic behaviour. They were not necessarily designed to predict risk, but rather to focus on preventative measures to act against problematic behaviour in youth. These two instruments were adapted and utilised in a South African context, yet it is largely considered to be inappropriate as they were designed for purposes other than prevention and cannot be used to identify adolescents or communities at risk for substance use (Morojele *et al.*, 2002; Reddy *et al.*, 2010). These instruments failed to capture the contextual factors that are associated with adolescent substance use in a context, as it was developed in a context other than South Africa. The SASUCRI was designed to capture the contextual realities of these adolescents functioning in low socio-economic status communities and can be used to inform intervention. Therefore, it can be stressed that the SASUCRI was not required to be adapted from an international psychometric instrument to target at risk youth within a South African population. The SASUCRI can be described as unique and suggests that there is a need for such a psychometric instrument. The psychometric instruments that were adapted from abroad will be discussed accordingly:

The Youth Risk Behaviour Survey System (YRBSS) is an epidemiological surveillance system that was developed in 1990 in the United States of America. The development of the YRBSS was started by the Centre for Disease Control and Prevention (CDC) to monitor health risk behaviours that can contribute to mortality and morbidity and social problems among youth and adults. The

idea was to shift attention to the behaviours of youth that can cause risk to their health, and affect their adult lives. These behaviours start in youth, but either extends into adulthood or have implications for adulthood. Kolbe, Kann and Collins (1993), demonstrated how health problems among youth are due to preventable behaviours. Alcohol and drug use are associated with much of the leading causes of mortality and morbidity (Perrine, Peck & Fell, 1988). Validating the YRBSS continued, as item analysis and assessing for reliability of the instrument took place over a long period. In 2002 and 2008 the South African version of the YRBSS was adapted and used for nationwide surveys of youth risk behaviours (Reddy *et al.*, 2003, 2010). It was noted that certain questions were added to the American version of the YRBSS and others were altered to improve its applicability for South African youth in terms of specific risk behaviours and contextual exposure, yet the psychometric properties of these adapted versions were never included in the YRBSS reports of 2002 and 2008 (Florence, 2014).

According to Blanken (1993), the YRBSS does not provide in-depth descriptions of drug use and that the instrument is more valuable in assessing the relationships between different risk behaviours. The instrument also puts emphasis more on substance use and other risky health related behaviours instead of shifting attention to specific contextually related risks for adolescent substance use. Constructing measures that are suitable for other communities at risk for substance use can be a factor that must be considered in this instrument (Blanken, 1993). Developing measures for other communities can also form part of the validation process of providing external validity evidence. In addition, the ecological systems theoretical framework can be incorporated with this instrument in efforts to understand at risk youth in communities, however, the nature of the YRBSS only takes into account the relationships between risky behaviours adopted by adolescents, and fails to introduce measures that can focus on prevention.

The “Communities that Care” survey worked within the prevention science paradigm, from the premise that an understanding of risk and protective factors would assist in targeting preventative interventions. The prevention science paradigm comprises of the identification of risk and

protective factors along with the development of interventions that can decrease problem behaviour, by addressing the risk and protective factors connected with problematic behaviours. Arthur *et al.* (2002) used a risk-and-protection-focused prevention approach, where a self-report instrument to measure risk and protective factors associated with anti-social behaviour were developed in an American context specifically focusing on adolescents aged 11-18 years.

A social development model was employed as the theoretical lens through which the study was conceptualised (Catalano & Hawkins, 1996). Measures are needed to assess the epidemiology of risk and protective factors in communities. Glaser, Horn, Arthur, Hawkins and Catalano (2005) explain that these instruments can be utilised to classify communities that are at-risk, and indicate where interventions (especially preventatively) are needed. These measures can also assist in identifying the more appropriate interventions for a specific community (or developing an appropriate one where necessary) to address their specific needs. The communities that care instrument was adapted and used in a South African context, which targeted at risk youth. The contextual realities of at risk youth are not captured in this instrument. Problems associated with a specific context are not clearly highlighted in this instrument. Failing to view how adolescents can be at risk for substance use from an ecological systems theoretical framework can limit the understanding of the contextual realities for those at risk. The YRBBS and “Communities that Care survey” instruments were included in this section, as it speaks to the aspect of prevention. Based on the information provided on the abovementioned measuring instruments, it is clear that there is a gap in adapted psychometric instruments within a South African context that is able to measure the contextual realities of at-risk youth. The SASUCRI also highlights this key aspect of prevention as it aims to identify at-risk youth. This section pointed out that there are psychometric tests used in South Africa that was largely adapted from abroad. The SASUCRI was designed in South Africa with context specific items to identify adolescents and communities at-risk to substance use. The present study provides a discussion on the SASUCRI sub-scales and how it was developed from an

ecological systems theoretical perspective. These two instruments have been mentioned as it provides insight to how they were adapted and utilised in a South African context.

3.6. Conclusion

The ecological systems theoretical framework, together with the validity theory will be used to assess the SASUCRI sub-scales and association with adolescent substance use. The ecological systems theoretical framework will be implemented to shift attention to how SASUCRI sub-scales can act as predictors of substance use among adolescents, which can inform future interventions that focus on at risk youth in low socio-economic status communities. Chapter Four will highlight and discuss the methodological considerations for the present study.



CHAPTER 4: METHODOLOGY

4.1. Introduction

This is a quantitative study located in the field of measurement and validity theory. The present study contributed to the validation of the SASUCRI (South Africa Substance Use Contextual Risk Instrument) by assessing its external validity. It explored the extent to which the sub-scales of the SASUCRI predict substance use among substance using and non-using adolescents. This chapter will highlight the methodological aspects of the study including design, measuring instruments, data analysis techniques and ethics of the present study. This chapter will also provide a background to the SASUCRI, which will highlight how validity evidence contributed to the development of sub-scales. H_0 : The SASUCRI sub-scales do not significantly predict substance use among adolescents.

H_1 : The SASUCRI sub-scales significantly predict substance use among adolescents.

4.2. Research Design

An exploratory study was conducted analysing secondary data. The present study utilised a correlational design, which is typically used by researchers when the purpose of the study is to predict certain outcomes in one variable from another variable that serves as the predictor (Creswell, 2008). Correlational research attempts to determine the extent of statistical relationships between two or more variables (Terre Blanche, Durrheim & Painter, 2006). Specifically, correlational designs involve two types of variables: a predictor variable and a criterion variable (Creswell, 2008). While the predictor variables (SASUCRI sub-scales) are used to make a forecast or prediction, the criterion variable (substance use, which is group by choice-use or non-use) is the anticipated outcome that is being predicted. Prediction speaks to the aim of the study and can be considered beneficial as it seeks to assess the predictive validity of the instrument by exploring the extent to which the sub-scales of the SASUCRI predict substance use.

4.3. Sampling Framework

Since the present study used secondary data, the participants from the initial validation study were retained. The following section pertains to the sampling procedures followed by Florence (2014). Non-probability purposive sampling was employed to select schools from three districts in the Western Cape. Twenty-six schools were selected from low socio-economic status communities in a way that ensured that the schools reflected the district in terms of size (Florence, 2014). This context was considered appropriate, as the prevalence of adolescent substance use is highest in these low socio-economic status communities in the Western Cape (SACENDU, 2014). The districts that were selected for the initial validation were Metro Central, Metro North and Winelands districts.

An analysis was done to determine which of the eight metro districts in the Western Cape housed the most low socio-economic status schools. This was determined using the National Quintile for each school. It is a system of rating low socio-economic status schools based on the characteristics of the area. Census data for the schools' catchment areas were used to decide on a quintile rank for each school. The data included the average income of households in the area, unemployment rates, and the average level of education. Since the target group was Grades 8 to 12 learners, the sampling frame was narrowed down to include secondary schools that are represented in quintiles one to three. These represent the most resource-constrained schools in these districts. Whole classes were selected to ensure efficient data collection during the school day without disturbing their learning programme (Florence, 2014).

4.4. Data Collection Instrument

This section will describe the substance use instrument (SUI) that was used to measure relevant substance-use behaviours, and the risk and protective factors that are associated with adolescent substance use (SASUCRI). The substance use instrument will be discussed first, followed by the process in developing the SASUCRI conducted in the initial validation study (see Figure 1, Chapter

1). The current study contributes to the validation of the SASUCRI by providing external validity evidence. It is important to note that the focus of the present study is the SASUCRI, and not the validation of the SUI.

4.4.1. Substance Use Instrument (SUI)

The substance use instrument was developed to evaluate the use of substances that are commonly used by adolescents in the Western Cape. Questions were designed to place emphasis on the use of alcohol; cannabis; methamphetamine; heroin and ecstasy. Participants were asked to complete the substance use questionnaire by answering either “yes” or “no” to whether they had ever used any of the above-mentioned substances. The information provided based on the questions allowed the researcher to divide the adolescents into two groups namely users and non-users. This information allowed the initial validation to assess the construct validity using external validity evidence. This information will be used in the same manner for the present study and will constitute the outcome variable for the analysis, namely substance use.

4.4.2. The South African Substance Use Contextual Risk Instrument (SASUCRI)

The SASUCRI originally consisted of 147 items in 23 sub-scales developed and analysed under the system of the ecological systems theoretical framework. Bronfenbrenner’s ecological systems theoretical framework comprises systems namely: individual; micro; meso; macro; exo and chrono systems. This theory looks at a child’s development in the context of the system of relationships that form his or her environment (Darling, 2007; Paquette & Ryan, 2001). This theory has been renamed “bio-ecological systems theoretical framework” to emphasise that the child’s own biology is a primary environment fuelling the development process (Darling, 2007; Paquette & Ryan, 2001).

The interaction between factors in the child’s maturing biology, his immediate family/community environment, and the societal landscape can fuel but also steer the child’s development. Bronfenbrenner suggested that a child’s development could be moulded by the diverse systems in the environment and also by the interrelationships among the ecological systems (Paquette & Ryan,

2001; Krishnan, 2010). The connection between the child and the environment is considered to be mutual. Bronfenbrenner suggested that humans are unable to mature in isolation (Paquette & Ryan, 2001; Krishnan, 2010). Instead, this development is possible within a system of relationships that comprise family and society (Darling, 2007; Krishnan, 2010). See Chapter Three, for a comprehensive discussion with regard to the various ecological systems.

The revised version of the 21 SASUCRI sub-scales retained 132 items of the 147 original items (Florence, 2014). Two language versions of the SASUCRI were developed to be administered to English-and Afrikaans-speaking groups. The construct equivalence of the SASUCRI sub-scales items across the two language versions was explored. In the initial validation study it was found that about half of the sub-scales in both language versions of the SASUCRI discriminated between substance using and non-using adolescents. However, the effect sizes for most of these were relatively small thus, leading to the recommendation for further external evidence to be collected (Florence, 2014). Items for the revised version were selected based on their item total correlations, item distributions, factor loadings and the contribution to scale reliability. Item selection procedures were performed on the Afrikaans version of the SASUCRI and the outcomes were applied to the English version of the instrument. The English version of the SASUCRI proved to be more challenging than the Afrikaans version of the instrument when basing the selection of items and scales on the outcomes for the Afrikaans version.

4.4.2.1. Validity Evidence of The SASUCRI

Validity evidence comes in various forms, and a sound validity argument integrates many strands of evidence into a coherent account of the degree to which existing evidence and theory support the intended interpretation of test scores for specific uses (Kobrin *et al.*, 2008). Furthermore, content evidence for the SASUCRI was collected during the initial validation study that assessed how well adolescents from the target population understood and could relate to the items and format of the instrument (Bowman, Lannin, Cook & McCluskey, 2009; Carels, 2012). Content evidence gathering is generally a non-statistical systematic examination of content to determine whether it

covers the psychological domain of the construct being measured. Construct relevance was also assessed within the content validation phase. The construct relevance of the SASUCRI sub-scales were confirmed by the two focus groups, conducted in the initial validation study, by Florence (2014). These focus group discussions conducted in the initial validation study, consisted of questions about the factors that had been identified by the communities and whether these were an adequate representation of the construct (Florence, 2014). Content evidence was further demonstrated based on the feedback from the relevant communities (Carels, 2012). Target population reviews of content relevance and representation of SASUCRI sub-scales have also been conducted quantitatively, using frequency distributions to analyse the data (Carels, 2012). In terms of the final scale structure of the SASUCRI, the best items were selected for the SASUCRI based on their item total correlations, item distributions, their factor loadings in the PCA, and their contribution to scale reliability. Florence (2014) reported in the initial validation study that a second-order common factor analysis was performed on sub-scale totals to assess the dimensionality of the instrument. The initial validation study reported that some sub-scales did not load onto the systems as expected according to the ecological systems theoretical framework, but could be grouped into risk and protective-type factors (Florence, 2014).

4.5. Research Procedure

The present study utilised secondary data. Therefore, the data collection procedures mentioned in this section does not pertain to the present study, but rather pertain to that of the initial validation study (Florence, 2014). All of the procedures that will be discussed in this section occurred after the initial validation study received ethical clearance. During an initial visit, learners were informed about the study and were given information letters. It should be noted that the information sheets, assent and consent forms were translated into Afrikaans before being used in the respective communities. Information as well as consent forms were provided to parents to request and obtain their parental consent. Learners were also required to provide signed assent as a means of assenting to participate in the initial validation study of Florence (2014).

Once parental consent and learners' assent was obtained, the study and instrument were explained to learners during the data collection of the instrument. Participants were informed of the purpose of the study as well as the value of their responses. Only the researcher and trained fieldworkers were allowed to administer the instrument. Also, three different formats of each of the language versions of the instrument were administered during data collection (three Afrikaans and three English) (Florence, 2014). Each format had a different arrangement of the sub-scales so that the instruments, while containing the same sub-scales, did not begin and end with the same sub-scales. This was done in an attempt to ensure that, in cases where participants did not complete the items due to fatigue, the missing values would not all be on the same sub-scales. All of the procedures described above pertain to the initial validation study. The secondary analysis done in the present study was done using the data collected in the initial validation study. The next section of the chapter will focus on the data analysis procedure in the present study.

4.6. Data Analysis

The data was statistically analysed using the Statistical Package for the Social Sciences (SPSS) version 23 (IBM SPSS, 2015). Discriminant Function Analysis (DFA) was used to analyse the data. The analysis included an enter method since the study required a linear analysis of the data. The use of a stepwise method to determine which combination of sub-scale totals predicts group membership was not necessary in the present study. The aim of the present study was to assess the extent to which each of the sub-scales can predict substance use by providing external validity evidence. Whitaker (1997) suggests that there are many difficulties connected with the use of a stepwise method. A stepwise method does not assist researchers with important tasks such as variable selection and variable ordering (Whitaker, 1997).

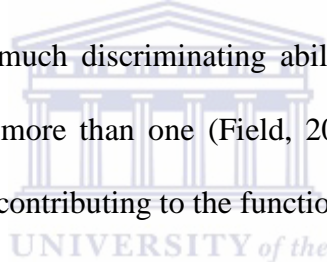
Discriminant Function Analysis (DFA) allowed for the present study to assess predictive validity of the SASUCRI by exploring the extent to which the sub-scales of the SASUCRI predict substance use. The main function of DFA is to predict group membership based on a linear grouping of the interval variables (Stockburger, 2007). Büyüköztürk and Çokluk-Bökeoğlu (2008, p. 73) highlight

the following “The model consists of discriminant functions that appear based on a linear combination of predictive variables that provide the best discrimination between groups”. The functions as highlighted refer to these discriminant functions obtained from a sample whose group memberships are familiar. In addition, the analysis starts with a set of observations where group membership and the values of the interval variables are known (Bian, n.d.; Büyüköztürk & Çokluk-Bökeoğlu, 2008; Stockburger, 2007). The result of the DFA is a model that allows for prediction of group membership once the interval variables are identified (Büyüköztürk & Çokluk-Bökeoğlu, 2008).

In DFA, the independent variables are the predictors (SASUCRI sub-scales) and the dependent variable can be classified as substance use (the choices on this variable are use or non-use). Poulsen and French (2004), highlight that the major purpose of DFA is to predict membership in two groups from a set of predictors, when there is no ordering in the groups. In the present study the focus was on the two groups which are substance using and non-using (dependent variable) groups and attempted to predict whether the 21 sub-scales of the SASUCRI can predict substance use. The independent variables are considered to be the groups, thus referring to the substance using and non-using group for DFA (Lea, 1997; Pohar, Blas & Turk, 2004). Lea (1997, para. 4) reports the following “discriminant functions are the linear combinations of the standardised independent variables which yield the biggest mean differences between the groups”. Lea (1997) postulates that if there is an existence of a dependent variable which is considered a dichotomy then there should be one discriminant function. One of the steps in DFA is to assess the mean scores for each of the sub-scales in the substance using and non-using groups (Field, 2009; Pohar *et al.*, 2004). By assessing for mean differences one is able to highlight the distributions of observations into the substance users and non-users group, which allows for the representation of trends in the data to be revealed (Field, 2009; Lea, 1997).

The outputs performed in the DFA contained the following: group means; summary of canonical discriminant function; test of significance and classification of results. The first step in carrying out

a DFA is to conduct a test of the distribution of means (Field, 2009; Lea, 1997). The eigenvalues and multivariate tests also need to be carried out to assess the model fit of the SASUCRI. This needs to occur as it can be an indication of whether the model can be used or not (Bian, n.d.; Field, 2009; Kleibergen & Zhan, 2013; Pohar *et al.*, 2004). The canonical discriminant function can be crucial in testing the different functions for statistical significance (Field, 2009). The groups presented are dichotomous i.e. substance users and non-users, thus there should be only one function testing this variable. There are two groups; therefore number of functions should be equal to one (Bian, n.d.; Kleibergen & Zhan, 2013). The numbers of functions are required to be equal to the amount of discriminating variables present (Bian, n.d.). Kleibergen and Zhan (2013) highlighted that an eigenvalue is seen as the relation between the explained and unexplained variation. Kleibergen and Zhan (2013), suggest that these eigenvalues have a relationship with the canonical correlations and can describe how much discriminating ability a function can hold. For a good model fit the Eigen value must be more than one (Field, 2009). The bigger the eigenvalue, the stronger is the discriminating power contributing to the function.



The Wilks Lambda is considered crucial when testing the null hypothesis. According to Hawksworth and Bull (2007), a Wilks' lambda can be utilised to show how each function is able to separate cases into specific groups. Smaller Wilks' lambda values can indicate that the contribution to the discriminatory function is great (Field, 2009; Nimon & Oswald, 2013). Field (2009, p. 614) reports the following criteria of the Wilks' Lambda: "If the value of *Sig.* for this statistic is less than .05 then the groups differ significantly with respect to the dependent variables". The standardised discriminant function coefficient and the structure matrix are considered to be crucial for the interpretation of the variable contribution (Field, 2009).

The standardised canonical discriminant function coefficient can represent a similar purpose as the beta weights in a regression analysis (Field, 2009; Guajardo, 2008). These discriminant function coefficients point towards the importance of the sub-scale totals predicting substance use. The discriminant function coefficient permits for the connection between variables measured on

dissimilar scales (Guajardo, 2008). Guajardo (2008) states that these discriminant coefficients that possess larger values can correspond to variables with a superior discriminating ability. According to Field (2009) a high coefficient can be an indication of the level of importance it contributes to the variate of substance use. The negative coefficients point toward the contribution to the variate that is in the opposite direction. The summary of the canonical discriminant function contains a structure matrix. The correlations that are presented in a structure matrix are able to function as factor loadings in a factor analysis (Beck, Bryman & Futing, 2003). The structure matrix can be highlighted as a useful double check as it provides the same information, but in a different format, much like the output represented in the standardised canonical discriminant function coefficient (Graham, Guthrie & Thompspon, 2003). One can gain insight into the discriminant function by identifying the largest correlations it is associated with (Beck *et al.*, 2003). Field (2009, p. 619) highlights that: “when some dependent variables have high canonical variate correlations while others have low ones, then the ones with high correlations contribute most to group separation”. The group centroids are considered to be mean variate scores for the substance user and non-users group (Field, 2009). The group centroids can be interpreted by assessing the direction of the variate as either being positive or negative (Beck *et al.*, 2003; Field, 2009).

4.7. Ethical Considerations

Permission to conduct the initial validation study (Florence, 2014) was obtained by two committees namely: The University of the Western Cape’s Higher Degrees and The Research Grants and Study Leave Ethic Committees. The following is a description of the ethical requirements fulfilled by the initial validation study (Florence, 2014). The present study utilised secondary data analysis, therefore no participants were directly engaged. Ethical clearance to conduct the initial validation study was obtained from the two committees described above (see appendix A). All ethical standards were maintained in the initial validation study. Permission to conduct research was obtained from the Western Cape Education Department (WCED) and relevant district managers were approached to ensure that the study was able to commence. Information sheets (see

Appendixes C and D) were issued to all the participants as well as to the parents of participants. Assent forms (see Appendix C) were also issued to participants to be signed as proof of their permission to be involved in the project.

Consent forms (see Appendix B) were issued to the parents of adolescents to be signed as proof of the parents giving permission for the children to participate in the study. The information sheets and assent and consent forms (see Appendix D and E) were also translated into Afrikaans before being used in the selected communities. The information sheets (see appendix C and E) provided to participants were utilised to collect the primary data for the present study. The initial validation study (Florence, 2014), employed questionnaires, which remained anonymous and the information obtained was kept confidential. Throughout the initial validation study (Florence, 2014), participants were informed of their rights not to answer certain questions and to withdraw from the process at any stage without any consequences. The initial validation study adhered to ethical principles such as confidentiality and anonymity which continues to be an essential component in the present study and is equally as imperative when data collected for a particular purpose is later made accessible for analysis by others (secondary data analysis). Thus, all ethical standards were maintained throughout this research process.

4.8. Conclusion

This chapter outlined the methodological considerations for the present study. The sections were discussed in line with the purpose of the study. The succeeding chapter will present the findings of the statistical analyses presented above, along with a discussion of these findings. These findings will be discussed in relation to the validity theory and the ecological systems theoretical framework.

CHAPTER 5: FINDINGS

5.1. Introduction to Findings

The aim of the study was to assess the predictive validity of the SASUCRI by exploring the extent to which the sub-scales of the SASUCRI predict substance use among adolescents. This chapter will proceed to report on the results of the DFA performed to meet this aim. This was done in order to establish whether there were notable improvements in predictive validity after the revision made based on the findings from the initial validation. The findings of this chapter will be presented within the systems of the ecological systems theoretical framework as it will allow one to gain insight into the contextual factors of each system in relation to the sub-scales.

The following hypotheses will be tested in the present study and the results will be reported in this chapter.

H₀: The SASUCRI sub-scale totals do not significantly predict substance use among adolescents.

H₁: The SASUCRI sub-scale totals significantly predict substance use among adolescents.

5.1.1. Description of Sample

The present study utilised one sample which consisted of English and Afrikaans mother-tongue-speaking participants. Grades 8 to 12 learners were included in the representations of both the Afrikaans and the English-samples. The final sample of participants included N=1063 Afrikaans mother-tongue learners and N=896 English mother-tongue learners. Learners were sampled using convenience cluster sampling depending on the number of learners available in each of the grades at specific schools. Moreover, cluster sampling involves the sampling of groups of elements, which in the present study involved the classes of learners (Gravetter & Frozano, 2009; Terre Blanch, Durrheim & Painter, 2006). Cluster sampling was utilised to reduce disruption at the schools by selecting whole classes instead of individual learners (Foxcroft & Roodt, 2009). Table 5.1 presents the participants per grade across the language and gender groups.

Table 5.1: Participants Per Grade, Language And Gender: Number And Percentage

	Afrikaans Sample						English Sample					
	Female		Male		Total		Female		Male		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Grade 8	146	51	140	49	286	27	88	50	88	50	176	20
Grade 9	206	63	122	37	328	31	152	53	136	47	288	32
Grade 10	122	59	84	41	206	19	123	64	68	36	191	21
Grade 11	48	55	40	45	88	8	68	57	52	43	120	14
Grade 12	105	70	44	30	149	15	63	55	51	45	114	13
Total	627	60	430	40	1057	100	494	56	395	44	889	100

With regard to the Afrikaans learners, the Grade 8 and 9 learners made up almost 60% of the sample, while just over 20% were in grades 11 and 12. The trend was similar in the English- sample where over 50% of the sample consisted of Grades 8 and 9, while the Grades 11 and 12 made up just over 25% of this sample. Both the Afrikaans and English samples contained more female than male learners in each of the grades. Table 5.2 will show the percentage of substance users and non-users per age.

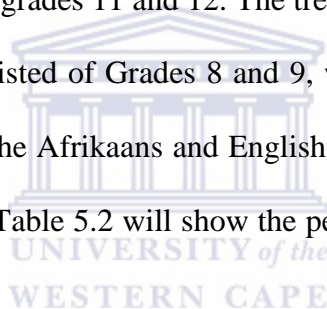


Table 5.2 Percentage of Substance Users by Age Group

Age	Substance users	Non-users	Users
12	Count	2	3
	Percentage	40.00%	60.00%
13	Count	44	55
	Percentage	44.40%	55.60%
14	Count	73	122
	Percentage	37.40%	62.60%
15	Count	47	168
	Percentage	21.90%	78.10%
16	Count	48	125
	Percentage	27.70%	72.30%
17	Count	26	148
	Percentage	14.90%	85.10%
18	Count	9	100
	Percentage	8.30%	91.70%
19	Count	5	26
	Percentage	16.10%	83.90%
20	Count	1	2
	Percentage	33.30%	66.70%
21	Count	0	1
	Percentage	0.00%	100.00%
	Total	255	750
	Percentage	25.40%	74.60%

Table 5.2 demonstrates the breakdown of substance using and non-using adolescents by age. The sample consisted of more substance users than non-users in each of the age categories. The percentage of users ranges from 55% (13-year-olds) to 100% (21-year-olds). The percentage of users generally increased as the adolescents got older. Roughly 30% of the sample fell in the age category 12-14 years, 55% in the category 15-17, and 15% in the category 18-21.

5.1.2. Assumptions for DFA

Discriminant Function Analysis is believed not to be utilised regularly in the social sciences due to its assumptions that are difficult to meet (Büyüköztürk & Çokluk-Bökeoğlu, 2008). The assumptions that were tested for the DFA were: Homogeneity of variances and normality in the data. The test for normality showed that there was no normality across the data. Data collected using Likert-type items, as in the SASUCRI, are not likely to be normally distributed (Floyd & Widaman, 1995). The data can be expected to be non-normal as the totals for the sub-scales do not necessarily represent true metric data since they are composed of ordinal data collected on each of

the items that contribute to the SASUCRI sub-scale totals. The analysis also revealed that there were outliers in the data. The Box's M tests the assumption of equality of variance-covariance matrices in the predetermined groups (Büyüköztürk & Çokluk-Bökeoğlu, 2008; Field, 2009). The large (898) Box's M statistic was supported by a small p-value which indicated that there is a violation of this assumption. However, given the large sample in the present study, this problem is not regarded as serious. A conclusion can be made that there are differences in variance-covariance matrices in the two groups (substance using and non-using adolescents).

The normality and multivariate homoscedasticity as assumptions for the statistical analyses employed in this chapter were not met. However, the testing of assumptions in the present study was not considered crucial as the study is focused on contributing to the validation of the SASUCRI by contributing external evidence. The emphasis is only on the development of the instrument at this stage. Generalisability of the information will become more important during the process of developing norms or cut scores for the SASUCRI. The present study aims to address issues of validity to ensure that the instrument is able to produce valid results. The limitation with the SASUCRI is that there is a restriction of range. However, this does not limit the utility of the SASUCRI.

5.2 Average Mean Differences between Substances Users and Non-Users

A stepwise analysis approach is able to indicate which of the combination of sub-scale totals predicts group membership. In the present study, however, a linear method was employed since the study is interested in whether each of the sub-scales is able to discriminate between substance using and non-using adolescents. This is in line with the main aim which is to add to the external validity of the SASUCRI.

This section of the chapter will present the discriminant function coefficients which display the SASUCRI sub-scale totals that can act as predictors of substance use based on higher order correlations. The independent variables were entered together for this analysis to highlight the

extent to which each of the sub-scales can predict substance use. Table 5.3 will report on the mean sub-scale totals for users and non-users on each of the sub-scales of the SASUCRI.

Table 5.3: Mean Sub-scale Totals Per Group

Systems Levels	Sub-Scales	Mean (Non-Users)	Mean (Users)
Individual system	Social Identity	31.63	30.89
	Sense Of Belonging	31.58	27.94
	Self-Efficacy	24.97	25.20
	Effects Of Drugs	27.38	24.27
	Religiosity	20.05	19.35
Micro (family) system	Family Functioning	21.12	20.77
	Family Cohesion And Commitment	22.62	22.18
	Parental Monitoring	17.71	17.54
	Economic Pressure In Family	26.11	25.74
Micro (community) system	Peer Support	19.29	19.66
	Peer Influence	15.51	15.22
	School As A Support	21.06	20.65
	School As A Stressor	16.99	16.77
	Neighbourhood	18.64	17.12
Meso system	Contradictions	4.95	4.60
	Mixed Messages	15.51	14.63
Macro system	Tolerance Of Adolescent Drug Use	15.85	15.01
	Tolerance Of soft drugs	8.47	8.54
Chrono system	Hopelessness In Community	8.63	8.38
	Hopelessness In Individual	8.76	8.66
	Hope For The Future	20.1	19.87

Users scored lower on 18 of 20 scales. Substance users scored lower than non-users on all these sub-scales that displayed mean differences, except for the “Tolerance of Soft Drugs”; “Peer Support” and “Self-Efficacy”. These above-mentioned sub-scales showing mean differences for substance users were highlighted. The individual system showed that users scored more on one sub-scale: “Self-Efficacy”. In addition, the micro (community) system presented that the sub-scale “Peer Support” scored higher on the substance use group. The sub-scale “Tolerance of Soft Drugs” showed to be higher on the substance use group. These results point towards a trend where substance users had higher mean scores on three sub-scales. Table 5.4 below points out whether the

differences between the means for substance using and non-using adolescents are statistically significant on each of the sub-scales.

Table 5.4: Significance of Differences between Average Sub-scales Mean Scores for Users and Non-Users

Systems Levels	Sub-Scales	Wilks' Lambda	F	df1	Sig.
Individual system	Social Identity	0.996	6.924	1	.009**
	Sense Of Belonging	0.957	88.723	1	.000***
	Self-Efficacy	1	0.272	1	0.602
	Effects Of Drugs	0.906	203.696	1	.000***
	Religiosity	0.994	12.077	1	.001**
Micro (family) system	Family Functioning	0.999	2.25	1	0.134
	Family Cohesion And Commitment	0.997	5.035	1	.025*
	Parental Monitoring	0.999	2.199	1	0.138
	Economic Pressure In Family	0.998	3.376	1	0.066
Micro (community) system	Peer Support	0.997	6.562	1	.010*
	Peer Influence	0.998	3.17	1	0.075
	School As A Support	0.997	5.608	1	.018*
	School As A Stressor	0.999	1.95	1	0.163
	Neighbourhood	0.963	76.058	1	.000***
Meso system	Contradictions	0.991	17.344	1	.000***
	Mixed Messages	0.992	15.248	1	.000***
Macro system	Tolerance Of Adolescent Drug Use	0.987	25.623	1	.000***
	Tolerance Of soft drugs	0.999	1.869	1	0.172
Chrono system	Hopelessness In Community	0.997	4.998	1	.025*
	Hopelessness In Individual	0.999	1.075	1	0.3
	Hope For The Future	0.999	1.321	1	0.251

* $p < 0.5$, ** $p < .01$, *** $p < .001$

Table 5.4 points out that there are significant differences between substance using and non-using adolescents on 12 of the sub-scales “Social Identity”, “Sense of Belonging”; “Effects of Drugs”; “Religiosity”; “Family Cohesion And Commitment”; “Peer Support”; “School As a Support”; “Neighbourhood”; “Contradictions”; “Mixed Messages”; “Tolerance for Adolescent Drug Use”; “Hopelessness in Community”. Users experienced the sub-scale “Effects of Drugs” more than non-users, which can also be seen in Table 5.2 where it had a relatively high mean score. The sub-scales “Social Identity”; “Sense of Belonging”; “Religiosity” also presented to have a significant effect on

users, indicating that there is a consistency in the information that is presented in Tables 5.3 and 5.4. It can be stated that four out of five sub-scales in the individual system are showing significant differences between users and non-users on the following sub-scales: “Social Identity; “Sense of Belonging”; “Effects of Drugs” And “Religiosity”. These results found on the individual system are consistent with the findings in Table 5.2 that points out that non-users had higher mean scores, except on “Self-Efficacy”. The micro (family) system showed that the sub-scale “Family cohesion and commitment” significantly differs between substance using and non-using adolescents. The findings in Table 5.3 showed that the micro (family) system had three sub-scales where non-users scored higher than users, whereby “family cohesion and commitment” was considered to have a higher mean score (non-users).

Table 5.4 points out the following sub-scales in the micro (community) systems that have significant differences between substance using and non-using adolescents: “Peer Support; “School as a Support” and “Neighbourhood”. In Table 5.3 non-users showed to score higher than users on all the sub-scales except for “Peer Support” which pointed towards a higher score for users. This sub-scale is also shown to have significant differences between users and non-user. The micro community system showed that only three out five sub-scales as highlighted can act as predictors, indicating that users experienced the community to have an influence on their consumption of substances. The meso-system presented two sub-scales to have significant differences between substance using and non-using adolescents: “Contradictions” and “Mixed Messages”. This demonstrates a trend for users to experience difficulties in their community or school. Table 5.3 also showed that non-users scored higher than users on these aforementioned sub-scales.

The macro system showed that “Tolerance for Adolescent Drug Use” is significant as it shows differences between substance users and non-users. The findings in Table 5.2 also showed that non-users for this particular sub-scale scored higher than users. The sub-scale “Hopelessness in a Community” presented to also have significant differences between substance users and non-users.

The results showed that the abovementioned sub-scale to have a significant effect, however, in Table 5.3 non-users scored higher on all sub-scales in the chrono system.

5.3. Assessing Model Fit

The different functions are tested for statistical significance because there are two dichotomous groups. Therefore, the model will include one function (see Chapter Four, section 4.6). For a model to have a good-fit the Eigen value should be closer to one (Field, 2009). This section of the analysis will focus on assessing the model fit of the SASUCRI. Table 5.5 highlights the eigenvalue, which is a requirement in testing the model-fit but also showing the discriminant ability a function has.

Table 5.5: Assessing Model-fit

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	.364a	100	100	0.517

The criteria for assessing the model-fit was introduced in Chapter Four (section 4.6). The eigenvalue of 0.3 suggests a poor model for the discriminating function. Thus, the function one does not explain the variation well. The implication of this is that results should be interpreted with caution. The next sub-section of this chapter will assess for the significance of the discriminant function.

5.4. Testing The Significance of The Wilks Lambda

Wilk's Lambda can be used to assess the significance of the discriminant functions within the model. Table 5.6 points out the Wilks Lambda statistic which is important when testing the null hypothesis of the SASUCRI. In order to test the discriminant function in the model the value of significance for the statistic should be less than .05 (Chapter Four, section 4.6).

Table 5.6: Testing the Significance of the SASUCRI

Test of Function(s)	Wilks' Lambda	Chi-square	DF	Sig.
1	0.733	604.678	21	0

* $p < 0.5$

Test of Function are the functions included in a specific test mainly to assess the null hypothesis in order to determine whether the canonical correlations associated with the functions are all equal to zero. Table 5.6 reported that the Wilks' Lambda in is 0.733, which is less than 1 ($=p<.05$), suggesting the model is significant and it can discriminate between the dependent and independent variables. Hence, one can say that sub-scale totals can significantly predict substance use among adolescents. The results provided confirm that the model discriminates well between substance users and non-users with regard to the discriminant functions.

5.5. Testing the Discriminant Function of the SASUCRI Sub-Scales Totals

Discriminant functions are interpreted by means of standardized coefficients and the structure matrix. Refer to Chapter 4 (section 4.6) for criteria on testing the discriminant function. Standardised beta coefficients are given for each variable in each discriminant function, and the larger the standardized coefficient, the greater is the contribution of the respective variable to the discrimination between substance users and non-users (Field, 2009).

Table 5.7: Predicting the Discriminant Power of SASUCRI Sub-scale Totals

Systems Levels	Sub-Scales	Function
Individual system	Social Identity	0.162
	Sense Of Belonging	1.290
	Self-Efficacy	-0.716
	Effects Of Drugs	0.797
	Religiosity	0.061
Micro (family) system	Family Functioning	0.200
	Family Cohesion And Commitment	-0.257
	Parental Monitoring	-0.094
	Economic Pressure In Family	-0.025
Micro (community) system	Peer Support	-0.199
	Peer Influence	-0.051
	School As A Support	-0.011
	School As A Stressor	-0.058
	Neighbourhood	0.079
Meso system	Contradictions	-0.005
	Mixed Messages	0.231
Macro system	Tolerance Of Adolescent Drug Use	0.202
	Tolerance Of soft drugs	-0.097
Chrono system	Hopelessness In Community	0.019
	Hopelessness In Individual	-0.054

These coefficients highlighted in Table 5.7 can be used to calculate the discriminant score for a specific sub-scale. Bian (n.d.) notes that these coefficients are able to indicate the significance of the independent variables (SASUCRI sub-scales) in predicting the dependent (substance use). The power of these nine coefficients indicates how strongly the contribution is towards the substance use. The sub-scales in Table 5.6 that proved to have higher discriminant coefficients were highlighted in bold to indicate the variable contribution (see Chapter Four, section 4.6 for criteria used). The individual system showed that there were four SASUCRI sub-scales: “sense of belonging”; “Social Identity”; “Effects of Drugs” And “Religiosity” that contributes strongly to the discriminant function. The micro (family) system also highlighted that “Family Functioning” can contribute positively to substance use. This finding is consistent with the information presented in Tables 5.3 and 5.4. The micro (community) system presented the sub-scale “Neighbourhood” as a strong contributor to substance use as it had a positive relationship with the variate. The information presented in the micro (community) system is the same as in Tables 5.3 and 5.4. The meso system showed that “Mixed Messages” had a positive contribution to users and non- users. The macro and chrono systems also highlighted sub-scales that positively contribute to the variate, indicating that there is consistency in the sub-scales presented as contributors to the variate. The sub-scales presented in systems that were not contributing to the variate, all showed to have a negative relationship on substance use, suggesting that these sub-scales have a poor discriminating power among substance users and non-users. The next sub-section of the chapter will emphasise the correlations that can contribute to the discriminant function.

5.5.1. Structure of Functions per Sub-Scales of the SASUCRI

This structure matrix was used to interpret the functions of each sub- scale. Higher correlations that is, values that exceed 0.4 reflect measures that might relate to a corresponding function (see Chapter Four, section 4.6 for criteria). The structure of the sub-scale proves to be essential in

highlighting which totals act as predictors for substance use. The structure matrix of the sub-scale totals in the SASUCRI is reflected in Table 5.8.

Table 5.8: SASUCRI Sub-Scales that are predicting Substance Use

Systems Levels	Sub-Scales	Function
Individual system	Social Identity	0.099
	Sense Of Belonging	0.353
	Self-Efficacy	-0.020
	Effects Of Drugs	0.535
	Religiosity	0.130
Micro (family) system	Family Functioning	0.089
	Family Cohesion And Commitment	0.084
	Parental Monitoring	0.054
	Economic Pressure In Family	0.059
Micro (community) system	Peer Support	-0.096
	Peer Influence	0.067
	School As A Support	0.089
	School As A Stressor	0.052
	Neighbourhood	0.327
Meso system	Contradictions	0.156
	Mixed Messages	0.146
Macro system	Tolerance Of Adolescent Drug Use	0.190
	Tolerance Of soft drugs	-0.051
Chrono system	Hopelessness In Community	0.084
	Hopelessness In Individual	0.039
	Hope For The Future	0.043

Table 5.8 revealed that the canonical structure coefficients for substance use are mostly positive (see Chapter Four, section 4.6 for criteria). The values indicated in the table above revealed how well the sub-scale totals correlates with the discriminant function. There are consistencies in the findings presented in Tables 5.6 and 5.7. The individual system showed that there were four strong predictors “Sense of Belonging” (0.353); “Social Identity” (0.099); “Effects of Drugs” (0.535) and “Religiosity” (0.130) that contribute strongly to the discriminant function. The sub-scale “Family Functioning” (0.089) was revealed to be a strong predictor in the micro (family) system. This finding is consistent with the information presented in Table 5.7. The micro (community) system presented the sub-scale “Neighbourhood” (0.327) to have a strong correlation with the discriminant

function, meaning that it can be seen as a strong predictor. The meso system showed that “Mixed Messages” (0.146) had a positive correlation to substance use. The final two systems (macro and chrono system) highlighted that there are two sub-scales that can positively correlate to the discriminant function: “Tolerance of Adolescent Drug Use” (0.190) and “Hopelessness in Community” (0.084). The sub-scales that were indicated to have a lower canonical loading do not have a positive effect on substance use (Field, 2009).

The table revealed that there are 18 SASUCRI sub-scales that can contribute to the discriminant function. The nine sub-scales highlighted in Table 5.7 also appear to have high correlational values. In Table 5.8 the findings are consistent with information presented in Table 5.6, therefore one can state that there is uniformity in the sub-scales displaying some power to predict substance use among users and non-users. The sub-scales “Hopelessness in Community” and “Family functioning” all indicated lower correlation values, yet there is consistency in their representation throughout the findings which contribute to the discriminant function.

Table 5.9 highlights the group centroids which are considered to be the mean discriminant scores for each of the groups. A further way of interpreting the findings is to describe each group in terms of its profile by utilising the group means of the predictor variables. When assessing the group centroids in a model one needs to look at the direction of the mean discriminant power (Field, 2009) (see Chapter Four, section 4.6). The substance using and non-using groups will be presented in the table below to show how mean scores contribute to the discriminant functions.

Table 5.9: Functions at Group Centroids

Substance Users And Non-Users	Function
	1
Non-using	1.062
Using	-0.343

Table 5.9 reported that the substance non-using group has a mean of 1.062 while users produced a mean of -0.343 . Cases with scores near to a centroid are predicted as belonging to the substance use group. When the score on the discriminant function is closer to 1.06, then those responses would

probably be from the non-users. The next sub-section of the chapter will focus on the classification of group membership.

5.6. Group Membership of Substance Users or Non-Users

This section of the analysis will focus on the classification of the SASUCRI data. The classification matrix will be presented as it deals with variables that were successfully grouped. Further, group membership of substance using and non-using adolescents will also be explored to highlight which SASUCRI sub-scales can discriminate between the two groups. Table 5.10 presents the predicted frequencies of groups from the analysis, about actual group membership versus predicted group membership (Field, 2009).

Table 5.10: Group Membership between Users and Non-Users

SUBSTANCE USERS AND NON-USERS			Predicted Group Membership		Total
			0	1	
Cross-validated	Count	0	398	80	478
		1	412	1069	1481
	%	0	83.3	16.7	100.0
		1	27.8	72.2	100.0

The numbers that are reflected in each column specify how many cases were correctly and incorrectly classified. One of the functions of DFA is to divide the two groups; i.e. substance using and non-using adolescents (Bian, n.d.). The table reports that for the non-users group, more than 83% of cases were correctly predicted. It was also found that 16% of cases were incorrectly predicted for the non-users. The substance users group revealed that there were more than 72% of cases correctly predicted. The table also revealed that more than 27% of cases were incorrectly predicted for the substance users group. Overall the classification result revealed that 74.9% of cases were correctly predicted. The results show that the model has correctly classified substance users using the predictors in the SASUCRI.

5.7. SUMMARY OF FINDINGS

5.7.1 Assessing the Predictive Validity of the SASUCRI: Sub-Scale Totals that Predict Substance Use

The aim of the present study was to assess the predictive validity of the SASUCRI by determining which sub-scale totals can act as significant predictors to substance use. The DFA was run in order to assess the predictive validity of the SASUCRI, therefore external validity evidence was required. This section of the chapter will focus on summarising the findings, with reference to the hypotheses that were tested, but also highlight how the SASUCRI sub-scales may be viewed from an ecological systems theoretical framework and to assess how the sub-scales are functioning.

5.7.2. Sub-Scales that are Predictors to Substance Use

A linear method was employed as it allowed one to determine which sub-scales best predicts group membership. The test of equality of means showed that the null hypothesis was rejected for 15 SASUCRI sub-scales. On comparing the standardised coefficient, it was possible to identify which SASUCRI sub-scales could be considered to have a higher discriminating power. The standardized canonical discriminant function coefficient was utilised to calculate the discriminant score among variables (Field, 2009). Findings showed that there were sub-scales from the individual and micro (family) system that contributed positively to the discriminant function. The individual system presented three sub-scales that had high discriminant coefficients: “Sense of Belonging”; “Social Identity” and “Effects of Drugs”. The micro (family) system highlighted that “family functioning” can contribute to the discriminant function. The meso and macro system, also presented the following sub-scales that can contribute to the substance use: “Mixed Messages” and “Tolerance for Adolescents Drug Use”. The structure matrix in Table 5.8 identified which sub-scales are most useful for predicting substance use among adolescents. Table 5.8 showed that were three best predictors of substance use among adolescents: “Sense of Belonging”; “Effects of Drugs” and “Neighbourhood”. In terms of the ecological systems theoretical framework, it is evident that these

SASUCRI sub-scales are loading in two systems: the individual and micro-systems. The cross validated classification showed that overall 74.9% of cases were correctly grouped for substance users

5.7.3. The SASUCRI Sub-Scales that are Predictors Based on the DFA

The findings presented in this section of the chapter will focus on the SASUCRI sub-scales that have the power to predict substance use among adolescents. It was found that nine SASUCRI sub-scales have the predictive power to measure substance use among adolescents. Table 5.11 indicates the SASUCRI sub-scales totals that can predict substance based on the ecological systems theoretical framework.

Table 5.11: SASURI Sub-Scales that can predict Substance Use among Adolescents

Systems Levels	Sub-Scales
Individual system	Social Identity
	Sense Of Belonging
	Self-Efficacy
	Effects Of Drugs
	Religiosity
Micro (family) system	Family Functioning
	Family Cohesion And Commitment
	Parental Monitoring
	Economic Pressure In Family
Micro (community) system	Peer Support
	Peer Influence
	School As A Support
	School As A Stressor
	Neighbourhood
Meso system	Contradictions
	Mixed Messages
Macro system	Tolerance Of Adolescent Drug Use
	Tolerance Of Crime
Chrono system	Hopelessness In Community
	Hopelessness In Individual
	Hope For The Future

Table 5.11 showed that nine of the SASUCRI sub-scales highlighted are significant predictors of substance use among adolescents. The sub-scales “Social Identity”; “Sense of Belonging”; “Effects Of Drugs”; “Religiosity”; “Family Functioning”; “Neighbourhood”; “Tolerance of Adolescent Drug Use”; “Mixed Messages” And “Hopelessness In Community “ as pointed out in Tables 5.4, 5.7 were presented as significant predictors of substance use. Similar results were found in the initial validation study where the two sub-scales (Effects of Drugs and Religiosity) discriminated significantly between substance using and non-using adolescents (Florence, 2014). The sub-scales shown can also be viewed from an ecological systems theoretical framework, where it is possible to understand the contextual realities of adolescents functioning within a system. The SASUCRI sub-scales presented in Table 5.11 are considered to be valid and useful at this point in time and are said to contribute to the external validity evidence of the instrument, as they were repeatedly represented in findings. At this point, only nine SASUCRI sub-scales prove to have the power to discriminate between using and non-using adolescents. The findings show that the SASUCRI sub-scales are represented mostly at the individual systems. It can be stressed that users experienced these four sub-scales in the individual system to have a profound effect on them. Visser and Moleko (1999), suggest that adolescents that experience difficulties in this system often use alcohol to boost their feelings of self-acceptance specifically where little support is received from caregivers. External evidence was provided to this system as the initial validation study found the same results.

5.7.4. Conclusion

The findings indicate that there are SASUCRI sub-scales that can act as contributors to the discriminant function and can potentially be cross examined in future research to assess its predictive power across findings. The statistical analyses conducted, showed that nine SASUCRI sub-scales have the power to predict substance use among adolescents. One can conclude that this is a discriminant model that can classify respondents into two predefined substance using and non-using groups. The classification results showed that the model does well at classifying substance-

using and non-using adolescents utilising the predictors in the SASUCRI scales as 75.3% of cases were correctly grouped.

The findings of this chapter will be utilised to contribute towards the external validity of the SASUCRI. A conclusion can be made that this model has correctly predicted the discriminant power of SASUCRI sub-scales. The findings highlighted that nine sub-scales can predict substance use among adolescents. The implication of these findings will contribute significantly to the understanding of how each of the sub-scales functions within the respective systems. The findings presented also contribute to the validity argument for the present study as it assessed the predictive validity of the SASUCRI.



CHAPTER 6: DISCUSSION AND CONCLUSION

6.1. Introduction

The present study investigated the further validation of the SASUCRI by assessing the predictive validity of the instrument as a contribution towards external validity evidence. The SASUCRI was developed to measure the contextual factors that are associated with adolescent substance use in low socio-economic status communities in the Western Cape, South Africa. The literature on measurement pointed towards the continuing aspect of validity (see Chapter Two) whereby it is vital that one employs Multitrait-Multimethod Matrix (MTMM) methods to enhance the validity of an instrument. Messick (1989) proposed that the process to enhance the validity of an instrument is through the MTMM approach. This can be done by validating an instrument through either comparing scores of the instrument to different construct scores with an emphasis on utilising the identical method of measurement (Campbell & Fiske, 1959; Messick, 1989). Alternatively, validating an instrument can also take place when instrument scores are compared to various construct scores using different methods of measurement (Campbell & Fiske, 1959).

The DFA was used in the present study to support the MTMM approach of employing various methods to validate an instrument. The initial validation utilised multiple methods to continue the validation of the SASUCRI. Although, the present study is on its own, it will contribute to the validation of the instrument by presenting external validity evidence. All the validity evidence collected in the initial validation study along with external evidence found in the present study has been presented in the previous chapters along with a report of these findings. This chapter will include a comprehensive discussion of the results. Further, it will also concentrate on the limitations of the present study and make recommendations for further improvement of the SASUCRI, as well as to inform the process of using this instrument for intervention purposes.

6.2. Application of the Ecological Systems Theoretical Framework and Validity Theory

The previous sub-section of this chapter highlighted how the validity theory informed the choice of the ecological systems theoretical framework for the identification of the SASUCRI sub-scales that can be viewed from a systems perspective (see Chapter Two). Studies in the area of adolescent substance use seldom take context into account or include factors that can be viewed from an ecological perspective. The ecological systems theoretical framework was therefore employed in the present study in an attempt to address this. The results of the statistical analyses conducted for the present study are meaningless on their own, but together they build towards evidence for the validity argument. In Chapter Three, the development of the more mature version of Bronfenbrenner's ecological systems theoretical framework was expounded on, especially the dimensions that added value to development of the SASUCRI. Chapter Four focused on the methodological consideration of the present study and highlighted how the ecological systems theoretical framework informed the development of the SASUCRI. Furthermore, Chapter Three emphasised the measuring factors of substance use as a criterion and how it can be understood in the ecological systems theoretical framework.

This chapter will demonstrate how the ecological systems theoretical framework can fit into the process of gathering validity evidence. The empirical analyses conducted to gather external validity evidence were organised around the ecological systems theoretical framework and the system within it. The ecological systems theoretical framework was used to inform the development of the SASUCRI and the various dimensions (sub-scales). There is a need for an instrument within the South African context to view substance use as a social issue from a systems perspective. Therefore, it was vital to include this ecological systems theoretical framework to capture how systems are able to have associations with substance use among adolescents in low socio-economic status communities.

6.3. Findings that Contribute to the External Validity of the SASUCRI

External evidence for the validity argument of the SASUCRI was assessed in the present study. This was done by utilising procedures of Messick's validity theory by employing the MTMM approach as it expanded on the analytical techniques employed in the initial validation study (Campbell & Fiske, 1959; Messick, 1989). Moreover, DFA was employed in the present study to see which of the SASUCRI sub-scales can be considered as predictors of substance use among adolescents. The ecological systems theoretical framework will also be utilised to examine how these SASUCRI sub-scales can be viewed from a systems perspective to understand the contextual realities of substance using and non-using adolescents. Thus, the sub-scales that are predictors of substance use among adolescents add little value on their own, but incorporating the evidence found with the ecological systems theoretical framework will add more value to the external evidence presented for the SASUCRI.

The findings of the present study contributed to the validity argument for the SASUCRI. The present study reassessed the external validity of the SASUCRI by utilising a sounder statistical method. The same data were used for both the initial validation study and the present study. A DFA was performed in order to determine which sub-scales have the predictive power to discriminate among substance using and non-using adolescents. Findings presented that nine sub-scales spread across all six of the ecological systems theoretical framework presented the discriminant power to predict substance use among adolescents. The classification results show that overall the sub-scales of the SASUCRI do well at classifying adolescents as substance users or non-users. The overall cross-validated percentage (74.9%) indicates that "Effects of Drugs"; "Sense of Belonging"; "Social Identity"; "Religiosity"; "Mixed Messages"; "Family Functioning"; "Tolerance of Adolescent Drug Use"; "Parental Monitoring"; "Hopelessness In Community" have the predictive power to discriminate among substance using and non-using adolescents. It was established that the SASUCRI sub-scales significantly predict substance use among adolescents. These results point to support for the external validity at least for these nine sub-scales of the SASUCRI. The implications

of the sub-scales that are represented within the ecological systems theoretical framework can provide insight into the contextual factors of how the individual may function in a specific system.

The initial validation study examined the SASUCRI sub-scales with the use of the ecological systems theoretical framework. The initial validation study also exhibited external validity evidence, as proof was found on specific systems such as in the micro-systems; meso-and macro-systems. The individual system showed that there were two sub-scales that have the power to predict substance use. The findings across the two studies showed that “Effects of Drugs” and “Religiosity” are able to act as predictors. The micro (family) and micro (community) system showed that the sub-scales: “Family functioning” and “Neighbourhood” can act as predictors across the two studies. The two studies conducted also showed consistency in the presentation of sub-scales by showing that “mixed messages” at the meso-systems and “Tolerance for Adolescent Drug Use” at the macro-systems have the power to predict substance use. The initial validation did not present any sub-scale in the chrono-system that has predictive power. However, the present study showed that there is evidence that points towards a predictive power in that system. The sub-scale “Hopelessness in Community” presented to have the predictive power to discriminate among substance using and non-using adolescents. These findings of the initial validation study contributed to the support for the external validity evidence for these sub-scales of the SASUCRI. Furthermore, it is evident that five of six systems (all but the chrono-system) in the initial validation study, exhibited evidence towards to the validation of the SASUCRI (Florence, 2014).

The above results can be explained in the following way. The SASUCRI focused on the contextual factors as well as some individual factors on their own, but more importantly it also aimed to measure the interaction between the individual and contextual factors. According to the ecological systems theoretical framework, these processes can be considered as contributors to consequences such as substance use in adolescents (Bronfenbrenner, 2005). The results from both the initial validation study and the present study repeatedly showed a pattern of interaction between the individual, micro-system (family & community) level, and the chrono-systems of the theory. The

macro-system across the two studies only presented external evidence on the following sub-scale: “tolerance adolescents drug use”. It can be assumed that due to the overlap in the same sub-scales presented in both studies that it contributes to the validity evidence for the SASUCRI. The sub-scale “Effects of Drugs” repeatedly showed to be a predictor of substance use in the present study and in the initial validation study (Florence, 2014). The findings point towards a pattern of interaction between these sub-scales in the individual systems. A pattern of interrelationships between the individual and the other systems can therefore be expected. Brook *et al.* (2006), suggest that understanding the interaction between the individual system and other systems is complex particularly from the subjective perspective of adolescents (Brook *et al.*, 2006). Maring and Braun (2006), suggest that development can be influenced by a variety of processes at different levels of the human ecology where it can be grouped into risk and protective processes.

The present study has contributed to external validity evidence for the SASUCRI along with the findings of the initial validation study. In terms of providing external validity evidence to the validation of the instrument, it can be said that evidence was provided to assess whether the SASUCRI sub-scales are able to discriminate between substance using and non-using adolescents. The findings also show that the SASUCRI sub-scales that were highlighted can be considered valid and valuable to distinguish between substance using and non-using adolescents. The next section of the chapter will pay attention to the sub-scales of the SASUCRI and how it is represented in the systems of the ecological systems theoretical framework.

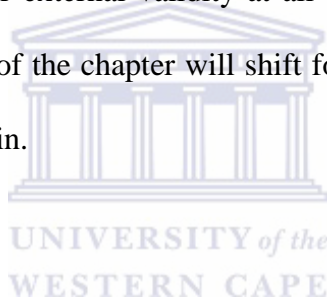
6.4. Discussion of Findings Per Systems Level of the Ecological Systems Theoretical Framework

The findings demonstrated which sub-scales are predictors of substance use through the predictive power of SASUCRI sub-scales. The implications of these sub-scales that are represented within the system of the ecological systems theoretical framework are that it does provide insight into the contextual factors of how the individual may function in a specific system of the ecological systems theoretical framework. According to Brook *et al.* (2001), substance use by adolescents may cause

stunted psychological growth and functioning, and might have negative consequences for the attempt to have a healthy lifestyle. Violence and other illegal activities are contextual factors that may stem from substance use impeding on the individual's psychological and social well-being (Brook *et al.* 2001). A pattern of interrelationships between the individual and the other systems' levels can therefore be expected when interpreting how they may function within their specific contexts.

Nine sub-scales in the SASUCRI do present the power to predict substance use in adolescents. Based on the findings of the present study it can be stressed that nine of 21 sub-scales presented to have the discriminant power to predict substance use among adolescents. These results point towards support for the external validity at least for these above-mentioned sub-scales of the SASUCRI. There is thus support for external validity at all five levels of the ecological systems theoretical framework. This section of the chapter will shift focus onto the separate systems where the SASUCRI sub-scales are loaded in.

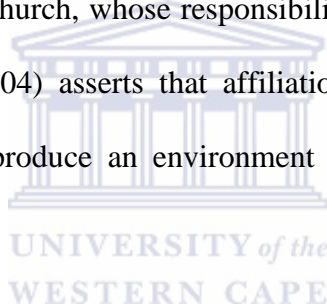
6.4.1. Individual Systems



Based on the findings it can be stressed that the following sub-scales fall into the individual Systems: "Effects of Drugs"; "Sense of Belonging"; "Social Identity" And "Religiosity". The findings pointed out that these sub-scales have the power to predict substance use among adolescents. One can stress that these sub-scales that are presented within the individual system may have implications. The implications are that the adolescent can exhibit signs of deviant behaviour, which can influence the relationship between agents of socialisation such as family, school and church, whose responsibility it is to shape behaviour (Gana, 2004). The value and implications of the other sub-scales represented within the individual system cannot be discarded. The sub-scales that are presented to be predictors can be an indication that these were developed in such a way that they can successfully discriminate between substance using and non-using

adolescents. Further investigations and revisions will be done on the sub-scale “self-efficacy” that is not presented to be good predictor.

The sub-scale “Effects of Drugs” appeared in both the findings of the initial validation as well as the present study of substance use among adolescents in the SASUCRI. In addition, a sub-scale underlined to have the predictive power in the individual system may have implications on the adolescent’s physical and mental and social development, and as a consequence it may endanger the transition from adolescence to adulthood (Blanken, 1993). Gana (2004) believes that “Sense of Belonging” can be considered as an individual factor, as it can be associated with substance use. In her study she suggests that substance use and maladaptive behaviour among adolescents can be a consequence of difficulties in relationships between the adolescent and essential agents of role-playing such as family, school and church, whose responsibility it is to mould the behaviour of the adolescent (Gana, 2004). Gana (2004) asserts that affiliation may provide the adolescent with additional social support and can produce an environment where there is shelter from deviant behaviour such as substance abuse.



An individual may be influenced by many factors in a context (Gana, 2004). Visser and Routledge (2007) assert that contextual factors need to be taken into consideration to understand the nature and aetiology of adolescent substance use. In the same study conducted by Visser and Routledge (2007) they examined the relationship between psychological well-being and substance use in Tshwane adolescents (12-19 years old). It was reported that contextual factors can function in two directions in that substance use can be as a consequence of an individual’s low well-being and satisfaction, or they can be as a result of the substance use (Visser & Routledge, 2007).

6.4.2. The Micro (Family) Systems

The sub-scale “Family Functioning” was presented in the micro system as a predictor of substance use among adolescents. This SASUCRI sub-scale was identified in the findings to have the power to predict substance use among adolescents. In terms of the sub-scale “Family Functioning” one can

mention that the quality of the relationship between parent / caregiver and child has a crucial role in adolescent development and expected behaviour outcomes (Wagner & Waldon, 2001). Oftentimes the quality of a relationship between the adolescent and his or her family depends on the cohesion and commitment that is offered by caregivers in a family setting (Wagner & Waldon, 2001).

A study conducted by Amoateng, Barber and Erikson (2006) focused on family factors as predictors of tobacco and alcohol use among 14-17-year-old Cape Town youth. The findings revealed that parental behavioural control, monitoring and setting boundaries, are all factors that can be associated with adolescent substance use (Amoateng, Barber & Erikson, 2006). The authors investigated the relationships between the parenting variables, and it was revealed that increased family stress can be associated with a decreased parental support system and knowledge. Brook *et al.* (2006) conducted a study similar to Amoateng, Barber and Erikson (2006) where adolescents' perceptions of their parents' practices in relation to the children's use of alcohol were examined. The findings of the study showed that adolescents who had witnessed their parents use substances were more likely to consume substances as well (Brook *et al.*, 2006). The implications of these aforementioned SASUCRI sub-scales within a stressful economic context in combination with difficulties in relationships between parents and children can be an indication of potential risk for substance use. SASUCRI sub-scales presented in the micro (family) system can provide a detailed view on the functioning of an individual within a particular context, other than exclusively taking into account the broader social factors influencing substance use.

6.4.3. Micro Community Systems

The sub-scale "Neighbourhood" was found to possess the discriminating power to predict substance use among using and non-using adolescents. This sub-scale was presented in the micro community system. This sub-scale can act as a predictor of substance use among adolescents. In terms of the contextual implications of peer support and the impact of the sub-scale "Neighbourhood", adolescents can be at risk of substance use where there is a close relationship between the individual

and their peer groups (Gana, 2004). Gana (2004) conducted a study where she explored the effect of peer, religious and community influences on alcohol and tobacco use among learners (14-17 years) in Cape Town schools. The findings showed that adolescents at risk of substance use were closely connected to their peer groups (Gana, 2004). The role of the community can indicate whether an individual may engage in substance use behaviour. It can be underlined that these micro system factors should be viewed as combinations in acquiring an understanding of the contextual realities in which these adolescents are functioning. The micro individual level particularly the sub-scale “Sense of Belonging”, coupled with communities who are exposed to drugs, crime and violence; and family-related factors may expose the adolescent in consuming substances that are harmful.

6.4.4. Meso-Systems

The Meso system is mainly understood as the system that depends on the influence of the micro system as this is the level where the adolescent is exposed to various changes in his or her environment. Based on the findings in the present study, the sub-scale “Mixed Messages” appeared to be presented in the meso-system as a predictor, as it was shown to adequately discriminate between substance using and non-using adolescents (see Chapter Five, section 5.10). The sub-scale “Mixed Messages” was also pointed out as one of the predictors of substance use in the initial validation study. A sub-scale emphasised to have the power to predict adolescent substance use in the micro-and meso-system may be an indication of the potential impact it may have on families and schools (Blanken, 1993).

There are several types of interactions that can take place in this level. The most basic type of interaction is referred to as the ecological transition, which is when the individual moves into a new or different context such as starting a new grade in school, going camping, graduating or pursuing a new career or job (Berk, 2000; Boemmel & Briscoe, 2001). The possible changes that can transpire during this stage are that the adolescent is challenged with demands by organisational structures in the environment such as school or a job that have certain criteria in which one should conduct oneself (Berk, 2000). Feedback received from such institutions may or may not coincide with ideals

and views unique to the individual. As a result, confusion and mixed messages during this level may arise. Swartz-Fillies (2007) clearly captures the meso-factors in her study where she qualitatively explored the experiences of methamphetamine-using adolescents aged 13-17 years with regard to their personal, social and environmental conditions. She contended that since an adolescent's role as a scholar fulfils an identifiable position in society, maintaining the role could act as a preventive method to substance use. Swartz-Fillies (2007) suggest that the role of the school is crucial for an individual but also in communities where the environmental conditions are challenging due to aspects of gangsterism and the availability of drugs. She had the belief that the availability of substances not only exposes adolescents to the drugs, but also serves to sustain the habit once using occurs. De Haan and Trageton (2001), corroborate the findings of Swartz-Fillies (2007) by stating that school sports and extramural involvement can be proven to act against substance use in adolescents (De Haan & Trageton, 2001).

6.4.5. Macro and Chrono System

The findings demonstrated the following sub-scale at the macro-system: "Tolerance of Adolescent Drug Use" as a predictor as it was correctly classified to discriminate between substance using and non-using adolescents. In addition, the findings also indicate that the following SASUCRI sub-scale can be loaded in a chrono-system: "hopelessness in community". Both SASUCRI sub-scales indicated were not pointed out in the initial validation study as significant predictors of substance use, although both were shown to be predictors in the findings of the present study. One can point out that the impact of socio-economic and political changes may influence risk behaviour of adolescents. The argument can be made that deviant behaviour in association with high levels of environmental stress such as crime and violence may increase the likelihood of adolescents being exposed to substance use (Berk, 2000).

Blanken (1993) asserts that the contextual implications of these sub-scales having the power to predict substance use can have an impact on the nation's (macro-and-chrono systems) social and

economic health through the over-burdening of the legal and criminal justice systems and unequal distribution of health care services. Few South African and international studies have focused on the macro and chrono-system factors that are associated with adolescent substance use (Brook *et al.*, 2006). The core reason for this is that these factors are challenging to measure from an adolescents' perspective. A quantitative study conducted by Flisher *et al.* (2003), focused on Cape Town youth (Grades 8-11) and examined whether cigarettes, alcohol and cannabis use correlated with factors such as urbanisation; high school drop-out rates; absenteeism; economic disadvantage; poor scholastic progress and family structure. The study revealed rapid urbanisation is often associated with housing issues, crime, poverty, unemployment and separation from extended family, which can lead to substance use (Flisher *et al.*, 2003). It can be stressed that there are culturally specific factors that may have an influence on the individual (Brook *et al.*, 2006).

The notion of Brook *et al.* (2006) can be supported by the study conducted by Ward *et al.* (2008). The study found that employment was positively related to substance use among a sample of young adults. The findings by Ward *et al.* (2008), substantiate the findings of Flisher *et al.* (2003) and Brook *et al.* (2006), which emphasises that environmental factors do have an association with substance use among young individuals. In terms of environmental factors that have contextually specific outcomes as explored by Brook *et al.* (2006). Reddy *et al.* (2007) explored this idea where findings showed that black and female South African learners are more sheltered from substance use than American learners. Reddy *et al.* (2007) suggested that the difference is related to access to disposable income since their study was also able to show that black and female South African learners had less access to disposable income than their American counterparts, and as a result were less likely to consume substances.

6.5. Contribution to the Validity Argument

The findings of the present study have contributed to the validity theory/argument for the SASUCRI in terms of external evidence. External evidence of the SASUCRI was gathered by

conducting a DFA to make clear which sub-scales can be considered as predictors to substance use or not.

The MTMM approach introduced by Messick was used in the present study along with a strong theoretical basis on external validity. The multitrait-multimethod technique employed was DFA to build on the external validity evidence gathered in initial validation study. Furthermore, Messick (1990) denotes that there should be an emphasis on the conceptions surrounding validity, which can be obtained in current testing standards. By this, Messick (1990) suggests that scientific evidence is required to inform the development of instruments that requires validation. Also, Messick (1990, 1995) asserts that conceptions of validity are shown in their classic version to provide a standard against which to assess the importance of changes. The development of the SASUCRI underwent various processes as highlighted in Chapter Four. Some of these processes involved that items had to be reworked or removed. Messick (1995) recommends that if changes are made in the development of an instrument, further validation must occur. The process of providing validity evidence is an iterative and an on-going cycle of assessing and revising various aspects of the instrument (Messick, 1995; Sireci, 2007).

The ecological systems theoretical framework formed a strong theoretical basis in this chapter as it was vital to point out the specific sub-scales within their system that may be considered as predictors of substance use among adolescents. The implications of these sub-scales and the ecological systems they were loaded in provided some context on how the individual may function within his or her context. Further, the sub-scales indicated to be predictors of substance use are at this point considered to be more valid than the other sub-scales that did not present the same predictive power. Therefore, these sub-scales pointed out to be predictors can be utilised at this point in time. The same data that were used in the initial validation study were also employed in the present study. Based on recommendations from the initial validation study, different statistical methods had to be utilised in order to assess the predictive power of the SASUCRI sub-scales. The

nine SASUCRI sub-scales showed to be good predictors in the DFA were: “Social Identity”; “Sense of Belonging”; “Effects of Drugs”; “Religiosity”; “Family Functioning”; “Neighbourhood”; “Tolerance of Adolescent Drug Use”; “Mixed Messages” And “Hopelessness in Community”. The findings of the present study suggest that these sub-scales have the discriminant power to predict substance use in adolescents. These SASUCRI sub-scales can also be considered more valid than the other sub-scales that were not highlighted as significant predictors of substance use among adolescents. The results of the present study, contributed in providing external validity evidence for the SASUCRI. The methods employed in the present study allowed for the continuous aspect of instrument validation to continue.

6.6. Limitations of Study

Findings from the present study should be considered in the light of potential limitations. The present study used cross sectional data, which entails data collected at one specific time (Mann, 2003). One can state that only gathering data from school learners in a study that seeks to measure substance use as a variable does not constitute a representative sample (Florence, 2014). In the initial validation study, it was stressed that responses of users may have been missed, as cross-sectional studies are generally dependent on all learners to be present the day of the data collection. The youth that were not present during the data collection process should have formed part of the sample so that it can be more representative. The DFA is used to discriminate between predetermined groups based on certain scores (Poulsen & French, 2004). Although there are some limitations to the common use of DFA (such as the fact that its assumptions are not easily attainable and that it is essential to determine dependent groups before analysis), they may not appear in every research problem (Poulsen & French, 2004).

Logistic regression was an option in the present study since it is considered to be more robust (Field, 2009; Pohar *et al.*, 2004). Logistic regression (LR) is seen as an extension of a linear regression which allows one to assess categorical outcomes variables (Field, 2009). LR is an

appropriate technique to use as it would have allowed one to predict membership of two categories of substance use, which is considered dichotomous (Field, 2009; Pohar *et al.*, 2004). The DFA was used in the present study as it was considered more robust in testing assumptions about the data being used (see Chapter Five, section 5.1.2). Assumptions such as normality and homogeneity of variances were tested as pointed out by the criteria of the DFA. The DFA is considered to be sensitive to any violations in the data (Field, 2009; Pohar *et al.*, 2004). According to Pohar *et al.* (2004, p. 18) “linear discriminant function analysis remains preferable and fails only when the number of categories are smaller than 2 or 3”. Due to the DFA not meeting the assumption of normality, the LR would have been more flexible in meeting these assumptions.

There might be some cases where assumptions of the analysis are easily met or the groups are clear. In such cases, its benefits must be considered, since it is a conceptually and mathematically powerful multivariate method. The present study also used data where participants were recruited from schools only. Assessing the SASUCRI sub-scales and its predictive power in communities that are characterised by a low socio-economic status can also be considered as a potential limitation as it only focused on one specific sample. The sample that was used did not focus on other communities outside the Western Cape where substance use can be considered as a risk factor. However, despite these limitations, the present study does provide valuable empirical evidence for sub-scales that may act as predictors to substance use among adolescents.

6.7. Significance of Study

The SASUCRI can measure the level and prevalence of exposure to factors associated with adolescent substance use in schools or communities. Furthermore, the SASUCRI can also identify groups reporting high risk or low protection with regard to certain factors (Florence, 2014). Due to the effect that substance use has on society as a whole, not only on individuals, it is imperative to identify these associated factors in order to scrutinise the dynamics between these indicated factors and substance use. By continuing the validation process of the SASUCRI it will contribute to the substance abuse research field as it will be able to address the problem from a preventative

approach. Addressing the social issue of substance abuse from both a preventative point of view and an ecological perspective it can be considered as beneficial due to the addictive nature of substances that are prevalent in low socio-economic status communities. Access to tertiary interventions are also considered problematic for adolescents that come from low socio-economic status communities, therefore the present study contributed to the validation of the SASUCRI, which can inform future interventions and place focus on prevention. The contribution that the SASUCRI is making is that it can inform primary and secondary interventions. Tertiary interventions can be targeted more accurately if there is a clearer understanding of the dynamics between substance use and the factors that influence behaviours such as substance use in these adolescents (Florence, 2014).

Once completed, the instrument can be utilised to identify youth in low-socio-economic status South African communities who might be at risk of substance use. The present study was based on Florence's (2014) recommendation which is to contribute to the validity argument for the SASUCRI in support of external evidence. The findings of the present study provided external validity evidence for the SASUCRI. The DFA was employed in the present study as it was recommended that a sounder method be introduced to provide external validity evidence, but also to present how the SASUCRI sub-scales considered being valid at this point, are able to correctly discriminate between substance using and non-using adolescents. The sub-scales that are not considered to be predictors will require further examination and revision to see whether the constructs are indeed measuring what they were originally designed for.

6.8. Recommendations for Further Research

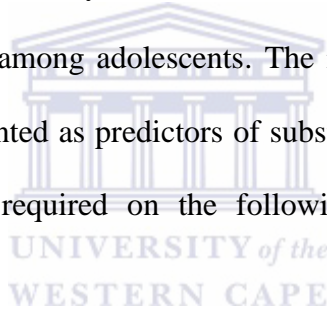
Future research should adopt the MTMM method where multiple approaches can be considered to test the validity of an instrument in scale development (Campbell & Fiske, 1959; Messick, 1989). The present study utilised two multivariate techniques, instead one can recommend that if the study is replicated one can employ an additional technique termed Factor Analysis. One approach that the factor analysis may take is a "confirmatory factor analysis approach" that shifts emphasis on a

specified set of variables that can be tested in the predicted manner, by this means also concentrating on the predictive power of items in the SASUCRI. Furthermore, by using the CFA approach one is also able to expand on testing the discriminant validity of the SASUCRI. For the confirmatory procedure, the analysis can be used to calculate the percentage for correct classification of each item from a specific construct (Zait & Berteau, 2011). When the percentage is shown to have low values, it implies that there are items with difficulties that are unable to discriminate well in relation with other items that form a different construct (Zait & Berteau, 2011). Further, research should focus on exploring the macro system factors as it failed to load in both the initial validation study and the present study. Furthermore, due to the risk substance use poses for adolescents in low socioeconomic status communities, it can be recommended that the SASUCRI explore this social issue in contexts that have similar social issues such as the Western Cape.

6.9. Conclusion

The validation of an instrument is a continuous process (Messick, 1989). Furthermore, the present study presented sub-scales from the revised version of the SASUCRI in which items were reformulated to assess whether they are able to predict adolescent substance use. The external validity was assessed to contribute to the continuous aspect of validation. In addition, De Bruin and Lew (2000), recommend that instrument development studies usually suggest that further improvement be made to an instrument through the processes of reviewing and reformulation of certain items as evident in the SASUCRI. The process of validation requires that external validity be employed in instrument validation. The present study highlighted that nine of twenty-one sub-scales presented a discriminant power to predict substance use among adolescents. It can be stressed that the present study proved that these nine sub-scales were correctly classified in discriminating between substance using and non-using adolescents. The present study did not present convincing external validity evidence as only nine SASUCRI sub-scales are able to act as significant predictors of adolescent substance use.

Findings showed that nine SASUCRI sub-scales have the discriminant power to predict substance use among adolescents in low socio-economic status communities. The following sub-scales are considered to be more valid at this point, but not necessarily representative of being more important than the other SASUCRI sub-scales that were not shown to be significant predictors of substance use. The following nine SASUCRI sub-scales are considered to be predictors of substance: “Social Identity”; “Sense of Belonging”; “Effects of Drugs”; “Religiosity”; “Family Functioning”; “Neighbourhood”; “Tolerance of Adolescent Drug Use”; “Mixed Messages” And “Hopelessness in Community”. Based on the findings it was revealed that these SASUCRI sub-scales are representing all six systems namely: Individual; micro family; micro community; meso; macro and chrono-system. The systems that did not present convincing external evidence were the micro (family); micro (community) and chrono-system which contain fewer sub-scales that do not have the power to predict substance use among adolescents. The initial validation study found similar results as few sub-scales were presented as predictors of substance use in those particular systems. Therefore, further examination is required on the following systems: micro (family); micro (community) and chrono-system.



In conclusion, external evidence has been provided for the SASUCRI by the present study. The findings were crucial as they contributed to the external validity evidence of the SASUCRI. The validation of the SASUCRI is considered an iterative process which is on-going through the present study as it provided external evidence on the sub-scales that may predict substance use among adolescents. The Findings of the present study were also discussed with reference to the ecological systems theoretical framework, as it provided insight into the contextual realities of adolescents.

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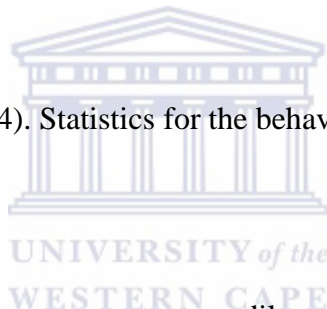
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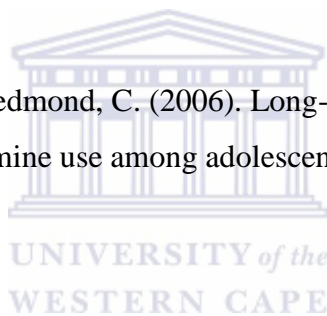


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APPENDIX A: PERMISSION TO CONDUCT STUDY

APPENDIX A



UNIVERSITY of the
WESTERN CAPE

OFFICE OF THE DEAN
DEPARTMENT OF RESEARCH DEVELOPMENT

13 June 2012

To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape has approved the methodology and ethics of the following research project by:
Ms M Florence (Psychology)

Research Project: Adolescent substance abuse: The development and validation of a measure of perceived individual and contextual factors.

Registration no: 10/8/14

A handwritten signature in black ink, appearing to read 'Josias'.

*Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape*

Private Bag X17, Bellville 7535, South Africa
T: +27 21 959 2988/2948 . F: +27 21 959 3170
E: pjosias@uwc.ac.za
www.uwc.ac.za

A place of quality,
a place to grow, from hope
to action through knowledge

APPENDIX B: PERMISSION LETTER FROM RESEARCHER



UNIVERSITY *of the* WESTERN CAPE

DEPARTMENT OF PSYCHOLOGY

Private Bag X 17, Bellville 7535, South Africa, Telephone: (021) 959-2283/2453
Fax: (021) 959-3515 Telex: 52 6661

4 March 2015

TO WHOM IT MAY CONCERN

RE: Permission to conduct study

I hereby grant permission to Kyle Bester (student number 3508278) to do secondary data analysis on data collected for a project title "Adolescent substance abuse: The development and validation of a measure of perceived individual and contextual factors" – registration number 10/8/14. The study by Mr Bester is titled "External Validity Evidence of the South African Substance Use Contextual Risk Instrument: Predictive Validity" and forms part of the validation of an instrument to measure the factors associated with adolescent substance use in low socio-economic status communities. The analysis to be conducted by Mr Bester is based on a recommendation from the larger study and is a continuation of the process of validating the instrument.

Yours sincerely

A handwritten signature in cursive script, appearing to read 'M.A. Florence'.

M.A. Florence

mflorence@uwc.ac.za



UNIVERSITY OF THE WESTERN CAPE

Private Bag X17, Bellville 7535
Tel: 021-959 2283, Fax: 021-959 3515

APPENDIX C: *INFORMATION SHEET (PARENTS)*

Title of Research Project: Adolescent substance use: The development and validation of a measure of perceived individual and contextual wellness factors.

What is the present study about?

This research is being conducted by Maria Florence of the Psychology Department at the University of the Western Cape. This project has been approved by the University of the Western Cape's Senate Research and Ethics Committee. Your child has been invited to participate in the research because s/he is between the ages of 13 and 18 years and living in the Western Cape. The purpose of this research is to develop a questionnaire that will help us find out what factors in the community could lead to drug and alcohol use among young people. This will contribute to a better understanding of the problem in this area of the Western Cape, and could lead to better programmes being implemented.

What will your child be asked to do if s/he agrees to participate?

Your child will be asked to answer questions on a questionnaire. The kind of questions that will be asked is, for example, "How often have you felt like you are able to improve your own situation?". Your child will be given the questionnaire by trained researchers during class time (previously arranged with teachers and the school principal), and s/he will be given a chance to fill in the questionnaire and hand it back during that session. Participation in the research is NOT a requirement of the class that s/he would have attended in this slot.

Would my child's participation in the present study be kept confidential?

We will ensure that your child's personal information is kept confidential. We will need to record information like his/her age and gender, but his/her name will not appear on the questionnaire or the record that will be kept of the information. The researchers will be the only people who will have access to the results. If we write a report or article about this research, your child's identity (as well as the name of the school and community) will be protected.

What are the risks of this research?

There are no known risks associated with participating in this research. We are not doing research on your child as a person or to affect her/him in any way. Your child is filling in this questionnaire

so that we can collect information about drug and alcohol use in general. At this stage we are only interested in the development of the questionnaire so the information that will be collected will be used to ensure that it is a valid questionnaire.

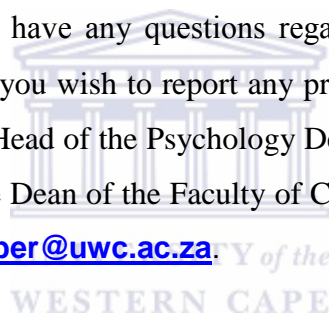
Does my child have to be in this research and may s/he stop participating at any time?

If your child decides to participate in this research, s/he may stop at any time. If your child decides not to participate in this research (or you decide not to grant permission for him/her to participate in the research) or if s/he stops participating at any time, there will not be any consequences.

Is any assistance available if my child is negatively affected by participating in the present study?

Should your child be negatively affected by this research, you can contact Maria Florence who will do everything possible to refer you for support and assistance. **What if I have questions?**

If you have any questions about the research itself, please contact **Maria Florence (021-9592827) mflorence@uwc.ac.za**. Should you have any questions regarding this research and your child's rights as a research participant or if you wish to report any problems you have experienced related to the research, please contact: The Head of the Psychology Department: **Prof K. Mwaba (021-959 2839) kmwaba@uwc.ac.za** OR The Dean of the Faculty of Community and Health Sciences: **Prof H. Klopper (021-959 2631) hklopper@uwc.ac.za**





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APPENDIX D: Consent Form (Parents)

Title of Research Project: Adolescent substance use: The development and validation of a measure of perceived individual and contextual wellness factors.

The research has been described to me in language that I understand and I freely and voluntarily give permission for my child to participate. My questions about the research have been answered. I understand that my child’s identity will not be disclosed and that s/he may withdraw from the research at any time without giving a reason and this will not negatively affect him/her in any way.

Participant/child’s name.....

Parent/guardian’s signature.....

Date.....

Witness’ name:.....

Witness’ signature:

Date:



Should you have any questions regarding this research or wish to report any problems you have experienced related to the research, please contact the research coordinator:

Research Coordinator’s Name: Maria Florence

University of the Western Cape

Private Bag X17, Bellville 7535

Telephone: (021)959-2283/2453/2827

Fax: (021)959-3515

Email: mflorence@uwc.ac.za

THANK YOU FOR YOUR CONTRIBUTION TO THIS RESEARCH 😊



UNIVERSITY OF THE WESTERN CAPE

Private Bag X17, Bellville 7535
Tel: 021-959 2283, Fax: 021-959 3515

APPENDIX E: *Information Sheet (Learners)*

Title of Research Project: Adolescent substance use: The development and validation of a measure of perceived individual and contextual wellness factors.

What is the present study about?

This research is being conducted by Maria Florence of the Psychology Department at the University of the Western Cape. This project has been approved by the University of the Western Cape's Senate Research and Ethics Committee. You have been invited to participate in the research because you are between the ages of 13 and 18 years and living in the Western Cape. The purpose of this research is to develop a questionnaire that will help us find out what factors in the community could lead to drug and alcohol use among young people. This will contribute to a better understanding of the problem in this area of the Western Cape, and could lead to better programmes being implemented.

What will you be asked to do if you agree to participate?

You will be asked to answer questions on a questionnaire. The kind of questions that will be asked is, for example, "How often have you felt like you are able to improve your own situation?". You will be given the questionnaire by trained researchers during class time (previously arranged with teachers and the school principal), and you will be given a chance to fill in the questionnaire and hand it back during that session. Participation in the research is NOT a requirement of the class that you would have attended in this slot.

Would your participation in the present study be kept confidential?

We will ensure that your personal information is kept confidential. We will need to record information like your age and gender, but your name will not appear on the questionnaire or the record that will be kept of the information. The researchers will be the only people who will have access to the results. If we write a report or article about this research, your identity (as well as the name of the school and community) will be protected.

What are the risks of this research?

There are no known risks associated with participating in this research. We are not doing research on you as a person or to affect you in any way. You are filling in this questionnaire so that we can

collect information about drug and alcohol use in general. At this stage we are only interested in the development of the questionnaire so the information that will be collected will be used to ensure that it is a valid questionnaire.

Do I have to be in this research and may I stop participating at any time?

If you decide to participate in this research, you may stop at any time. If you decide not to participate in this research or if you stop participating at any time, there will not be any consequences.

Is any assistance available if I am negatively affected by participating in the present study?

Should you be negatively affected by this research, you can contact Maria Florence who will do everything possible to refer you for support and assistance.

What if I have questions?

If you have any questions about the research itself, please contact **Maria Florence (021-9592827)** mflorence@uwc.ac.za. Should you have any questions regarding this research and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact: The Head of the Psychology Department: **Prof K. Mwaba (021-959 2839)** kmwaba@uwc.ac.za OR The Dean of the Faculty of Community and Health Sciences: **Prof H. Klopper (021-959 2631)** hklopper@uwc.ac.za.



UNIVERSITY OF THE WESTERN CAPE

Private Bag X17, Bellville 7535
Tel: 021-959 2283, Fax: 021-959 3515

APPENDIX F: ASSENT FORM (MINOR)

Title of Research Project: Adolescent substance use: The development and validation of a measure of perceived individual and contextual wellness factors.

The research has been described to me in language that I understand and I freely and voluntarily agree to participate. My questions about the research have been answered. I understand that my identity will not be disclosed and that I may withdraw from the research at any time without giving a reason and this will not negatively affect me in any way.

Participant's name.....

Participant's signature.....

Date.....

Witness' name.....

Witness' signature:

Date:

Should you have any questions regarding this research or wish to report any problems you have experienced related to the research, please contact the research coordinator:

Research Coordinator's Name: Maria Florence

University of the Western Cape

Private Bag X17, Bellville 7535

Telephone: (021)959-2283/2453/2827

Fax: (021)959-3515

Email: mflorence@uwc.ac.za

😊 **THANK YOU FOR YOUR CONTRIBUTION TO THIS RESEARCH** 😊

APPENDIX G: QUESTIONNAIRES

A (For official use only))

FACTORS ASSOCIATED WITH DRUG USE

1. This questionnaire will be used to find out what factors could lead to alcohol and drug use in your community.
2. Your answers are important for the present study whether you use alcohol and/or drugs or not.
3. It should take around 40-50 minutes to complete this questionnaire.
4. There are NO RIGHT OR WRONG ANSWERS.
5. Choose the option that fits your answer best and tick (✓) it in the blocks provided.
6. You do not have to write your name on the questionnaire or show your answers to anybody.
7. Nobody who knows you will look at your answers once you have finished it.
8. You are free to withdraw from the study at any time, during the process.
9. Please read every question carefully and answer the questions honestly.
10. Some questions will sound the same – please answer them anyway.

Your cooperation with the completion of this questionnaire is highly appreciated.



The following questions are about whether you use alcohol and drugs or not.
 It is important that you answer these questions honestly.
 Remember that no one will know that this is your questionnaire.

Tick (✓) by the option that applies to you **OR** write your answer in the space provided.

	Alcohol		Dagga (Cannabis)		Tik (Methamphetamine)		Buttons (Mandrax)		Unga (Heroin)		E (Ecstasy)		Other Specify:									
1) Have you ever used any of the following?	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	B-H							
2) Are you still using any of the following?	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	I-O							
Answer the rest of the questions ONLY if you have answered YES to question 1) for any of the drugs listed in question 1 above. If you've answered NO to question 1) above then proceed to the next page and answer the rest of the questionnaire.																						
3) How regularly do/did you use the following?	Alcohol		Dagga			Tik			Buttons			Unga			E			Other				
	Daily	Weekly	Seldom	Daily	Weekly	Seldom	Daily	Weekly	Seldom	Daily	Weekly	Seldom	Daily	Weekly	Seldom	Daily	Weekly	Seldom	Daily	Weekly	Seldom	P-V
4) How old were you when you first used the following?	Alcohol		Dagga			Tik			Buttons			Unga			E			Other				
																					W-AC	
5) If you use(d) more than one type of drug on the same day (including alcohol) tick the drugs that you would use or would have used together.	Alcohol		Dagga			Tik			Buttons			Unga			E			Other				
																					AD	
6) Have you ever been treated for use, abuse, or addiction to any of the following?	Alcohol		Dagga			Tik			Buttons			Unga			E			Other				
																					AEI	