EXAMINING THE DIRECT AND INDIRECT EFFECT THAT INDIVIDUAL AND CONTEXTUAL RISK FACTORS HAVE IN PREDICTING SUBSTANCE ABUSE.

A thesis submitted in fulfilment of the
requirements for the degree of

DOCTOR OF PHILOSOPHY

of

RHODES UNIVERSITY

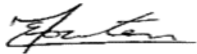
By
ELRON STEVE FOUTEN

December 2023

SUPERVISOR
Prof. Charles Young

DECLARATION

I hereby declare that this dissertation is my own work and that any information derived from the published and unpublished work of others has been rightly and properly acknowledged in the text and the included reference list. The dissertation is produced and submitted in fulfilment of the requirement for the degree of Doctor of Philosophy in Psychology at Rhodes University.



Elron Fouten

Date: 3 January 2024

DEDICATION

I dedicate this work to everyone who has ever been directly or indirectly affected by substance abuse. I also dedicate this work to those who tirelessly strive to provide care and support to those who are directly and indirectly affected by substance abuse.

ACKNOWLEDGEMENTS

First and foremost, I thank God the Father and the Lord Jesus who graced me with the desire to pursue a PhD and who equipped me through the power of the Holy Spirit to persevere when it seemed an impossible feat.

My heartfelt thanks go to my supervisor, Professor Charles Young, for your academic, emotional, and financial support throughout this journey. Thank you for your unwavering guidance, and invaluable feedback. Your expertise, insights, and mentorship have been instrumental in shaping this dissertation.

Thank you to my wife Vanessa Fouten and my daughter Erin Vogt for your patience and for the sacrifices you made. Thank you for being patient and understanding during times when I was emotionally distant.

Thank you to the Substance Abuse project team (Charl, Elize, Maria, Serena and Shazly) for starting this process. Thanks also goes to the substance abuse treatment centres for allowing me to conduct this study and to their clients who provided the data on which this study is based.

Last but not least, to my mother Alice Fouten thank you for your prayers.

ABSTRACT

Substance abuse levels in South Africa have continued to rise, with the age of first experimentation with drugs reported as being 10 years. Several studies have shown that substance abuse has an adverse impact on users, their families and their communities, resulting in a number of social, psychological and economic struggles. Moreover, substance abuse places an increased psychological, social and financial burden on the individual and the family, as it has been related to the destabilisation of the nuclear and extended family units, permeating every area of life and affecting the very social fabric of society.

This study therefore endeavoured to determine which of the individual and contextual risk factors measured by the South African Substance Use Contextual Risk Instrument (SASUCRI) best predicts substance abuse in a sample of self-identified substance abusers. Additionally, the study sought to determine the magnitude, strength and direction of the interaction of the individual and contextual risk factors in predicting substance abuse. The specific aims of the study were: 1) to build a theoretical model that best approximates the identified and measured individual and contextual factors associated with substance abuse, 2) to use structural equation modelling (SEM) to test the adequacy of the model's fit to the data that have been collected, 3) to use SEM to statistically determine which of the perceived individual or contextual factors best predict substance abuse, and 4) to use SEM to statistically determine which combination of perceived individual and contextual factors best predict substance abuse. To achieve these aims, the study applied SEM to data collected from individuals seeking either inpatient or outpatient treatment for substance abuse in the Eastern Cape and Western Cape Provinces of South Africa, respectively.

The purpose of SEM is to a priori specify a theoretical causal model consisting of a set of predicted covariances between variables, and then test whether it is plausible when compared

to the observed data. The appropriateness of performing SEM exists in its ability and suitability to examine the nature and magnitude of postulated dependence relationships, while simultaneously assessing the direct and indirect relations of the variables. The theoretical causal model that was tested contained latent and manifest variables that were identified as risk factors for substance abuse. The causal model was informed by Bronfenbrenner's (1977a, 1986) ecological systems theory (EST) and was specified to approximate the different systems of the theory. Data for the study were collected using the relatively newly developed and validated SASUCRI.

The results of the confirmatory factor analysis (CFA) showed that the SASUCRI was a reliable and valid instrument to use with this population, and that the results of the structural model can be interpreted with confidence. The fit statistics, for the normal theory and related bootstrap latent path SEM, all indicate that the model is an excellent fit to the data CMIN/DF = 2.82, NFI = .946, CFI = .97, RMSEA = .04., thus achieving the study's objective. The normal theory analysis of the paths in the diagram identified the microsystem, "Access/proximity to drugs" (APTD) and "Concerns for future" (CFF) as significant predictors of substance abuse, whereas the bootstrap analysis of the paths identified the macrosystem, APTD and CFF as significant predictors of substance abuse.

This study identified 10 risk profiles that interact in the prediction of substance abuse; these are: individuals with low self-efficacy (SE) who perceive their family as lacking or having low intra-family communication, who lack positive peer support, who perceive criminal behaviours as normal, who feel a strong need to fit in, who are less religious, who have easy access to drugs, who lack a sense of community traditions and belonging, who see public displays of substance use (SU) as normal, and who lack concern for the future, are at 59% greater risk of substance abuse. Though micro level factors (low SE, lack of or low intra-family communication, and a lack of positive peer support) and meso-level factors (normalisation of

criminal activity, a strong need to fit in, and being less religious) does not significantly predict abuse, they significantly interact with external factors in predicting substance abuse. Thus, it is only when they interact with factors located in the other systems (exosystem, macrosystem and chronosystem) that they become significant predictors of substance abuse. Conversely, exosystem (easy access to drugs), macrosystem (lack of a sense of community traditions and belonging, commonplace public displays of SU), and chronosystem factors (lack of concern for the future), independently are significant predictors of substance abuse.

These findings carry significant public health implications by challenging the prevailing focus on individual-based interventions. Recognising that the drivers of substance abuse extend beyond individual factors, this study therefore advocates for interventions that address the broader systems contributing to the issue. This has the potential to inform more effective and holistic public health strategies. Finally, this study emphasises the need for comprehensive strategies that span different systems, acknowledging the role of family, community and societal factors. This call for complex interventions aligns with the ecological systems perspective, advocating for a paradigm shift in how we address SU by considering the broader environmental influences that contribute to the problem. In summary, this study not only contributes to the academic understanding of SU, but also has practical implications for public health policies and interventions.

TABLE OF CONTENTS

DECLARATION i

DEDICATION ii

ACKNOWLEDGEMENTS iii

ABSTRACT iv

TABLE OF CONTENTS vii

LIST OF TABLES xvi

LIST OF FIGURES xviii

LIST OF ABBREVIATIONS AND ACRONYMS xix

CHAPTER ONE 1

INTRODUCTION 1

1.1 Introduction and Background 1

1.1.1 Study setting 2

1.1.2 Extent of the problem 4

1.1.3 Definition of terms 6

1.2 Rationale of the Study 11

1.3 Overview of the Larger Study 12

1.4 Aims of the Current Study 13

1.5 Overview of the Thesis 14

CHAPTER TWO 155

LITERATURE REVIEW 155

THE EVOLUTION OF SUBSTANCE USE DISORDER IN THE DSM AND THE PREVALENCE OF SUBSTANCE ABUSE 155

2.1 Introduction 155

2.2 The Evolution of Substance Abuse in the DSM 155

2.2.1 DSM-I (1952) 177

2.2.2 DSM-II (1968) 188

2.2.3 DSM-III (1980)..199

2.2.4 DSM-III-R (1987)..211

2.2.5 DSM-IV (1994)..222

2.2.6 DSM-5 (2013) / DSM-5-TR (2022)..244

2.3 International Prevalence of Substance Abuse...266

2.4 National Prevalence of Substance Abuse 288

2.5 Substance Abuse Prevalence by Age Category/Group..............................311

2.5.1 Younger group 311

2.5.2 Older group 322

2.6 Substance Abuse Prevalence in Study Sites 33

2.6.1 Western Cape..344

2.6.2 Eastern Cape 355

2.7 Conclusion 377

CHAPTER THREE 399

THE LANDSCAPE OF SUBSTANCE ABUSE RESEARCH...........................399

LITERATURE REVIEW 399

3.1 Introduction...399

3.2 Risk Factors 40

3.2.1 Individual risk factors 422

3.2.1.1 Biological factors...433

3.2.1.2 Psychological factors 444

3.2.1.2.1 Personality...455

3.2.1.2.2 Psychopathology 477

3.2.1.2.3 Trauma 499

3.2.2 Contextual factors 511

3.2.2.1 Peer environment 533

3.2.2.2 Parental bonding 533

3.2.2.3 Neighbourhood 555

3.2.2.4 Socioeconomic context and culture 566

3.3 Substance Abuse Development Paths 588

3.4 Studies Using Ecological Systems Theory 611

3.5 Conclusion 655

CHAPTER FOUR 677

THEORETICAL FRAMEWORK 677

4.1 Introduction 677

4.2 Overview of the Ecological Systems 688

4.2.1 The microsystem 688

4.2.2 The mesosystem 7070

4.2.3 The exosystem 711

4.2.4 The macrosystem 722

4.2.5 The chronosystem 733

4.3 Evolution of Bronfenbrenner’s Ecological Systems Theory (EST) 744

4.4 Relevance to the Current Study 755

4.5 Conclusion 777

CHAPTER FIVE 799

METHODOLOGY 799

5.1 Introduction 799

5.2 Design 822

5.3 Sample and Sampling Procedure 833

5.4 Procedure 855

5.4.1 Western Cape sampling procedure 855

5.4.2 Eastern Cape sampling procedure 877

5.5 Method of Data Collection 888

5.6 Data Collection Instrument 89

5.7 Factor/Variable Identification 101

5.8 Mean Scores of the Constructs/Variables 105

5.8.1 Self-efficacy 106

5.8.2 Intra-family communication 107

5.8.3 Positive peer support 108

5.8.4 Ambiguities about criminal behaviours 110

5.8.5 Fitting in 111

5.8.6 Religiosity 113

5.8.7 Access or proximity to drugs 114

5.8.8 Community traditions and belonging 115

5.8.9 Public displays of substance use 117

5.8.10 Concerns for the future 118

5.8.11 Risk of exclusion from participation 120

5.8.12 Positive effects of drugs/Substance abuse 122

5.9 Data Analysis 123

5.10 Ethical Considerations 124

5.11 Conclusion 125

CHAPTER SIX 126

STRUCTURAL EQUATION MODELLING 126

6.1 Introduction 126

6.2 Why SEM? 126

6.3 Basic Concepts of SEM 128

6.3.1 Latent versus observed variables 128

6.3.2 Exogenous versus endogenous latent variables 129

6.3.3 The factor analytic model 129

6.3.4 The full latent variable model 130

6.3.5 The general structural equation model symbol notation 130

6.4 Approaches to SEM 131

6.5 Steps in SEM 132

6.5.1 Model specification 132

6.5.2 Model identification 133

6.5.2.1 Just-identified models 134

6.5.2.2 Over-identified models 134

6.5.2.3 Under-identified models 135

6.5.2.4 Sources of identification problems 135

6.5.3 Model estimation 136

6.5.3.1 Maximum likelihood (ML) 136

6.5.3.2 Unweighted least squares (ULS) 137

6.5.3.3 Generalised least squares (GLS) 137

6.5.3.4 Scale-free least squares (SLS) 138

6.5.3.5 Asymptotically distribution-free (ADF) estimation 138

6.5.4 Model fit/model testing 138

6.5.4.1 Absolute fit indices 139

6.5.4.1.1 CMIN/DF 140

6.5.4.1.2 Goodness-of-Fit index (GFI) 141
6.5.4.1.3 Standardised Root Mean Square Residual (SRMR) 141
6.5.4.2 Relative fit indices 142
6.5.4.2.1 Comparative Fit Index (CFI) 143
6.5.4.3 Parsimony 144
6.5.4.3.1 Parsimony Goodness-of-Fit Index (PGFI) 144
6.5.4.4 Noncentral 145
6.5.4.4.1 Root mean square error of approximation (RMSEA) 145
6.5.4.5 Information theoretical fit 146
6.5.4.5.1 Consistent Akaike Information Criterion (CAIC) 147
6.5.5 Modification 147
6.6 Conclusion 148
CHAPTER SEVEN 149
DESCRIPTIVE AND CFA RESULTS 149
7.1 Introduction 149
7.2 Demographic Descriptive Results 149
7.3 Reliability of Constructs 150
7.4 Confirmatory Factor Analysis Results 152
7.4.1 Discriminant validity 153
7.4.2 Convergent validity 154
7.4.3 Discriminant validity and convergent validity results 154
7.5 Assessment of Multicollinearity 164
7.6 CFA Difference Test 167
7.7 Second Order Factor Analysis 168
7.8 Conclusion 174

CHAPTER EIGHT 175

SEM RESULTS 175

8.1 Introduction 175

8.2 Conceptual Model (Figure 6) 175

8.3 Results for the Full Latent Factor SEM 177

8.3.1 Model specification 177

8.3.2 Model identification 179

8.3.2.1 Model variables 179

8.3.2.2 Model identification produced outputs 180

8.3.3 Model estimation 180

8.3.4 Model testing 181

8.3.5 Model modification 182

8.3.6 Model interpretation 182

8.3.6.1 Dependent variable 182

8.3.6.2 Predictor variables 183

8.4 Residual Examination 185

8.5 Inter-Correlations 187

8.6 Second Order Factor 190

8.7 Mediation Analysis 195

8.8 Conclusion 1955

CHAPTER NINE 1966

DISCUSSION 1966

9.1 Introduction 1966

9.2 Adequacy of the Measuring Instrument 1988

9.2.1 Reliability 1988

9.2.2 Discriminant validity 1999

9.2.3 Convergent validity..20201

9.2.4 Multicollinearity 2022

9.3 Descriptive Results 2033

9.3.1 Age..2033

9.3.2 Gender..2044

9.3.3 Province 2055

9.4 Risk Factors that Predict Substance Abuse..2055

9.4.1 Exosystem (APTD)..2066

9.4.2 Macrosystem..2077

9.4.3 Chronosystem (CFF)..2099

9.5 Influnce of Risk Factors..21111

9.5.1 Microsystem influence..2122

9.5.2 Mesosystem influence..2133

9.5.3 Exosystem influence..2144

9.5.4 Macrosystem influence..2155

9.6 Conclusion 2166

CHAPTER TEN..2188

CONCLUSION..2188

10.1 Introduction..2188

10.2 Overall Findings..2188

10.3 Main Contribution of the Study 22020

10.4 Limitations of the Study..221

10.4.1 Study design..2222

10.4.2 Sample/participants..2233

10.4.3 Measuring instrument 2244
10.4.4 Outcome variable 2255
10.5 Strengths of the Study 2255
10.6 Recommendations for Future Research 2277
10.7 Conclusion 2277
REFERENCES 2299
APPENDICES 265
Appendix A: Rhodes University Ethics Clearance 265
Appendix B: Request for Permission to Collect Data 266
Appendix C: City of Cape Town Research Request 269
Appendix D: Province of the Eastern Cape Social Development – Permission Letter 270
Appendix E: Participant Information Sheet 271
Appendix F: Participant Consent Form 274
Appendix G: South African Substance Use Contextual Risk Instrument (SASUCRI)..... 276
Appendix H: SASUCRI – English Version (Revised) 279
Appendix I: Initial CFA Standardised Regression Weights and Correlations.................. 287
Appendix J: Respecified CFA 289
Appendix K: Second Order CFA 290

LIST OF TABLES

Table 5.1: Blueprint Dimensions 90

Table 5.2: Internal Consistency Coefficients 92

Table 5.3: Factorability of Scale Data 94

Table 5.4: English Sub-Scales Cronbach Alpha 94

Table 5.5: Biased Items 95

Table 5.6: Sub-Scales that are Predicting Substance Use 97

Table 5.7: Factor Naming Process 101

Table 5.8: Mean Scores for Self-Efficacy (SE) 105

Table 5.9: Mean Scores for Intra-Family Communication (IFC) 107

Table 5.10: Mean Scores for Positive Peer Support (PPS) 108

Table 5.11: Mean Scores for Ambiguities About Criminal Behaviour (AACB) 110

Table 5.12: Mean Scores for Measures for Fitting In (FI) 111

Table 5.13: Mean Scores for Religiosity (REL) 112

Table 5.14: Mean Scores for Access/Proximity to Drugs (APTD) 113

Table 5.15: Mean Scores for Community Traditions and Belonging (CTB) 115

Table 5.16: Mean Scores for Public Displays of Substance Use (PDSU) 116

Table 5.17: Mean Scores for Concerns for the Future (CFF) 119

Table 5.18: Mean Scores for Risk of Exclusion from Participation (REP) 120

Table 5.19: Mean Scores for Positive Effects of Drugs (PED) 121

Table 7.1: Demographic Descriptive Results 149

Table 7.2: Internal Consistency of the Constructs 150

Table 7.3: Model Fit Statistics for the Initial CFA Model 155

Table 7.4: Validity Analysis 156

Table 7.5: HTMT Analysis 157

Table 7.6: Fit Indices for the Respecified CFA 159

Table 7.7: Modified Validity Analysis 160

Table 7.8: Modified Validity Analysis and Confidence Intervals 161

Table 7.9: HTMT Analysis 162

Table 7.10: HTMT Analysis Lower and Upper Confidence Intervals 163

Table 7.11: Coefficients 164

Table 7.12: Collinearity Diagnostics 166

Table 7.13: Side-by-Side Fit Indices for Initial and Respecified CFA 167

Table 7.14: Second Order Factor Model Fit Indices 170

Table 7.15: Second Order CFA 171

Table 7.16: Second Order CFA Bootstrap Estimates 172

Table 7.17: Correlation 173

Table 8.1: Latent Path SEM Fit Indices 182

Table 8.2: Normal Theory Standardised Estimates (Regression Weights) 183

Table 8.3: Bootstrapped Standardised Estimates 184

Table 8.4: Hypothesis Test 185

Table 8.5: Standardised Residual Covariances 186

Table 8.6: Model Covariances 188

Table 8.7: Bootstrapped Covariances 188

Table 8.8: Standardised Correlation Estimates 189

Table 8.9: Bootstrapped Correlation Estimates 190

Table 8.10: Standardised Estimates for Second Order Factors 191

Table 8.11: Second Order Factors Bootstrapped Estimates 192

Table 8.12: Mediation analysis 193

LIST OF FIGURES

Figure 1: Individuals Seeking Treatment for AOD use in the WC during the Period 2001 to 2020 34

Figure 2: Individuals Seeking Treatment for AOD use in the EC during the Period 2001 to 2020 36

Figure 3: Initial CFA Model 154

Figure 4: Respecified CFA Model 158

Figure 5: Second Order Factor Model 169

Figure 6: Conceptual Model 176

Figure 7: Full SEM with Second Order Factors 178

LIST OF ABBREVIATIONS AND ACRONYMS

Access or Proximity to Drugs	APTD
Adverse Childhood Experience	ACE
Alcohol and Other Drugs	AOD
Alcohol, Smoking and Substance Involvement Screening Test	ASSIST
Ambiguities About Criminal Behaviour	AACB
American Psychiatric Association	APA
American Psychological Association	APA
Antisocial Personality Disorder	ASPD
Asymptotically Distribution-Free	ADF
Average Variance Extracted	AVE
Child Behaviour Checklist	CBCL
Community Traditions and Belonging	CTB
Composite Reliability	CR
Concerns For the Future	CFF
Conduct Disorder	CD
Confirmatory Factor Analysis	CFA
Consistent Akaike Information Criterion	CAIC

Content Validity Questionnaire	CVQ
Department of Health	DoH
Department of Social Development	DSD
Dependent Variable	DV
Diagnostic and Statistical Manual	DSM
Diagnostic Interview Schedule DSM IV	C-DIS IV
Differential Item Functioning	DIF
Discriminant Function Analysis	DFA
Eastern Cape Province	EC
Ecological Systems Theory	EST
European Monitoring Centre for Drugs and Drug Addiction	EMCDDA
European Union	EU
Exploratory Factor Analysis	EFA
Fitting In	FI
Forum on Alcohol, Drugs and Addictive Behaviours	FADAB
Full Information Maximum Likelihood	FIML
General Linear Models	GLM
Generalised Anxiety Disorder	GAD
Generalised Least Squares	GLS

Goodness-of-Fit Index	GFI
Hazardous, Harmful or Dependent Alcohol	HHDA
Heterotrait-Monotrait Ratio of Correlations	HTMT
Human Sciences Research Council	HSRC
Independent Variable	IV
Intra-Family Communication	IFC
Inventory of Drug-Taking Situations	IDTS
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	KMO
Latent Variable	LV
Maximum Likelihood	ML
Maximum Reliability	MaxR(H)
Michigan Study of Adolescent Life Transitions	MSALT
Modification Index	MI
Munich-Composite International Diagnostic Interview	M-CIDI
National Youth Risk Behaviour Survey	NYRBS
Non-Medical Use of Prescription Drugs	NMUPD
Northern Cape Province	NC
Opioid Use Disorder	OUD
Ordinary Least Squares	OLS

Over-The-Counter or Prescription	OTC/PRE
Parsimony Goodness-of-Fit Index	PGFI
Positive Effects of Drugs	PED
Positive Peer Support	PPS
Process–Person–Context–Time Model	PPCT
Public Displays of Substance Use	PDSU
Religiosity	REL
Risk of Exclusion	REP
Root Mean Square Error of Approximation	RMSEA
Scale Free Least Squares	SLS
Self-Efficacy	SE
Socioeconomic Context	SEC
Socioeconomic Status	SES
South African Community Epidemiology Network on Drug Use	SACENDU
South African Substance Use Contextual Risk Instrument	SASUCRI
South African Substance Use Contextual Risk Questionnaire	SASUCRQ
Standardised Root Mean Square Residual	SRMR
Structural Equation Modelling	SEM
Substance-Induced Disorder	SID

Substance Use	SU
Substance Use Disorder	SUD
Temperament and Character Inventory	TCI
United Nations Office on Drugs and Crime	UNODC
United Nations World Drug Report	UNWDR
United States	US
Unweighted Least Squares	ULS
Variance Inflation Factor	VIF
Weighted Least Squares	WLS
Western Cape Province	WC
World Health Organization	WHO
Young Adult Self-Report	YASR

CHAPTER ONE

INTRODUCTION

1.1 Introduction and Background

Although nationally representative demographic data on substance use (SU) are limited in South Africa, there are some reports that show that nationally 10.3% of the adult population (15 years and older) are estimated to consume alcohol at harmful levels (16.5% of men and 4.6% of women), and 8.6% (13.3% of men and 4.1% of women) are estimated to use illicit drugs (Myers et al., 2022; Pengpid et al., 2021). There is also evidence that suggests that a substantial proportion (13.3%) of South Africans meet diagnostic criteria for a substance use disorder (SUD), with the prevalence of SUD in the Western Cape Province (WC) being substantially higher (20.6%) than the national average (Herman et al., 2009; Myers et al., 2022). Ethnically, the WC region differs from the rest of the country because the majority of the population are "Coloured", in comparison with the "Black" African majority in South Africa. Also, the unique gang culture on the "Cape Flats" within the WC province is intimately associated with the drug trade (Pasché & Myers, 2012; Plüddemann, Flisher et al., 2010). This study is therefore primarily concerned with identifying which percieved individual and contextual risk factors best predict substance abuse in this context, particularly in the WC. Additionally, this study sought to estimate the nature and magnitude of the contributions of the interactions of the perceived individual and contextual risk factors in predicting and explaining substance abuse. To achieve the study aims, a multi-stage probability sampling strategy was implemented. This strategy allowed for the identification and selection of a sample of individuals who self-idefied as substance abusers in that they were seeking treatment to overcome their substance abuse. The research question that this study sought to answer is:

Which of the identified and measured perceived individual and contextual risk factors best predict substance abuse? This study therefore used structural equation modelling (SEM) to test the degree to which the collected data fits a specified model, specifically a latent factor substance abuse predictor model (see Figure 7, Chapter Eight). The use of SEM allows the researcher to diagramatically specify a theoretically informed model that is an approximation of the problem or phenomena being studied, and to statistically test if the theoretical model shows adequate fit to the data (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996). Chapter Six provides a detailed discussion on the terminology, rules, requirements and procedures for carrying out SEM.

This study focuses on substance abuse, including the abuse of alcohol, and licit and illicit drugs among emerging adults, young adults and adults, as substance abuse has become a major challenge for societies across the world. The United Nations Office on Drugs and Crime (UNODC, 2014, 2018) estimates that 3.5% to 7.0% of the world's population aged between 15 and 64 years have used an illicit substance during the past year. Alcohol and illicit substance abuse contribute to nearly 9.8% of the global burden of disease for people between the ages of 15 and 29 years (UNODC, 2014, 2018). Several studies have shown that alcohol and other drugs (AODs) have become a major public health concern in South Africa (Dada et al., 2016; Magidson et al., 2019; Pasché & Myers, 2012).

1.1.1 Study setting

At the time of conceptualising this study, the WC was experiencing an on-going methamphetamine epidemic that seemed to have started in the late 1990s and appeared to have reached its peak in the mid-2000s (Dada et al., 2016; Magidson et al., 2017; Pasché & Myers, 2012; Plüddemann, Flisher et al., 2010). Since 2002, the Cape Town Metropolitan area specifically has shown an estimated 150-fold increase in rates of methamphetamine users

presenting for substance abuse treatment at various treatment centres across the city (Dada et al., 2015; Magidson et al., 2019). Coinciding with the apparent methamphetamine epidemic, opioid use has also shown a steady increase since 1994 (Pasché & Myers, 2012). Between 1994 and 2010 treatment demand for heroin abuse in South Africa increased from <1% to between 5% and 20% in the WC, Northern Cape Province (NC), and Gauteng Province (Plüddemann, Dada et al., 2010). In the WC specifically, reported heroin abuse among treatment-seeking clients grew from 12% to 19% between the period 2010 to 2014 (Dada et al., 2016). As a response to the increase of substance abuse incidents and the related increase in substance abuse treatment seekers, the City of Cape Town supported the roll-out of evidence-based treatment focusing on the treatment of methamphetamine abuse. In 2007 the City began implementing the Matrix model of outpatient treatment within primary healthcare settings in local communities (Florence, 2014; Magidson et al., 2019; Myers et al., 2022).

Despite substance abuse being widespread internationally and nationally, the epicentre of the substance abuse problem in South Africa seems to be the WC province, with methamphetamine being the primary substance reported by abusers (Dada et al., 2016; Magidson et al., 2019). Specifically, the abuse of methamphetamine was shown to be most prevalent amongst young Coloured males, whether employed or unemployed (Dada et al., 2016). The severity of the situation left some social and mental health practitioners baffled in their attempts to explain why substance abuse was so prevalent in this group, particularly as they comprise 48% of the population in the WC but they make up 87% in treatment (Dada et al., 2016). Many explanations have been offered, unfortunately mostly based on conjecture and speculation. The range of speculations put forward concerning the aetiology of substance abuse amongst this group served as the catalyst for conducting this study. Unfortunately, the response of government and civil society was to roll out a treatment approach that focusses on the individual who presented with substance abuse, yet there were numerous new cases of first-

time substance abuse treatment seekers reported annually (Dada et al., 2016). This phenomenon indicated that treatment alone was not the answer to the growing epidemic and that there was a need to understand why the number of first-time substance users seeking treatment were on the rise.

1.1.2 Extent of the problem

About 275 million people worldwide, which is roughly 5.6% of the global population aged 15 to 64 years, used drugs at least once during 2016 (UNODC, 2018). According to the UNODC (2018) report, some 31 million people who use drugs suffer from drug use disorders, meaning that their drug use is harmful to the point where they may need treatment. Initial estimations suggest that, globally, 13.8 million young people aged 15 to 16 years used cannabis in the past year, equivalent to a rate of 5.6% (UNODC, 2018). According to the report (UNODC, 2018), roughly 450 000 people died as a result of drug use in 2015. Of those deaths, 167 750 were directly associated with drug use disorders (mainly overdoses). The rest were indirectly attributable to drug use and included deaths related to HIV and hepatitis C acquired through unsafe injecting practices (UNODC, 2018). Opioids continued to cause the most harm, accounting for 76% of deaths where drug use disorders were implicated. Cannabis was the most commonly used drug in 2016, with 192 million people using cannabis at least once in the past year (UNODC, 2018). The global number of cannabis users continued to rise and appears to have increased by roughly 16% in the decade ending 2016, which is in line with the increase in the world population (UNODC, 2018). Most indicators from North America suggest that cocaine use rose between 2013 and 2016 (UNODC, 2018).

A 2017 South African national cross-sectional survey of 39 210 persons aged 15 years and older (Median = 34 years) found that the prevalence of hazardous, harmful or dependent alcohol (HHDA) use was 10.3%, and past three-month drug use was 8.6% (Pengpid et al.,

2021). Comparatively, in a 2012 national population-based survey of persons 15 years and older, the prevalence of past three-month drug use was 4.4% (Peltzer & Phaswana-Mafuya, 2018). Specific SU percentages, as identified in the 2017 survey, were 4.0% cannabis, 0.4% sedatives, 0.3% opiates, 0.3% amphetamines, 0.2% inhalants and 0.1% hallucinogens in the past three months (Pengpid et al., 2021). Factors associated with HHDA and/or drug use mainly included male sex, middle adulthood, specific ethnic (Coloured) groups, lower socioeconomic status, unemployed, urban residence and other SU (Pengpid et al., 2021).

Findings from the 2012 survey show that drug use for any past three-month period was 4.4% overall, at 7.9% among men and 1.3% among women (Peltzer & Phaswana-Mafuya, 2018). The proportion of past three-month cannabis use was 4.0%, followed by sedatives or sleeping pills (0.4%), amphetamine-type stimulants (0.3%), cocaine (0.3%), opiates (0.3%), inhalants (0.2%) and hallucinogens (0.1%) (Peltzer & Phaswana-Mafuya, 2018). Among the nine South African provinces, any past three-month drug use was the highest in the WC (7.1%), followed by the Free State (6.3%) and NC (5.2%), with demographics being both men and women, younger age and Coloured, and hazardous or harmful alcohol use were associated with any past three-month drug use (Peltzer & Phaswana-Mafuya, 2018). When compared to an early national survey, Peltzer and Phaswana-Mafuya (2018) observed an increase of any past three-month drug use from 3.7% in 2008 to 4.4% in 2012. In relation to alcohol use, Burnhams et al. (2019) analysed data from a 2004 South African Stress and Health Survey and found that 40.6% of persons surveyed indicated lifetime use of alcohol, 35.3% reported regular use, and 8.8% met diagnostic criteria for alcohol abuse and 2.7% for alcohol dependence. The median age of onset of alcohol use was 20 years, with transition from use to regular use occurring between 1 and 3 years following onset (Burnhams et al., 2019).

Previous investigations in South Africa and other countries found that specific sociodemographic factors were associated with AOD use (Peltzer, 2010; Peltzer & Ramlagan,

2010; Peltzer & Phaswana-Mafuya, 2018; Pengpid et al., 2021; Van Heerden et al., 2009). These included male gender, younger age, specific population groups (Coloured and White people), lower income or not employed, and geolocality such as urban area (Peltzer, 2010; Peltzer & Ramlagan, 2010; Van Heerden et al., 2009). Further, certain health risk behaviours such as common mental disorders (major depression and anxiety disorders), alcohol use disorders, HIV risk behaviours and criminal victimisation have been found to be associated with drug use (Conway et al., 2016; Lai et al., 2015; Meader et al., 2016; Teesson et al., 2012; Walsh et al., 2014).

1.1.3 Definition of terms

This section focuses on defining important key terms used in the study for the purpose of orientating the reader to how the terms are used and understood in the study. Terms defined here are related to the theory, methodology and general field of substance abuse.

Bootstrapping is a nonparametric procedure that allows testing the statistical significance of various SEM results, such as path coefficients, Cronbach's alpha, and R^2 values (Cheung & Lau, 2008; Ringle et al., 2022; SPSS-SA, 2005).

Competitive mediation is when there is different directionality between the direct effect and indirect effect between two variables. The direct effect might have a negative influence, but the indirect effect might have a positive influence. With this type of mediation, the presence of the mediator can change the directionality of the influence on the dependent variable (Arbuckle, 2017; Collier, 2020).

Complementary mediation is where the direct effect and the indirect effect have a similar influence in regard to directionality. For instance, the direct effect may a have positive influence, and the indirect effect has a positive influence as well (Arbuckle, 2017; Collier, 2020).

Contextual risk factors are risk factors in an individual's social and geographic environment, such as poor parenting, delinquent peers or neighbourhood risk, that are believed to influence the development of problem behaviour (Kroneman et al., 2011; Ungar et al., 2013).

Direct effect is simply a direct relationship between an independent variable and a dependent variable (Arbuckle, 2017; Collier, 2020).

Drugs or substances encompasses chemical or psychoactive substances such as alcohol, caffeine, nicotine, cannabis (marijuana, Southern African term: *dagga*) and certain pain medicines. Any illegal drugs, such as heroin, LSD, cocaine and amphetamines, are psychoactive substances, also called psychotropic substances (McLellan, 2017).

Drug/substance abuse refers to the misuse and abuse of legal substances, such as nicotine, alcohol, over-the-counter drugs, prescribed drugs, alcohol concoctions, indigenous plants, solvents and inhalants, as well as illicit drugs (McLellan, 2017). This term is also used with reference to the chronic or habitual use of any chemical substance to alter states of body or mind for purposes that are not medically warranted (McLellan, 2017; O'Brien, 2015). All the participants in the study were receiving treatment for illicit drug abuse, as the study was interested in identifying which of the perceived individual and contextual factors best predicts drug use.

Drug/substance use broadly refers to the use of licit or illicit substances that include, but are not limited to, cigarettes, alcohol, amphetamine, cocaine, cannabis (marijuana, *dagga*), ecstasy, heroin, LSD, mandrax and methamphetamine (McLellan, 2017).

Ecological Systems Theory (EST) is a developmental theory that views human development from a person-in-environment context and emphasises that all growth and development occurs within the contexts of these bidirectional relationships. This shows the interaction in and

between various levels or systems, for example, an individual (usually a child) must be studied in the context of the family system, and the family needs to be understood within the broader community, societal culture and values (Bronfenbrenner, 1979, 2005).

Endogenous variable is a variable in a model that is affected by another variable in the model (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Exogenous variable is a variable in the model that is not affected by another variable in the model (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Factor is a variable measured via a set of observed variables, referred to as indicators (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Family functioning refers to the patterns in which family members relate, interact and react to and treat other members of the family, including communication styles, traditions, clear roles or boundaries, and family processes over time (Winek et al., 2010). Family functioning also includes a commitment by its members to support the functions of the family in relation to economic, safety, child rearing, caregiving and communication (Johnson et al., 2011).

Full mediation (also called indirect only mediation) where the direct effect between two constructs is non-significant, but an indirect effect through a mediator does have a significant relationship (Arbuckle, 2017; Collier, 2020).

Indicator is a variable used as one variable in a bigger set to measure a certain factor (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Indirect effect is the relationship that flows from an independent variable to a mediator and then to a dependent variable (Arbuckle, 2017; Collier, 2020).

Individual risk factors are specific characteristics, behaviours or attributes of a person that increase their likelihood of experiencing negative outcomes, such as health issues, accidents or financial problems (Ungar, 2013; Weich, 2002).

Latent variables in SEM generally correspond to hypothetical constructs or factors, which are explanatory variables presumed to reflect a continuum that is not directly observable (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Manifest variable represents the observed class in the data, that is, variables for which there are collected scores, and which are entered in a data file. Another term for manifest variables is observed variables (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Measurement errors are those errors that occur in items/questions in a questionnaire while measuring a latent variable. Each of these items is assigned a unique item error/measurement error to take care of the flaws or discrepancies that may have arisen in the measurement instrument (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Measurement model deals with the relationship between a latent variable and its indicators (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Mediation refers to the process by which one variable (the mediator) transmits or explains the relationship between two other variables (the independent variable and the dependent variable) (Arbuckle, 2017; Collier, 2020).

Observed variable is a variable in the model that is available in a data set. Observed variables can be categorical, ordinal or continuous, but all latent variables in SEM are continuous (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Parameters are constraints that indicate the nature and size of the relationship between two variables in the population. Although we can never know the true value of a parameter, statistics help us to make our best guess (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Parent-child relationship refers to the quality of the emotional bond between child and parents (mother, father or significant parental figure) and the degree to which this bond is mutual and sustained over time (Lezin et al., 2004).

Path/s is/are a series of regressions applied sequentially to data (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Reasons for use refers to the perceived causes for the start of drug use, as described by drug users (Boys et al., 2001; Laudet et al., 2004).

Recursive model and **non-recursive model** – a recursive model is a structural model without a "loop" and a non-recursive model has a "loop"; this is a counter intuitive understanding (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Residual errors, also called disturbance terms, are the errors that arise in the prediction of an endogenous variable by an exogenous variable (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Risk factors are risks that occur before drug abuse and are associated statistically with an increased probability of drug abuse (Hawkins et al., 1992). Healthy development is compromised when multiple risk factors occur that are not offset by compensating protective factors (Hawkins et al., 1992).

Specification is the act of formally stating a model (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Structural Equation Modeling (SEM) includes path analysis and confirmatory factor analysis (CFA). Basically, SEM is an extension of path analysis that includes CFA (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Structural model – a structural model defines the relationship between the various constructs in a model (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Unobserved variable is a variable in the model that is not available in the data set, for instance, a residual variable or a factor (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 1996; SPSS-SA, 2005).

Youth at risk – can be defined as young people whose social environment places them "at risk" of future anti-social behaviours, such as drug use, due to personal, environmental, social and family conditions that hinder their personal development and integration into the economy and society (Kosterman et al., 2001).

1.2 Rationale of the Study

This study built a theoretically informed model that examined the direct and indirect effect that perceived individual and contextual risk factors have on substance abuse. The rationale for specifying a model that predicts substance abuse was based on the negative effect that substance abuse has on society as a whole, and not just on the individual. There is also substantial evidence showing that first-time treatment seekers are increasing (Myers et al., 2022). As such, it was deemed necessary to determine which of the precursory individual and contextual risk factors predict substance abuse and to measure the direction and strength of the dynamic interaction between the risk factors and substance abuse. Uncovering the predictors and the interaction amongst them will go a long way to addressing the issue of substance abuse preventatively. This is particularly due to the highly addictive nature of the substances that are most prevalent in the WC, and the difficulty that substance users have in accessing tertiary

interventions. Primary, secondary and tertiary interventions can also be more effective if there is a clearer understanding of the dynamics between substance abuse and the risk factors that influence this behaviour amongst substance abuse treatment seekers. The use of a theoretically informed model also makes it relatively easy to identify patterns of relationships amongst the different perceived individual and contextual risk factors that are related to substance abuse. Ameliorating some of the precursory risk factors will impact on the general well-being of individuals in high-risk communities, and so directly and indirectly impact on crime rates, the spread of HIV and other social and public health problems that are also prevalent. Further, clinical efforts to reduce risk for SUDs among adolescents and young adults rely on the empirical identification of risk factors for addictive behaviours specific to this population.

Although this study was originally conceptualised to focus on the WC, it was extended to the Eastern Cape (EC) to determine if substance abusers in the EC have the same perceived individual and contextual risk factors. While substance abuse is a cause for concern in the EC, the extent of the problem is not as dire when compared to the WC.

1.3 Overview of the Larger Study

This study was conceptualised as part of a larger study that started with the development of an instrument that is appropriate for use in the South African context and that could accurately measure the individual and contextual risk factors associated with substance abuse. The larger study ultimately aims to quantitatively test whether there is a difference between adolescents who use substances and those who do not, with regard to subjective experiences of individual and contextual risk factors.

This study diverges from the larger study in that it focuses on emerging adults and adults currently receiving inpatient or outpatient treatment for substance abuse. This study also differs from the larger study in that the phrasing of the questions on the questionnaire was changed to

suit the older age group, and asked participants to think back or reflect on the time when they first started using. This study also exclusively recruited participants who where receiving treatment for their substance abuse, whereas the larger study aims to recruit participants from the general population. Whereas this study collected data in both the WC and the EC, the larger study only collected data in the WC.

1.4 Aims of the Current Study

The aim of this study was to test a theoretical model that approximates the various individual and contextual factors that have been identified in the literture to be related to the aetiology of substance abuse. Specifically, this study aims to identify which individual and contextual risk factors best predict substance abuse, and to estimate the direction and size of the contribution that each of the factors individually and collectively contribute to the aetiology of substance abuse. The specific aims of the study are thus:

1. To build a theoretical model that best approximates the identified individual and contextual risk factors associated with substance abuse.
2. To use SEM to test the adequacy of the model's fit to the data that have been collected.
3. To use SEM to statistically determine which of the perceived individual or contextual risk factors best predicts substance abuse.
4. To use SEM to statistically determine which combination of perceived individual and contextual risk factors best predicts substance abuse.

To achieve these aims this study collected empirical data from self-identified substance abusers concerning their perception of the individual and contextual risk factors that led to them becoming substance users. At the very least, this study provides empirical evidence to accept or reject the various conjectures proffered by various people across different sectors of society.

1.5 Overview of the Thesis

Chapter Two discusses the evolution of substance abuse in the Diagnostic and Statistical Manual of Mental Disorders (DSM), and presents the current international and national substance prevalence rates. The chapter also presents the substance abuse prevalence rates per age category and for the two provinces where the study data were collected. Chapter Three reports on local and international studies that have explored individual and contextual factors associated with substance abuse. Although the majority of the literature concerning factors associated with substance abuse focus on adolescent risk and protective factors, this study focuses on risk factors associated with emerging adult, young adult and adult substance abuse. Chapter Four presents the theoretical lens through which this study will be interpreted and understood. Chapter Five discusses the methodological issues that were considered in the study, and Chapter Six describes in detail the logic behind SEM, the steps that are to be followed when undertaking an SEM and the reporting standards of an SEM study. Chapter Seven presents the descriptive results of the study population and the confirmatory factor analysis of the data collection instrument. Chapter Eight follows the prescribed SEM reporting standards in presenting the empirical finding of the study. In Chapter Nine these findings are summarised and discussed in relation to the literature in Chapter Three and the theory in Chapter Four. Chapter Ten concludes this treatise and discusses the limitations of the study and recommendations for further research.

CHAPTER TWO

LITERATURE REVIEW

THE EVOLUTION OF SUBSTANCE USE DISORDER IN THE DSM AND THE PREVALENCE OF SUBSTANCE ABUSE

2.1 Introduction

The great social concern generated by substance abuse in general is revealed in the large amount of SU prevalence data from cross-sectional, longitudinal, and systematic review studies related to adolescent SU specifically (Brook et al., 2006; Galea et al., 2004; Goulet et al., 2020; Hawkins et al., 1992; Isaac, 2019; Morojelo et al., 2006; Rich, 2017; Sánchez-Queija et al., 2016; Stone et al., 2012). Internationally, substance abuse research has largely taken the form of national descriptive prevalence studies, attempting to identify risk and protective factors for adolescents and emerging adults, polysubstance use, and comorbidity of SUD with other psychiatric and psychological disorders (Galea et al., 2004; Goulet et al., 2020; Hawkins et al., 1992; Stone et al., 2012). This chapter starts with a discussion on the evolution of substance abuse in the DSM and then presents the international and national prevalence of substance abuse, briefly touched on in the introduction. The chapter also provides the current substance abuse prevalence rates for the two regions where the data for this study were collected.

2.2 The Evolution of Substance Abuse in the DSM

Diagnosis is of vital importance in healthcare as it is critical to applying effective and appropriate treatment, it informs the patient's or client's prognosis, it enables communication about diseases among the general community of health providers, including clinicians and scientists, it is foundational to healthcare education and training, and it is necessary for the

conducting of research (Fischer, 2012; Surís et al., 2016). The first American initiative to develop standardised diagnostic criteria was prompted by the United States Census Bureau, to aid efforts to estimate the prevalence of mental disorders in America for the 1920 census (Fischer, 2012; Surís et al., 2016). Because five separate "official" diagnostic classification systems were being used in different settings in the United States, the American Psychiatric Association (APA) set out to create a unified and definitive diagnostic system for all of American psychiatry (Fischer, 2012; Surís et al., 2016).

The Diagnostic and Statistical Manual of Mental Disorders (DSM) is the product of this APA endeavour, providing standard criteria for the classification and diagnosis of mental disorders, including SUDs (Fischer, 2012; Robinson & Adinoff, 2016; Surís et al., 2016; Zou et al., 2017). The DSM has undergone several revisions since it was first published in 1952, with significant changes made in the criteria for diagnosing substance abuse and dependence from DSM-1 to DSM-5 (Fischer, 2012; Robinson & Adinoff, 2016; Surís et al., 2016; Zou et al., 2017). Overall, the changes in the definition and diagnostic criteria of substance abuse and dependence from DSM-1 to DSM-5 reflect a greater understanding of the complex nature of SUDs, and a move towards a more comprehensive, evidence-based approach to diagnosis and treatment (Robinson & Adinoff, 2016; Zou et al., 2017). While the fact that the DSM identifies SUDs as primary mental health disorders may be taken for granted today, it is noteworthy that SUDs were, prior to the third publication of the DSM (1980), largely conceptualised as manifestations of underlying primary psychopathology (Fischer, 2012; Robinson & Adinoff, 2016; Surís et al., 2016; Zou et al., 2017). A brief discussion of the changes in classification and diagnostic criteria of substance abuse from DSM-I through to the DSM-5 follows.

2.2.1 DSM-I (1952)

The DSM-I is divided into two main sections, one for disorders with established organic brain disease and the other for disorders without evidence of organic brain findings. The latter disorders were labelled "functional" and were subdivided into disorders of psychosis, psychoneurosis and personality. DSM-1 defined substance abuse as a person's recurrent use of a drug or alcohol despite the resultant adverse social, psychological and physical consequences (APA, 1952). Unfortunately, the criteria for diagnosis were not well defined, and there was no distinction made between substance abuse and dependence. According to Robinson and Adinoff (2016), this was due to the DSM-I being based upon an expanded nosology used by the United States Army. DSM-I thus conceptualised SUD (i.e., "drug addiction" and "alcoholism") as most commonly arising from a primary personality disorder, specifically Sociopathic Personality Disorder (APA, 1952).

Although DSM-I conceptualised the aetiology of SUD as a symptom of a broader underlying disturbance, it did leave some room for exceptions – at least in coding (Robinson & Adinoff, 2016). For example, in the case of alcoholism, the DSM did allow for a primary diagnosis of SUD when there is a well-established addiction to alcohol without recognisable underlying disorder (APA, 1952; Robinson & Adinoff, 2016). Similarly, for drug addiction, the diagnostic label could be given while the individual is actually addicted, with the proper personality classification to be given as an additional diagnosis (APA, 1952; Robinson & Adinoff, 2016). That these exceptions were noteworthy exemptions, and not the rule, speaks to the strength of the aetiological conceptualisation of SUD as being secondary to, or arising from a primary personality disorder (Robinson & Adinoff, 2016). During this period in history, drug addiction was thus either regarded as symptomatic of a personality disorder or organic brain disorders, psychotic disorders, psychophysiological disorders and psychoneurotic disorders (Zou et al., 2017).

2.2.2 DSM-II (1968)

Robinson and Adinoff (2016) state that by 1959 major advances in the treatment of mental disorders (i.e., the introduction of effective pharmacologic treatments) had occurred in the field. Following the lead of the World Health Organization (WHO, 1951), the American Medical Association (cited in Robinson & Adinoff, 2016) recognised the severity of alcoholism and declared it to be a medical disorder. This further emphasised the need for a classification system based on the medical model. DSM-2 (1968) thus introduced the term "substance dependence" to describe a pattern of SU that led to physiological and psychological dependence. The criteria for diagnosis included tolerance, withdrawal and the use of larger amounts of a substance over time (APA, 1968). Substance abuse was still not well defined, and there was no clear distinction made between substance abuse and dependence (Robinson & Adinoff, 2016). While the DSM-I and DSM-II did not employ diagnostic criteria as we understand them today, the DSM-II did encourage separate diagnoses for alcoholism and drug addiction, including the manifestation of the addiction as a symptomatic expression of another disorder (Robinson & Adinoff, 2016; Schuckit & Nathan, 1991).

Three recognised types of alcoholism were recognised in DSM-II: (a) episodic excessive drinking (intoxication four times per year); (b) habitual excessive drinking (given to alcoholic persons who become intoxicated more than 12 times a year or are recognisably under the influence of alcohol more than once a week, even though not intoxicated); and (c) alcohol addiction (defined in terms of dependency, suggested by withdrawal which may be evidenced by the inability to abstain for one day or heavy drinking for three months or more) (APA, 1968; Robinson & Adinoff, 2016; Schuckit & Nathan, 1991). Although withdrawal was emphasised for drug addiction, it was also recognised that dependence could occur without withdrawal. Medically prescribed drugs were excluded in that they were taken in proportion to the medical need (APA, 1968; Robinson & Adinoff, 2016).

The category of drug dependence was assigned to individuals who were addicted to or dependent on drugs other than alcohol, tobacco and ordinary caffeine containing beverages (APA, 1968; Robinson & Adinoff, 2016; Zou et al., 2017). Dependence on medically prescribed drugs was also excluded as long as the drug was medically indicated, and the intake proportionate to the medical need (Robinson & Adinoff, 2016; Zou et al., 2017). The diagnosis required evidence of habitual use or a clear sense of need for the drug. At this stage, withdrawal symptoms were not required as the only evidence of dependence as, while always present when opium derivatives are withdrawn, they may be entirely absent when cocaine or marihuana are withdrawn (APA, 1968; Robinson & Adinoff, 2016; Zou et al., 2017). The diagnosis may stand alone or be coupled with any other diagnosis.

2.2.3 DSM-III (1980)

In keeping with the growing need for a valid and reliable diagnostic compendium for clinicians and researchers alike, the third edition of the DSM (DSM-III) broke with psychoanalytic tradition and instituted consensus-based diagnoses and diagnostic criteria (Robinson & Adinoff, 2016). DSM-III introduced separate diagnostic criteria for substance abuse and dependence. Substance abuse was defined as a pattern of SU that led to significant impairment or distress but did not meet the criteria for dependence (APA, 1980; Zou et al., 2017). The criteria for diagnosis included recurrent SU resulting in failure to fulfil major role obligations, recurrent SU in hazardous situations, legal problems related to SU, and continued use despite social or interpersonal problems caused by SU (APA, 1980; Robinson & Adinoff, 2016; Zou et al., 2017). Substance dependence was defined as a pattern of SU that led to physiological dependence, with criteria including tolerance, withdrawal and compulsive use of a substance (APA, 1980; Zou et al., 2017). Almost invariably there is also a pattern of pathological use that causes impairment in social or occupational functioning, although in rare cases the manifestations of the disorder are limited to physiological dependence (Zou et al., 2017).

Substance dependence is generally a more severe form of SUD than substance abuse (Zou et al., 2017).

Little explicit explanation is offered within the manual as to the basis for adopting this distinction. It seems that the former was equated with pathological use (e.g., social or occupational consequences, including legal problems which may arise from car accidents due to intoxication), and the latter with physiological dependence (i.e., tolerance or withdrawal) (Robinson & Adinoff, 2016; Rounsaville et al., 1986). While the rationale behind the DSM-III's creation of these two categories is not described in the manual, a number of criticisms of this paradigm were held by individuals ultimately tasked with subsequent DSM revisions (Hasin et al., 2013). Among other things, they stated that the distinction between "abuse" and "dependence" was made entirely on the basis of evidence for the presence of physiological tolerance or withdrawal, which left the then current system vulnerable to powerful, swiftly changing social forces, such as the tightening of laws restricting alcohol use while driving. Thus, for example, actions of a legislature in a particular region and/or country could determine the number of people who met DSM-III criteria for a mental disorder (i.e., alcohol abuse) (Rounsaville et al., 1986). Such criticisms formed the basis for recommendations to alter these categories in the subsequent iterations of the DSM.

Some notable irregularities existed within the DSM-III (Rounsaville et al., 1986). For example, the manual made the explicit additional requirements of a pathological use criterion for Alcohol and Cannabis Dependence diagnoses in addition to the main physiological criterion; the manual also stated that data were lacking in support of the main physiological criterion necessary for a Cannabis Dependence diagnosis, i.e., "the existence and significance of tolerance with regular heavy use of cannabis are controversial" (APA, 1980, p. 176; Rounsaville et al., 1986). Furthermore, while Cocaine Abuse was a recognised diagnosis, Cocaine Dependence was not

included “since only transitory withdrawal symptoms occur after cessation of or reduction in prolonged use” (APA, 1980, p. 173; Rounsaville et al., 1986).

These criticisms withstanding, the DSM-III was considered to be a major milestone in the field, reflecting a re-emergence of the medical model and the rise of research investigators as the most prominent voices within the field (Rounsaville et al., 1986). For the first time, this version of the DSM explicitly acknowledged differences in cultural perspectives on the acceptability of SU, while also attempting to anchor the diagnostic criteria in terms of behavioural changes that most subcultures would view as extremely undesirable (Robinson & Adinoff, 2016; Rounsaville et al., 1986).

2.2.4 DSM-III-R (1987)

While the third edition of the DSM reflected, up to this point, the most profound changes in conceptualisation of psychiatric nosology since its inception, its successor, the DSM-III-R, further evidenced important changes (Robinson & Adinoff, 2016; Zou et al., 2017). One such change was DSM-III-R’s inclusion of criterion items formerly associated with abuse (i.e., aspects of pathological use) in the Dependence category (APA, 1987; Robinson & Adinoff, 2016; Zou et al., 2017). By grouping (pathological) behavioural dysfunctions with physiological processes in a polythetic diagnostic set, the conceptualisation of the new Dependence category stood in contrast to earlier views that physiological symptoms were both necessary and sufficient for a dependence diagnosis (Robinson & Adinoff, 2016; Zou et al., 2017).

The DSM-III-R goes even further in separating physiological dependence from the diagnosis of Dependence, explicitly stating that surgical patients who develop a tolerance to prescribed opioids, and experience withdrawal symptoms without showing any signs of impaired control over their use of opioids, are not considered to fall into the category of Substance Dependence

(APA, 1987; Robinson & Adinoff, 2016; Zou et al., 2017). Revisions in the DSM-III-R included elimination of the Abuse category and the incorporation of elements into a newly expanded Dependence category (APA, 1987; Robinson & Adinoff, 2016). The recommendation to expand the Dependence criteria while removing the Abuse category offers some justification for the integration of the pathological use criterion into the Dependence category and the reversal of the DSM-III stance that physiological use was, in most cases, the hallmark of the disorder (Robinson & Adinoff, 2016). As the DSM-III-R ultimately retained the Abuse category, this re-conceptualisation of the mental health disorder never fully took shape (Robinson & Adinoff, 2016).

An admitted disadvantage to the re-conceptualised single disorder model was the potential for diagnostic abandonment of individuals with lower-level problems who did not meet the criterion for the would-be expanded Dependence category (APA, 1987; Robinson & Adinoff, 2016). Although possible coding schemes were set forth to circumvent this potential problem with the removal of the Abuse diagnosis (APA, 1987; Robinson & Adinoff, 2016; Zou et al., 2017), some suspect that the pragmatic fears of diagnostic abandonment superseded validity concerns and ultimately left the Abuse category intact, while at the same time advancing the dependence syndrome's biaxial concept, albeit solely within the Dependence diagnosis (APA, 1987; Robinson & Adinoff, 2016; Zou et al., 2017).

2.2.5 DSM-IV (1994) / DSM-IV-TR (2000)

As the science of mental health continued to progress, the Abuse and Dependence categories were shown to have significant limitations, including differences in reliability and external validity, incorrect assumptions about the relationship between abuse and dependence, and the problem of diagnostic orphans (individuals with symptoms for whom neither diagnosis was met) (APA, 1994; Beckson & Tucker, 2014; Robinson & Adinoff, 2016; Zou et al., 2017). The

DSM-IV (and DSM-IV-TR) attempted to clarify earlier inconsistencies regarding the distinction between physiological dependence and Substance Dependence by specifying that neither tolerance or withdrawal is necessary or sufficient for a diagnosis of Substance Dependence, and added specifiers “With” and “Without Physiological Dependence” (APA, 1994; Beckson & Tucker, 2014; Robinson & Adinoff, 2016).

Zou et al. (2017) contend that the essential feature of Substance Dependence in the DSM-IV is a cluster of cognitive, behavioural and physiological symptoms indicating that the individual continues use of the substance despite significant substance-related problems. Further, there is a pattern of repeated self-administration that usually results in tolerance, withdrawal and compulsive drug-taking behaviour (Zou et al., 2017). In the DSM-IV, a diagnosis of Substance Dependence can be applied to every class of substances except caffeine (APA, 1994; Zou et al., 2017). Although not specifically listed as a criterion item, “craving” (a strong subjective drive to use the substance) is likely to be experienced by most (if not all) individuals with Substance Dependence (Zou et al., 2017).

The diagnostic criteria for substance abuse in the DSM-IV include a maladaptive pattern of SU leading to significant impairment or distress, as manifested by one or more of the following within a 12-month period: Recurrent SU resulting in a failure to fulfil major role obligations at work, school, or home; Recurrent SU in situations in which it is physically hazardous; Recurrent substance-related legal problems; Continued SU despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance (APA, 2000; Robinson & Adinoff, 2016; Zou et al., 2017). In addition, the individual must not meet the criteria for Substance Dependence for the same substance (APA, 2000; Robinson & Adinoff, 2016; Zou et al., 2017). The key features of substance abuse in the DSM-IV include recurrent SU despite negative consequences, and significant impairment or distress in the individual’s life (Robinson & Adinoff, 2016; Zou et al., 2017).

Clearly, DSM-IV (and DSM-IV-TR) made some changes to the diagnostic criteria for substance abuse and dependence. The criteria for substance abuse remained the same as its predecessor, but the criteria for substance dependence were modified to include craving as a diagnostic criterion. The distinction between substance abuse and dependence was less clear, with the two disorders sharing many common features (Beckson & Tucker, 2014; Robinson & Adinoff, 2016; Zou et al., 2017).

2.2.6 DSM-5 (2013) / DSM-5-TR (2022)

DSM-5 (and DSM-5-TR) represented the most dramatic modifications since DSM-III, with the removal of the Abuse-Dependence paradigm and important revisions to the diagnostic criteria themselves (Robinson & Adinoff, 2016; Zou et al., 2017). Most notably, DSM-5 (and DSM-5-TR) combines Abuse and Dependence into a single unified category and measures severity on a continuous scale from mild (2–3 symptoms endorsed) to moderate (4–5 symptoms endorsed) and severe (6 or more symptoms endorsed) out of 11 total symptoms (versus the previous 7) (APA, 2013; Robinson & Adinoff, 2016; Zou et al., 2017). The shift to a unified category measured along a dimension of severity represents a notable change from the post-hoc categorical severity specifiers in the previous version, and further cements the difference between the now outdated DSM diagnosis of Dependence and the medical concept of physiological dependence, a distinction which had been increasingly emphasised over time (APA, 2013; Hasin et al., 2013; Robinson & Adinoff, 2016). The criteria for diagnosis include a range of symptoms, with a higher number of symptoms indicating a more severe disorder. The criteria include impaired control over SU, social impairment, risky use, tolerance and withdrawal (APA, 2013; Hasin et al., 2013; Robinson & Adinoff, 2016). Craving is no longer a diagnostic criterion but is included as a specifier (APA, 2013; Hasin et al., 2013; Robinson & Adinoff, 2016).

Other noteworthy changes in the DSM-5 (and DSM-5-TR) include the addition of the craving criterion, the removal of the legal problem's criterion, and the title of the chapter, which now reads Substance-Related and Addictive Disorders (Robinson & Adinoff, 2016). Despite the use of the term "addiction" in the title, the text reveals that the word "addiction" itself is omitted from the official DSM-5 SUD diagnostic terminology because of its uncertain definition and its potentially negative connotation (APA, 2013; Hasin et al., 2013; Robinson & Adinoff, 2016; Zou et al., 2017). In addition, for the first time the chapter includes a behavioural addiction (i.e., Gambling Disorder), suggesting that a behavioural addiction has a shared underlying neurological reward system and a compatible symptom set with SUDs (APA, 2013; Hasin et al., 2013; Robinson & Adinoff, 2016; Zou et al., 2017).

Overall, the diagnosis of a SUD is based on a pathological pattern of behaviours related to use of the substance needing to meet a set of criteria, namely: Criterion A: Development of a substance-specific syndrome due to the recent ingestion of a substance; Criterion B: Changes are attributable to the physiological effects of the substance on the central nervous system; Criterion C: The substance-specific syndrome causes clinically significant distress or impairment in social, occupational or other important areas of functioning; and Criterion D: The symptoms are not attributable to another medical condition and are not better explained by another mental disorder (Zou et al., 2017).

In this section I have attempted to comprehensively and succinctly provide an overview of the different versions of the DSM since it was first published in 1952. I tried to accurately present my understanding of the significant changes made in the criteria for diagnosing substance abuse and dependence from DSM-1 to DSM-5, as presented in the literature and the manuals themselves (APA, 1952, 1968, 1980, 1987, 1994, 2000, 2013, 2022; Fischer, 2012; Robinson & Adinoff, 2016; Surís et al., 2016; Zou et al., 2017). As already mentioned above. the overall changes in the definition and diagnostic criteria of substance abuse and dependence from DSM-

1 to DSM-5 reflect a greater understanding of the complex nature of SUDs, and a move towards a more comprehensive, evidence-based approach to diagnosis and treatment (Robinson & Adinoff, 2016; Zou et al., 2017).

2.3 International Prevalence of Substance Abuse

The WHO held its first Forum on Alcohol, Drugs and Addictive Behaviours (FADAB) in June 2017. FADAB (WHO, 2017) reported that in 2008, 155–250 million people, or 3.5%–5.7% of the world's population between the ages of 15 and 64 years, used substances such as cannabis, amphetamines, cocaine, opioids and non-prescribed prescription medicines. Globally, cannabis is used by 129–290 million people, which is followed in prevalence of use by amphetamines, stimulants, cocaine and opioids (WHO, 2017). WHO (2017) estimates that 0.7% of the global burden of disease in 2004 was due to cocaine and opioid use, and that the social cost of illicit SU was approximately 2% of the world's gross domestic product. The 2008 data estimated that globally, 69 000 people die from opioid overdose annually and more than 15 million have Opioid Use Disorder (OUD) with physiologic dependence (WHO, 2017).

Recently, Volkow et al. (2021) examined the prevalence of specific SUDs since first drug use (including tobacco, alcohol, cannabis, cocaine, methamphetamine and heroin) or prescription misuse (including opioids, stimulants and tranquilizers) in adolescents aged 12 to 17 years and young adults aged 18 to 25 years. The study found that the prevalence of lifetime SU among adolescents in 2018 was 26.3% for alcohol, 15.4% for cannabis and 13.4% for tobacco; among young adults in 2018, prevalence of lifetime SU was 79.7% for alcohol, 51.5% for cannabis and 55.0% for tobacco (Volkow et al., 2021).

According to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA, 2021) report, drug use prevalence encompasses a wide range of substances. The minimum estimates are that approximately 83 million, or 28.9%, of adults (aged 15 to 64 years) in the

European Union are projected to have used illicit drugs at least once in their lifetime (EMCDDA, 2021). Experience of drug use is more frequently reported by males (50.6 million) than females (32.8 million). The most commonly tried drug is cannabis (47.6 million males and 30.9 million females). Much lower estimates are reported for the lifetime use of cocaine (9.6 million males and 4.3 million females), MDMA (6.8 million males and 3.5 million females) and amphetamines (5.9 million males and 2.7 million females). Levels of lifetime use of cannabis differ considerably between countries, ranging from approximately 4% of adults in Malta to 45% in France. Previous year drug use provides a measure of recent drug use and is largely concentrated among young adults. An estimated 17.4 million young adults (aged 15 to 34 years) used drugs in the last year (16.9%), with approximately twice as many males (21.6%) as females (12.1%) reporting drug use. The prevalence of high-risk opioid use among adults (aged 15 to 64 years) is estimated at 0.35% of the European Union (EU) population, equivalent to 1 million high-risk opioid users in 2019. There were 510 000 clients in opioid substitution treatment in 2019 in the EU. Opioid users accounted for 26% of drug treatment requests.

According to the UNODC (2021), an estimated 275 million people worldwide aged 15 to 64 years, or one in every 18 people in that age group, had used drugs at least once in the previous year (175 million to 374 million). This corresponds to 5.5% of the global population aged 15 to 64 years (3.5% to 7.4%). Between 2010 and 2019, the estimated number of past-year users of any drug globally increased from 226 million to 274 million, or by 22%. Among the estimated 275 million past-year users of any drug, approximately 36.3 million (19.6 million to 53.0 million), or almost 13%, are estimated to suffer from drug use disorders, meaning that their drug use is harmful to the extent that they may experience drug dependence and/or require treatment. This corresponds to a prevalence of drug use disorders of 0.7% (0.4% to 1.1%) globally among the population aged 15 to 64 years. Between 2010 and 2016, the prevalence of

drug use disorders remained somewhat stable globally. However, the prevalence estimates increased from 2017 onwards and the prevalence of drug use disorders (0.7%) in 2019 was higher than the previously estimated 0.6% in 2016, corresponding to a change in the estimated number of people suffering from drug use disorders from 30.5 million in 2016 to 36.0 million in 2019. This higher prevalence is the result of the findings of drug use surveys conducted during the period 2018 to 2019 in two countries with large populations, viz. India and Nigeria.

2.4 National Prevalence of Substance Abuse

National descriptive and prevalence data on SUD is limited in South Africa. The existing prevalence statistics are from intake surveillance data from substance abuse treatment centres. Analysing this surveillance data, Myers et al. (2022) conclude that South Africa has a high prevalence of SUD, with an estimated 13% of the adult population meeting DSM criteria for a lifetime diagnosis of these disorders. The 2011 United Nations World Drug Report (UNWDR) identified South Africa as one of the countries experiencing an increase in the use of unidentified amphetamines. The major contribution to the increase is attributed to an increase of consumption in methamphetamine in Cape Town and surrounding areas (Pasché & Myers, 2012).

In a study conducted by the South African Human Sciences Research Council (HSRC), Naidoo et al. (2016) found that, in South Africa, 23% to 41% of individuals younger than 20 years of age were admitted into substance abuse treatment centres during 2013. They argue that alcohol and illicit substance abuse prevalence rates seem to have stabilised in developed countries, but continue to escalate in developing countries (Naidoo et al., 2016). The HSRC prevalence rates were nearly 11% more than the findings of the National Youth Risk Behaviour Survey (NYRBS) conducted in 2011 among South African high school learners. The NYRBS study showed that the lifetime prevalence of cannabis was 12.8%, inhalants was 5.4%, heroin was

5.3%, cocaine was 4.9%, “Whoonga” (usually *dagga* and/or low-grade heroin mixed with other ingredients) was 4.5% and over-the-counter or prescription (OTC/PRE) drugs for the purpose of getting high was 11.5% (Reddy et al., 2013).

Utilising the South African Community Epidemiology Network on Drug Use (SACENDU) data, Pasché and Myers (2012) and Plüddemann et al. (2013) examined and described substance abuse trends in Cape Town and the broader WC. Pasché and Myers (2012) examined substance abuse trends and found that alcohol remains the substance with the greatest burden of harm. They reported that regional trends varied, with methamphetamine being the major driver of psychiatric and substance abuse treatment demand in the WC, and heroin use increasing in several provinces (Pasché & Myers, 2012). Plüddemann et al. (2013) described changing trends in adolescent treatment admissions for methamphetamine abuse in Cape Town. They argued that the initial increase in substance abuse between 2004 and 2006 and the decrease noted between 2006 and 2011 may suggest a change in methamphetamine abuse patterns amongst adolescents in Cape Town (Plüddemann et al., 2013).

Gopal and Collings (2014) examined patterns of mono- and polysubstance use in case file data for a six-year period (April 2006 – March 2012) in Durban. For this period, the study reported that 3746 individuals presented for treatment at two state supported drug treatment units. Gopal and Collings (2014) identified the modal treatment seeker as an employed, single, adult male and found no significant change in the profile over the six-year period. They did note a significant increase in polysubstance treatment seekers over the study period, from 39% to 56% (Gopal & Collings, 2014). Burnhams et al. (2012) aimed to describe the patterns of SU and service needs among people using general social services in the WC and comparing findings against the profile of persons attending specialist substance abuse treatment facilities in the region. As such, they accessed electronic intake documents from 691 social welfare clients to compare with their SACENDU data. They found that women, people from rural communities

and people with alcohol-related problems are more likely to seek assistance at social service offices providing low threshold intervention services than from the specialist treatment sector (Burnhams et al., 2012).

Peltzer and Phaswana-Mafuya (2018) assess the prevalence of drug use and the sociodemographic and health characteristics that influence drug use among young and adult South Africans. Data for the study were drawn from the South African national population-based survey in 2012 for 26 453 individuals (52.0% women and 48.0% men) aged 15 years and older. The purpose of this secondary analysis was to make more recent estimates on the frequency and type of drug use among women and men 15 years and older available, using a nationally representative household survey in 2012 (Peltzer & Phaswana-Mafuya, 2018). The study used the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) to assess past three-month drug using. The study found that past three-month any drug use was 4.4% overall, 7.9% among men and 1.3% among women (Peltzer & Phaswana-Mafuya, 2018). Further results showed that the proportion of past three-month cannabis use was 4.0%, followed by sedatives or sleeping pills (0.4%), amphetamine-type stimulants (0.3%), cocaine (0.3%), opiates (0.3%), inhalants (0.2%) and hallucinogens (0.1%) (Peltzer & Phaswana-Mafuya, 2018). The study also showed that among the nine South African provinces, any past three-month drug use was the highest in the WC (7.1%), followed by the Free State (6.3%) and NC (5.2%). Further adjusted, multivariable, logistic regression analysis showed that among both men and women, younger age, being Coloured and hazardous or harmful alcohol use were associated with any past three-month drug use (Peltzer & Phaswana-Mafuya, 2018). In addition, having been a victim of violent crime and sexual risk behaviour among men and having psychological distress among women were associated with any past three-month drug use (Peltzer & Phaswana-Mafuya, 2018).

2.5 Substance Abuse Prevalence by Age Category/Group

Survey and epidemiological data consistently show that the extent of drug use among young people, in particular past-year and past-month prevalence, remains much higher than that of older people (UNODC, 2018). Conversely, the lifetime prevalence of drug use remains higher among older people than among young people for the use of substances that have been on the market for decades (UNODC, 2018). In the general population of people aged 15 to 64 years, there was an estimated 34.3 million past-year users of opioids (persons who use opiates and persons who use prescription opioids for non-medical purposes) globally in 2016 (UNODC, 2019). The prevalence of past-year use of opioids among the population aged 15 to 64 years was high in North America (4.2%) and Oceania (2.2%), Central Asia and Transcaucasia (0.9%), Eastern and South-Eastern Europe (0.7%) and North America (0.8%) (UNODC, 2019). This section separates substance abuse by age category and presents the prevalence of substance abuse for each.

2.5.1 Younger group

A global estimate, produced for the first time by UNODC and based on available data from 130 countries, suggests that, in 2016, 13.8 million young people (mostly students) aged 15 to 16 years used cannabis at least once in the previous 12 months, equivalent to 5.6% of the population in that age range (UNODC, 2019). Annual use of cannabis in 15- to 16-year-old people was slightly higher than among the general population aged 15 to 64 years (3.9% in 2016) (UNODC, 2019). When compared with non-users, adolescent cannabis users have a higher likelihood of using other drugs, even when controlled for other important co-variates such as genetics and environmental influences (UNODC, 2019). As with adults, a major characteristic of drug use among young people is the concurrent use of more than one substance. Polydrug use remains fairly common among both recreational and regular drug users

(UNODC, 2019). With the exception of tobacco and alcohol, cannabis is considered the most commonly used drug among young people (UNODC, 2019). Epidemiological research, which is mainly concentrated in high-income countries, suggests that the perceived easy availability of cannabis, coupled with perceptions of a low risk of harm, makes cannabis, after tobacco and alcohol, the most common substance used. Its use is typically initiated in late adolescence and peaks in young adulthood. In most countries, cannabis is the most widely used drug, both among the general population and among young people (UNODC, 2019).

2.5.2 Older group

The use of drugs among older people has long been an under-researched area, the importance of which has only recently been recognised (UNODC, 2019). Changes in global demographics indicate an increase in both the number and proportion of older people in all regions (UNODC, 2019). Drug use among the older generation (aged 40 years and older) has been increasing at a faster rate than among those who are younger, according to the limited data available, which are mainly from Western countries (UNODC, 2019). People who went through adolescence at a time when drugs were popular and widely available are more likely to have tried drugs and, possibly, to have continued using them (UNODC, 2019). This pattern fits particularly the so-called "baby boomer" generation in Western Europe and North America. Born between 1946 and 1964, baby boomers had higher rates of SU during their youth than previous cohorts; a significant proportion continued to use drugs and, now that they are over 50, this use is reflected in the data (UNODC, 2019). In Europe, another cohort effect can be gleaned from data on those seeking treatment for opioid use. Although the number of opioid users entering treatment is declining, the proportion who were aged over 40 years increased from one in five in 2006 to one in three in 2013 (UNODC, 2019). According to the UNODC (2019), overdose deaths reflect a similar trend: these increased between 2006 and 2013 for those aged 40 years and older but declined for those aged under 40 years. The evidence indicates a large cohort of

ageing opioid users who started injecting heroin during the heroin “epidemics” of the 1980s and 1990s (UNODC, 2019).

Globally, deaths directly caused by drug use increased by 60% from 2000 to 2015. People over the age of 50 years accounted for 39% of deaths related to drug use disorders in 2015 (UNODC, 2019). However, the proportion of older people reflected in the statistics has been rising. In 2000, older people accounted for just 27% of deaths from drug use disorders (UNODC, 2019). Approximately 75% of deaths from drug use disorders among those aged 50 years and older are linked to the use of opioids. The use of cocaine and the use of amphetamines each account for about 6%; the use of other drugs makes up the remaining 13% (UNODC, 2019). The prevalence of the non-medical use of opioids and tranquilizers by women remains at a comparable level to that of men (UNODC, 2019). On the other hand, men are far more likely than women to use cannabis, cocaine and opiates. Women continue to account for only one in five people in treatment. The proportion of females in treatment tends to be higher for tranquilizers and sedatives than for other substances (UNODC, 2019).

2.6 Substance Abuse Prevalence in Study Sites

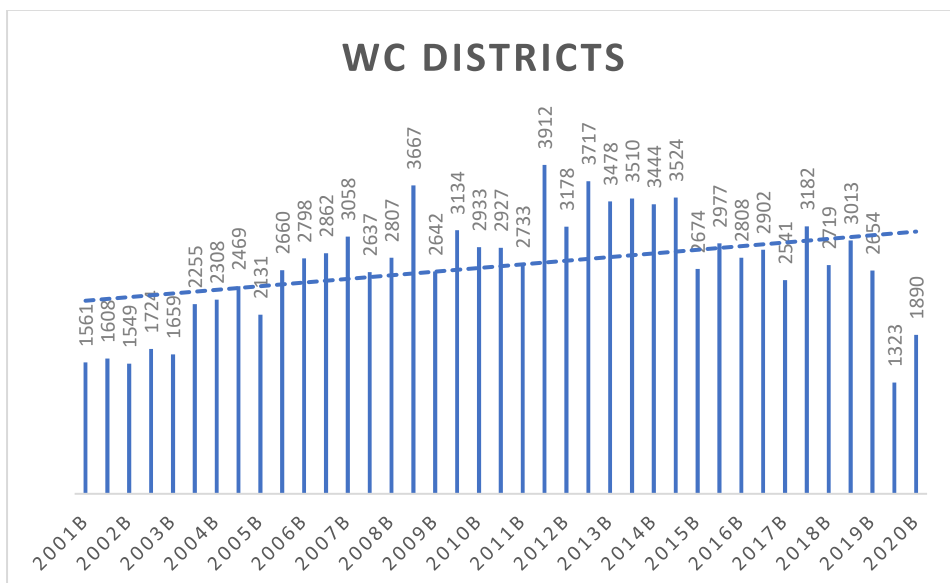
The following section reports on the prevalence of SU in the WC and EC. Presenting this information is necessary as it is from these regions that the data for this study were collected. The data that this discussion centres on are taken from the SACENDU (2022) phase 49 research brief. The South African Community Epidemiology Network on Drug Use (SACENDU) is a network of researchers, practitioners and policy makers that was established in 1996 (Dada et al., 2022). SACENDU’s objectives are to provide descriptive information on the nature and patterns of AOD use, to present treatment demand data that allow for the monitoring of emerging trends and risk factors associated with AOD use, and to record the characteristics of vulnerable populations and consequences of AOD use in South Africa (Dada et al., 2022).

2.6.1 Western Cape

SACENDU has been publishing biannual AOD reports since 2001 (see Figure 1 and Figure 2 below). As can be seen in Figure 1, in the WC 1561 individuals sought treatment for AOD use during the second half of 2001, primarily for methamphetamine use. The period reported in the 2012A brief recorded the highest number of individuals seeking treatment, and again predominately for methamphetamine use. Comparatively, the 2020A report recorded the lowest number of persons seeking treatment, this probably being due to the COVID-19 lockdown restrictions that limited the number of people permitted in closed and confined spaces. The 2020B report shows an increase from 1323 to 1890 individuals seeking treatment for AOD use. There has clearly been an upward trend in first-time treatment seekers in the WC during the period 2001 to 2020.

Figure 1

Individuals Seeking Treatment for AOD use in the WC during the Period 2001 to 2020



The most common primary substances of use reported by 37 specialist treatment centres was methamphetamine (40%), cannabis (17%), heroin (14%) and alcohol (17%), together

comprising 88% of all admissions (Dada et al., 2022). The proportion of persons presenting with methamphetamine as their primary substance of use decreased slightly to 40% in this period (Dada et al., 2022). The proportion of Coloured patients in treatment (49%) remains higher than any other race group (Black 33%, White 16% and Indian 1%). Coloured patients in treatment were more likely to be admitted for methamphetamine use (35%), followed by cannabis (21%), heroin/opiates (21%) and alcohol use (12%). Black African patients were more likely to be admitted for cannabis use (45%), alcohol (27%) and methamphetamine use (19%), while among White patients, the majority were admitted for alcohol use (42%), methamphetamine (17%), cannabis (12%), crack/cocaine and heroin/opiates use (9%). There was a slight decrease in the proportion of methamphetamine admissions among Black African patients during this period, while a substantial increase in heroin/opiates use was noted for those of Coloured descent. Up to 42% of patients reported using more than one substance.

The majority of patients younger than 20 years were male (79%). Coloured patients constituted 73% of these patients and 25% of patients were Black African. Most young patients were treated for the use of cannabis (75%), followed by alcohol (9%). A 20% increase in the proportion of patients admitted for heroin/opiates was noted. The period saw a significant decrease in the proportion of females who were treated for the use of OTC/PRE medicines (from 59% to 45%) and alcohol (from 36% to 30%). A third of adolescent patients who used methamphetamine were female (Dada et al., 2022).

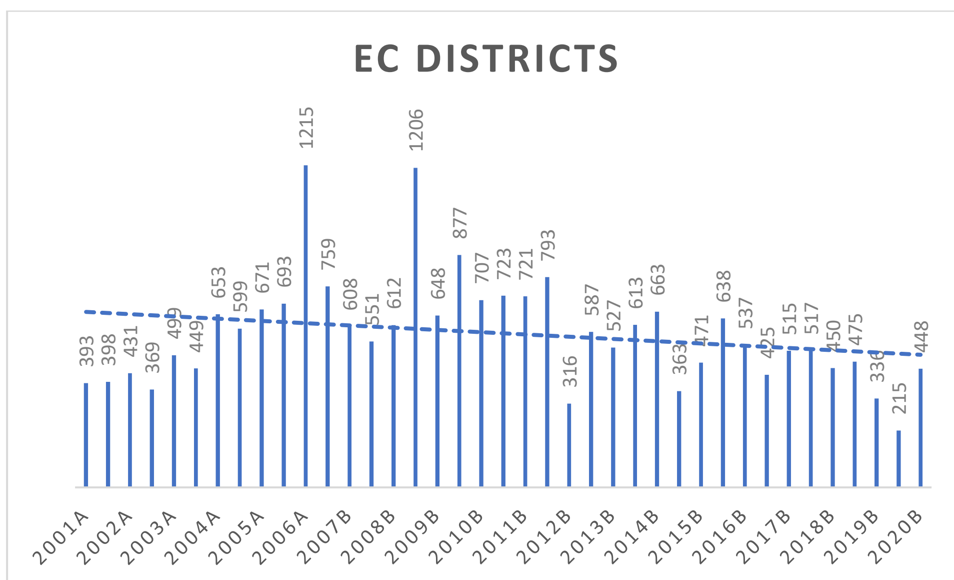
2.6.2 Eastern Cape

In the EC, data were collected from six specialist treatment centres. Compared to the WC, there are substantially lower numbers of people who seek treatment for AOD use. The highest number of treatment seekers in the EC is for the reported period 2006A (see Figure 2 below) that saw a total of 1215 people seeking treatment for AOD, which is less than the lowest intake

for the WC. Although methamphetamine is not the primary substance of use for this region, the proportion of persons reporting methamphetamine as their primary substance of use increased significantly in this period, from 17% to 37% (Dada et al., 2022). Consistent with the WC, the 2020A report period recorded the lowest number of AOD treatment seekers for the region. As is evident, there is a descending trend line in the number of first-time treatment seekers for AOD use for the period 2001 to 2020. The most common primary substance of use during this period was alcohol (26%), followed by cannabis (23%), methamphetamine (21%) and heroin/opiates (18%). Fifty-six patients sought treatment for “nyaope/whoonga” use during this period in this region, this increasing the proportion for heroin/opiates admissions (Dada et al., 2022).

Figure 2

Individuals Seeking Treatment for AOD use in the EC during the Period 2001 to 2020



A total of 475 patients were treated across these treatment centres for the January to June 2019 reporting period. Black African patients were mostly treated for cannabis (25%), followed by alcohol (23%) and heroin/opiates (21%). The primary substance of use among White patients was alcohol (37%), followed by methamphetamine (14%) and heroin/opiates (13%). There was

a decrease in Coloured patients accessing treatment for methamphetamine during this period. Male patients across age groups continue to dominate use of substances, however, 25% of patients who reported alcohol use were female (Dada et al., 2022). The overall mean age of the patients in treatment during this period remains at 30 years. Patients who were treated for OTC/PRE, alcohol and crack/cocaine were on average older than those treated for other substances. The biggest change was seen in cannabis/mandrax, which increased from age 25 to 32 years. Heroin/opiates (35%) was the most commonly used substance by patients in treatment who are younger than 20 years of age, followed by cannabis (33%) and methamphetamine (20%). Patients who were younger than 20 years comprised 25% of the treatment population and increased compared to the previous period (Dada et al., 2022). A slight decrease in patients between the ages 20 to 24 years was also noticed during this period (from 21% to 15%). The proportion of females decreased slightly (from 22% to 16%) since the last reporting period and males still comprise the most patients seen in treatment. There were only slight changes noticed in the proportion of ethnic groups. The proportion of those who were generally unemployed also significantly increased (33% to 42%) during this reporting period (Dada et al., 2022).

2.7 Conclusion

This chapter discussed the evolution of substance abuse in the DSM-I to the DSM-5-TR as well as the international and national prevalence rates of AOD use/abuse. Both international and national prevalence statistics show that the prevalence of AOD abuse is higher amongst men. In South Africa, a further unique pattern has emerged, viz. that AOD is more prevalent among Coloured men as opposed to any other group. Prevalence data provide useful information about trends of substance abuse amongst various groups, but they say nothing about why certain groups are more susceptible to, or at greater risk of AOD abuse. Specifically,

what it is about this particular group that places them at a higher risk to substance abuse relative to other racial groups in South Africa.

CHAPTER THREE

THE LANDSCAPE OF SUBSTANCE ABUSE RESEARCH

LITERATURE REVIEW

3.1 Introduction

This literature review endeavours to provide an overview of the field of substance abuse research by reviewing the most relevant local and international research examining individual and contextual risk factors that are associated with adolescent and adult (emerging adult and young adult) substance abuse. Although this study is primarily concerned with those individual and contextual factors that make certain people more vulnerable than others to substance abuse, the vast empirical literature on the topic concerns itself with both the risk and protective factors of substance abuse. This focus on risk and protective factors is echoed in the early research by Kraemer et al. (2001) who advocated for the classification of risk and protective factors into those that are fixed and those that are variable.

The following discussion will thus be organised in terms of factors that are considered fixed risk factors, i.e., factors that are innate to the individual, and factors that are deemed to be variable and may be ameliorated through interventions (Hawkins et al., 1992; Kraemer et al., 2001; Stone et al., 2012). The variable factors will further be divided into two sections, viz. interpersonal factors and contextual factors. Individual factors are those that lie within individuals and their interpersonal environments and contextual factors are those factors that relate to broad social and cultural factors (Hawkins et al., 1992; Stone et al., 2012). The utility of analysing individual risk factors and risk pathways will allow this study to address the interplay between multiple factors of influencing risks.

A discussion of the identified risk factors is presented in the proceeding section. The section starts with an overview of risk factors and then deals with each of the individual and contextual factors, ranging from genetic factors to community factors. Although this study focuses on individual and contextual factors that influence emerging and young adult substance abuse, the literature used in the discussion occasionally focuses on factors that influence both adolescent and adult substance abuse.

3.2 Risk Factors

In a systematic review, Stone et al. (2012) state that the field of adolescent substance abuse prevention has grown dramatically since the 1990s. Specifically, through the identification of longitudinal precursors that predict an increase in the likelihood of problems, considered to be risk factors, those that mediate or moderate exposure to risk, considered to be protective factors, and those that have a direct impact on decreasing the likelihood of problems, considered to be promotive factors (Stone et al., 2012). The systematic review conducted by Stone and colleagues (2012) followed Hawkins et al.'s (1992) seminal study on risk and protective factors.

The aim of Hawkins et al.'s (1992) study was to comprehensively review risk and protective factors for drug abuse, and to assess a number of approaches for drug abuse prevention potential with high-risk groups in order to make informed recommendations for research and practice in the field. Hawkins et al.'s (1992) study was based on the premise that the most promising route to effective strategies for the prevention of adolescent alcohol and other drug problems is through a risk-focused approach. According to Hawkins et al. (1992), this approach requires the identification of risk factors for drug abuse, and of methods by which risk factors have been effectively addressed, as well as the application of these methods to appropriate high-risk and general population samples in controlled studies.

More recently, Muchiri and Dos Santos (2018) noted that an increasingly recognised prevention approach for SU entails a reduction in risk factors, and the enhancement of promotive or protective factors in individuals and the environment surrounding them. Their explorative study evaluated the effect of potential risk and protective factors associated with family management relating to adolescent substance abuse. Muchiri and Dos Santos (2018) assert that an increasing number of studies have identified factors influencing SU, however there are few studies in South Africa that explore these factors. The factors that Muchiri and Dos Santos (2018) refer to are factors identified by Brook et al. (2001) that include contexts where interpersonal violence is relatively high, where illicit substances are readily available, where men conform to masculine ideas of machismo, where family drug use is rampant and where distant parent-child relationships are prevalent.

In a follow-up study, Brook et al. (2006) conducted structured interviews in the homes of 1468 male and female South African adolescents aged between 12 to 17 years. The aim of this study was to determine the association of frequency of illegal drug use with five groups of risk factors, viz. environmental stressors, parental drug use, parental child rearing, peer drug use and adolescent personal attributes. Personal attributes and peer SU significantly explained the largest percentage of the variance, 15% and 13% respectively, in the adolescent frequency of illegal SU (Brook et al., 2006). Parental factors and environmental stressors also significantly contributed (2%) to the explained variance of adolescent SU (Brook et al., 2006). This study found that proximal rather than distal issues are better indicators of adolescent SU risk (Brook et al., 2006).

Due to the pervasive nature of substance abuse, there is an abundance of research that attempts to identify factors that predict substance abuse. To this end, Collins et al. (2008) conducted a large-scale survey to compare predictors of inhalant use with factors predicting use of marijuana and other drugs. The aim of this study was to determine the number of inhalant

predictors at the individual level, while also considering contextual factors such as school size and poverty rates. The study found that among the risk factors, family conflict, friends' drug use and perceived availability of drugs most predicted inhalant use. Although favourable parental attitudes towards drug use also predicted inhalant use, this relationship was less strong than for marijuana and other drugs (Collins et al., 2008).

Ismail et al. (2017) aimed to examine the relationship between individual, familial and social environment factors and to identify which factors are good predictors in explaining the involvement of adolescents in substance abuse behaviour. This study used a survey method which involved the distribution of questionnaires to 480 respondents in the population who were identified as high-risk youth. The age of respondents ranged between 13 and 17 years, the majority being male. The results showed that individual, family and social environment were significant variables in the model and are major contributing factors to drug-related behaviour among adolescents (Ismail et al., 2017). This study concluded that the domain of social environmental factors is very important in understanding the involvement of adolescents and young adults in substance abuse (Ismail et al., 2017). This section provided a general review and discussion of literature that has examined risk factors involved in SU. The proceeding sections are specifically concerned with the literature that focused on individual risk factors for SU, starting with biological risk factors and extending to psychological risk factors.

3.2.1 Individual risk factors

Individual level factors encompass cognitive, attitudinal, personality, biological and developmental factors. Cognitive risk factors for SU include a lack of knowledge regarding the risks of use and abuse, along with the misperception that SU is "normal", and that the majority of people use substances (Dhawan & Mandal, 2017; Stone et al., 2012). Psychological

characteristics associated with SU include poor self-esteem, low assertiveness, emotional dysregulation, poor self-control, or an undiagnosed psychological condition (Hawkins et al., 2004; Stone et al., 2012). Individuals with poor social relationships with significant others, poor social coping skills and misperceptions of the extent and acceptability of drug-using behaviour in society are more likely to engage in SU (Hawkins et al., 2004; Stone et al., 2012). Disengagement from community poses a similar risk.

3.2.1.1 Biological factors

Hawkins et al. (1992), Galea et al. (2004) and Stone et al. (2012) provide comprehensive systematic reviews on studies that examine genetic factors that influence adolescent substance abuse development. Although individual biological and genetic factors are not amongst the variables that were examined in this study or the broader project, I discuss a few studies that examined adolescent development and how this relates to adult substance abuse.

Neiderhiser et al. (2013), in a study based in the United States (US), used a longitudinal design with 720 same-sex sibling pairs to examine genetic and environmental influences and their association with marital conflict about the child, parental monitoring, sibling relationship negativity, peer delinquency during adolescence and initiation of illegal drug abuse by young adulthood. They found four factors that explain the initiation of illegal drug use, two being shaped by genetic factors and two being shaped by the environment shared by siblings (Neiderhiser et al., 2013). The influence of environmental factors was shown to be distinctively shaped by poor parental monitoring of both siblings and the effects of siblings on each other's deviancy (Neiderhiser et al., 2013).

In another US longitudinal study, Horner et al. (2013) used a face-to-face measure to investigate pubertal timing and transmissible risk in relation to affiliation with deviant peers and the development of SUD. The study sample consisted of 500 boys, 250 with a father having

a lifetime diagnosis of SUD and 250 with a father without a SUD diagnosis. They found that advanced sexual maturation and transmissible risk constitute unrelated facets of SUD liability, and both factors bias development towards SUD via affiliation with deviant peers (Horner et al., 2013).

Durand et al. (2013) note that genetic testing has not identified a single gene that causes SU or addiction. They further assert that genes that contribute to SU may be expressed through personality characteristics, such as temperament, sensation seeking behaviours and poor impulse control (Durand et al., 2013). Horner et al. (2013) also argue that despite studies that provide reasonably strong evidence for genetic contributions to the aetiology of SUD, many environmental factors spanning peers, neighbourhood and family environment also impact on SUD risk (Horner et al., 2013). Some of these environmental factors, discussed below, are the variables that are measured in this study to determine their predictive effect on SU, to the exclusion of any biological factors.

3.2.1.2 Psychological factors

The American Psychological Association (2015) *APA dictionary of psychology* defines psychological factors as those functional factors (as opposed to biological factors) that contribute to the development of personality, the maintenance of health and well-being, and the aetiology of mental and behavioural disorders. They cite the nature of significant childhood and adult relationships, the experience of ease or stress in social environments (e.g., school, work), and the experience of trauma as examples of psychological factors (American Psychological Association, 2015). The following discussion reviews literature that reports on specific psychological risk factors that influence SU, including personality, psychopathology and trauma.

3.2.1.2.1 Personality

Although personality factors are not amongst the individual factor predictor variables measured and tested in the path model assessed in this study, studies have variously linked these to the development and maintenance of substance abuse (Hartwell et al., 2012; Kalsoom & Malik, 2019; Le Bon et al., 2004). One such study is Le Bon et al. (2004) who conducted quasi-experiments using Cloninger's Temperament and Character Inventory (TCI) to compare the personality of three groups of people to determine if a link existed between personality and illicit substance choice. The three groups comprised of 42 heroin dependent patients, 37 alcohol dependent patients and 83 individuals from random populations. Their study found that personality profiles were linked to some preferential choice of substances, with heroin patients scoring high in Novelty-Seeking and Self-Directedness. They also found that Exploratory Excitability segregated 76% of heroin patients from alcohol patients (Le Bon et al., 2004).

In a more recent study, Kalsoom and Malik (2019) examined the association between the personality trait, suggestibility, and drug abuse by conducting a cross-sectional survey in three different professional institutes. A purposive sampling strategy was used to select a total of 300 male and female students between the ages of 19 and 25 years who were enrolled in different programmes at the various institutions. While controlling the effect of sociodemographic variables, Kalsoom and Malik (2019) found that the personality factor, suggestibility, was a primary contributing factor in drug abuse. Suggestibility appeared to have the strongest relationship with drug abuse, presenting it as one of the key indicators of drug abuse. They concluded that age, living with family and suggestible personality traits are vulnerability factors for substance abuse (Kalsoom & Malik, 2019).

Ensminger et al. (2002) examined childhood antecedents of marijuana and cocaine use in adulthood using a self-report longitudinal design with 1242 children and 57 families of first

graders from the Chicago inner-city. First grade teachers, mothers and children also provided information. In the follow-up, only 952 participants were re-interviewed. The study found that the combination of both shy and aggressive behaviours is an important antecedent for later male drug use and is likely to distinguish those who will be persistent users in adulthood from those who experiment in adolescence (Ensminger et al., 2002). In another longitudinal study, Brook et al. (2009) examined parent-child bonding in early adolescence, and internalising behaviours in later adolescence, and their effects on problems related to SU in the mid-20s and health problems in the mid-30s. The study followed 502 participants from a community-based sample over a 30-year period. The study found strong relationships between psychosocial difficulties, such as internalising and externalising behaviours, poor ego integration and maladaptive coping behaviours in later adolescence, and adverse health consequences in the mid-30s (Brook et al., 2009).

Hartwell et al. (2012) used a quasi-experimental design with a sample of 227 non-treatment seeking individuals identified with current dependence to identify the different motives for drug use across substance dependent populations and across drug classes. To achieve this aim, the study used the Inventory of Drug-Taking Situations (IDTS) which contains eight subscales assessing motives for drug use. The findings revealed that prescription opioid dependent individuals scored significantly higher than all other groups on the Physical Discomfort, Testing Personal Control, and Conflict With Other subscales (Hartwell et al., 2012). Other groups were marijuana and cocaine users, with those identified as marijuana dependent scoring higher on the Pleasant Emotions and Pleasant Times With Others subscale (Hartwell et al., 2012). In a South African study, Shumba and Makura (2014) conducted interviews with a convenience sample of 24 participants (10 learners, 8 personnel and 6 School Governing Board (SGB) members) in order to determine the nature, extent and causes of drug abuse in South Africa. Although the study design is not ideally suited to achieve the stated purposes of the

study, the results showed that learners tended to use a cocktail of drug combinations, and that leaners who have low self-esteem and who feel a profound sense of inadequacy are vulnerable to illicit substance abuse. The study also found that marijuana (*dagga*), tobacco and alcohol were the most readily available, commonly used and abused substances by learners (Shumba & Makura, 2014).

3.2.1.2.2 Psychopathology

Various suggestions have been proposed to explain relationships between psychopathology and substance abuse. Ferdinand et al. (2001) aimed to investigate prospective associations between psychopathology in adolescence and tobacco, alcohol and drug use in young adulthood. The study employed a sample of 787 adolescents, aged 10 to 14 years, from the Dutch general population and was prospectively followed-up across an eight-year interval. The Child Behaviour Checklist (CBCL) was administered at initial assessment, and at two- and four-year follow-ups. Substance abuse was assessed with the Young Adult Self-Report (YASR) at eight-year follow-up. The study found that the Thought Problems scale of the CBCL was the strongest predictor of alcohol use, while smoking was predicted by the Thought Problems and Delinquent Behaviour scales (Ferdinand et al., 2001). The study also found that the strongest association with drug use in young adulthood was provided by the CBCL Delinquent Behaviour scale (Ferdinand et al., 2001). The predictive value of predictors in early adolescence was as important as in late adolescence. Furthermore, substance abuse and dependence were more prevalent among young adults versus other age groups (Ferdinand et al., 2001).

Zimmermann et al. (2003) note that cross-sectional findings in community surveys of adults suggested that adolescent anxiety disorders are strong predictors of the subsequent onset of alcohol use, abuse, and dependence. As such, Zimmermann et al. (2003) employed a

longitudinal design to follow a sample of German adolescents into adulthood to determine if panic and social phobias were strong predictors of subsequent alcohol problems among adolescents and young adults. The sample consisted of 3021 adolescents and young adults at baseline and 2548 at follow-up. Using the Munich-Composite International Diagnostic Interview (M-CIDI), the researchers found that baseline social phobias significantly predict the onset of regular and hazardous SU and the persistence of dependence (Zimmermann et al., 2003). They also found that panic attacks significantly predicted the onset of hazardous use and abuse, as well as the persistence of combined abuse and dependence. Zimmermann et al.'s (2003) longitudinal study of adolescents and young adults corroborated the findings of previous cross-sectional studies in that they found that panic and social phobias were strong predictors of subsequent alcohol problems among adolescents and young adults.

In South Africa, Plüddemann, Flisher et al. (2010) conducted a cross-sectional survey with 1561 grade 8 to grade 10 males and females from randomly selected schools in the WC. The study investigated the prevalence of methamphetamine use amongst high school students to determine if users were more likely to be at risk of mental and behavioural problems. The study found that 9% of students had tried methamphetamine at least once and there was some association between recent methamphetamine use and certain mental health and behavioural problems (Plüddemann, Flisher et al., 2010). In another South African study, Saban et al. (2014) examined psychiatric comorbidity and its association with specific SU in young adult substance users in treatment for SU. The computer assisted Diagnostic Interview Schedule for DSM-IV (C-DISC 4) was administered to male and female inpatient substance users (n = 95; ages 17 to 30 years) to screen for current psychiatric disorders. The study found that the most common comorbid psychopathologies were antisocial personality disorder (ASPD 87.4%) and conduct disorder (CD 67.4%). Further regression analyses showed a marginally significant

association between specific phobia and first use of cannabis, but indicated no statistically significant associations between psychopathology and SU (Saban et al., 2014).

The research of both Weinberg (2001) and Cosden (2001) endeavoured to uncover the associations between Learning Disability and risk factors for SUD. Cosden (2001) reviewed research on substance abuse for adolescents and adults with learning disabilities and interpreted the findings within a risk and resilience framework. Risk factors included poor understanding of one's disability, a lack of skills for developing peer relationships, and the need for prolonged family support. Weinberg (2001) reviewed research on risk factors for adolescent SUDs and discussed possible relationships between SUDs and learning disabilities. These studies found that individual level risk factors (genetic, biological, other familial and psychiatric) emerged as very important in the risk equation, as well as interaction between individual risk and environmental conditions (Cosden, 2001; Weinberg, 2001). Other commonalties between SUD risk and learning difficulty include prenatal substance exposure, family history of SUD, conduct disorder, social skills deficits and academic failure (Cosden, 2001; Weinberg, 2001). The pathologies identified in this section as factors relating to and/or predicting substance abuse are not amongst the predictor variables included in the current study.

3.2.1.2.3 Trauma

Exposure to traumatic experiences, especially those occurring in childhood, has been linked to SUDs, including abuse and dependence. Evidence of this is demonstrated in the study by Kilpatrick et al. (2000), who recruited a US national household probability sample of 4023 adolescents aged 12 to 17 years to participate in telephonic interviews about SU, victimisation experiences, familial SU, and posttraumatic reactions. The DSM-IV-defined substance abuse/dependence criteria were used to identify risk factors for substance abuse/dependence. Age and ethnicity data were available for only 3907 of the participants. The study findings

were threefold, viz. 1) that adolescents who had been physically assaulted, who had been sexually assaulted, who had witnessed violence, or who had family members with alcohol or drug use problems had increased risk for current substance abuse/dependence; 2) posttraumatic stress disorder independently increased risk of marijuana and hard drug abuse/dependence; and 3) when effects of other variables were controlled, African Americans, but not Hispanics or Native Americans, were at approximately 1/3 the risk of substance abuse/dependence as Caucasians (Kilpatrick et al., 2000).

Danielson et al. (2009) examined trauma-related risk factors for alcohol and drug abuse among a national sample of young adults. They further compared such risk factors between men and women. Participants for the study were 1753 young adults who participated in the 7- to 8-year follow-up telephone-based survey to the original National Survey of Adolescents. In the full sample, 29.1% met criteria for substance abuse. They found that trauma-related risk factors for alcohol and drug abuse differed for men and women, and that SUDs are highly prevalent among young adults (Danielson et al., 2009). In a relatively recent South African study, Gopal and Collings (2014) argued that identified risk factors are likely to be particularly salient in a South African context, characterised by high levels of substance abuse but also by a largely pre-adolescent initiation of drug usage. Their study estimated that 3.4 million South African children have experienced the death of one or both parents and that there are high prevalence rates for exposure to childhood trauma (Gopal & Collings, 2014). Although trauma is not measured directly in this study, it is measured through the degree of community violence and dysfunction, which can be used as indicators of violence in communities. As such, trauma can be inferred if the communities have high levels of violence and dysfunction.

In a US study that examined the causes and consequences of child maltreatment, Mason et al. (2017) implemented what has become known as the Lehigh longitudinal study. The study recruited 457 children from 297 families in the general population to serve as data sources. The

study inadvertently found that peer marijuana approval or use was a strong positive predictor of adolescent marijuana use, which was a strong positive predictor, in turn, of adult marijuana use, and which was strongly related to child maltreatment (Mason et al., 2017). The authors therefore concluded their study by emphasising the importance of understanding the processes that relate to the adoption and maintenance of marijuana use (Mason et al., 2017).

The preceding section provided a discussion of the literature related to individual risk factors related to SU. Individual risk factors are identified as those risk factors that lie within individuals and their interpersonal environments (Hawkins et al., 1992; Kraemer et al., 2001; Stone et al., 2012). Individual risk factors include specific characteristics, behaviours or attributes of a person that increase their likelihood of experiencing negative outcomes, such as health issues, accidents or financial problems (Ungar, 2013; Weich, 2002). The discussion was thus organised in terms of risk factors that are considered innate to the individual, which consists of biological risk factors (Durand et al., 2013; Galea, 2004; Hawkins et al., 1992; Horner et al., 2013; Neiderhiser et al., 2013; Stone et al., 2012) and psychological risk factors that included personality (Ensminger et al., 2002; Hartwell et al., 2012; Kalsoom & Malik, 2019; Le Bon et al., 2004; Shumba & Makura, 2014), psychopathology (Cosden, 2001; Ferdinand et al., 2001; Plüddemann, Dada et al., 2010; Saban et al., 2014; Weinberg, 2001; Zimmermann et al., 2003) and trauma (Danielson et al., 2009; Gopal & Collings, 2014; Kilpatrick et al., 2000; Mason et al., 2017).

3.2.2 Contextual factors

Contextual factors are those factors that relate to broad social and cultural factors, and as shown in the preceding discussion, individual factors are those that lie within individuals and their interpersonal environments. In relation to social and contextual factors related to SU initiation and abuse, Smirnov et al. (2013) assert that some drug use initiation may involve an interactive

process among friends, rather than passive acceptance of opportunity by susceptible individuals. They further contend that social grouping of SU is necessarily predicated on shared deviant characteristics of the users and that it is also suggestive of a degree of social interaction between users and non-users. Therefore, social environmental factors will contribute to SU initiation to a greater extent than individual risk factors or previous drug use (Smirnov et al., 2013).

Meier et al. (2016) have also observed that an increasing interest exists in community-based, universal risk assessment to identify youth who either have a SU disorder, or who will develop one in the future. This they argue is important, as the identification of universal risk assessment, followed by appropriate intervention, could potentially reduce the population burden of disease associated with SUDs (Meier et al., 2016). In the following section I review and discuss research that focuses on contextual factors associated with and/or which predicts substance abuse.

Stone et al.'s (2012) systematic review examined evidence for longitudinal predictors of substance abuse and use in emerging adulthood. They found that those predictors identified as predictors of SU in adolescence were not always predictors in emerging adulthood, and in one study the reverse was found in that young adults whose mothers achieved higher levels of education were more likely to use drugs and alcohol (Stone et al., 2012). The study also identified a unique predictor in emerging adulthood, namely, the importance of social contexts that involve greater freedom and less social control than experienced during adolescence. Specifically, moving out of the parental home and attending tertiary education were strongly related to increased SU (Stone et al., 2012).

3.2.2.1 Peer environment

The bidirectional influences of adolescent peer relationships and their correlation and predication with substance experimentation is well documented in the literature (see for example, Durand et al., 2013; Florence, 2014). Durand et al. (2013) identified a number of risk and protective factors that they argue may help distinguish those young people who are more likely to begin using drugs from those less likely to use. While some of the predictors in adolescent SU will still influence emerging adult use, the change in context, i.e., the experience of greater freedom and less social control in the emerging adulthood stage are undoubtedly new predictors (Stone et al., 2012). Some of the developmental tasks of adulthood include establishment of strong relationships, marriage and family responsibilities, completion of tertiary education, beginning a career and employment, and financial responsibilities.

Smirnov et al. (2013) found consistency with the idea that young adult drug users have considerable breadth and quality of social interaction that facilitates the diffusion of cultural norms. The emerging adults' predisposition for new information and experience renders the young adults receptive to SU culture, which is also explicable in the developmental context of early adulthood (Smirnov et al., 2013). Thus, while the social context changes for young adults, the peer risk factors tend to remain the same. As Ellickson et al. (2003) have found, early substance users do not necessarily mature out of a problematic lifestyle as young adults.

3.2.2.2 Parental bonding

Durand et al. (2013) found that interpersonal factors related to parental bonding and involvement can negate risk factors for SU in adolescents. This relationship is demonstrated by the finding that SU is nearly twice as high among 15- to 16-year-olds who do not feel a close bond with their parent(s) compared with adolescents who do experience close attachment (Durand et al., 2013). Brook et al. (2001) conducted one of the first studies that examined

environmental factors and their association with SU in a setting where violence is prevalent and illegal substances are readily available. This study was conducted with a sample of Colombian youths and their mothers who were interviewed for the purpose of exploring the intrapersonal, interpersonal and environmental factors associated with SU in their communities. In addition to identifying distant parent-child relationship as a risk factor for illegal drug use, the study also identified violence, drug availability, machismo, family drug use and unconventional behaviour as risk factors (Brook et al., 2001).

The primary investigators in the Colombian study also examined the predictors of illegal drug use in South Africa in 2002. In South Africa they found that adolescents who use drugs are more likely to have parents who use drugs, and that parents of non-users report more warmth than conflict in the relationships with their children (Brook et al., 2006). They further report an overlap of parental and peer factors in that adolescents of parents who do not use drugs and have better relationships with their parents are less likely to associate with substance-using peers (Brook et al., 2006). They argue that South African youth are more likely to model delinquent attitudes and associate with deviant peers because of the levels of violence and discrimination that they have been exposed to, as these factors affect the individual's adjustment (Brook et al., 2006). While Brook et al. (2006) report no racial differences in drug use among the South African participants in their study, Flisher et al. (2003) found that Black South African female adolescents are the most protected from drug use and recommend that the factors that protect these adolescents from SU be identified. Their findings further suggest that males of any racial group are more at risk of drug use than females.

A critique of the Brook et al. (2002) study (which the authors state in Brook et al., 2006) is that their study is based on the developmental family interactional perspective derived from American studies. This perspective was found to be less appropriate in the South African context and they thus recommend that an ecological framework be used to better describe the

influences of the associated factors in a South African context (Brook et al., 2006). This was an important insight and recommendation, which has strongly influenced the use of the ecological systems approach in the current study and the broader study that this project was part of.

3.2.2.3 Neighbourhood

There is considerable evidence that suggests strong links between disadvantaged communities and SU and related problems, particularly among youth (Brooks et al., 2012; Clark et al., 2011). Two influential contextual factors that promote SU are access to drugs and neighbourhood disorganisation. Durand et al. (2013) state that societal risk factors of adolescent SU consist of contextual community influences that promote the use of illicit substances. According to Durand et al. (2013), approximately half of adolescents consider alcohol and marijuana easy to obtain in their neighbourhoods and communities. A further key component that should be considered when determining the availability of drugs is the degree of law enforcement and societal norms. Durand et al. (2013) argue that, in contexts where laws are lenient and attitudes towards drug and alcohol use are favourable, there is an increase in the rate of consumption and the quantity of drugs used among adolescents. Unlike the availability of drugs, the literature provides less evidence to suggest a strong association between neighbourhood disorganisation and high rates of teen SU. However, characteristics of neighbourhood disorganisation, such as population density, physical deterioration, low attachment and high crime, do appear related to higher rates of drug use (Durand et al., 2013).

Kogan et al. (2017) conducted a three-year longitudinal study with men who completed audio computer assisted self-interviews at 18-month intervals. The study examined the influence of community and neighbourhood disadvantage in amplifying the effects of marijuana use on later SU problems, as well as the mediating influence of social disengagement on the path to use

frequency and related problems. The study found that community and neighbourhood disadvantage moderated the association of marijuana use with changes in substance abuse problems across time (Kogan et al., 2017). The study further showed a robust effect between marijuana use frequency and related problems, and that residing in disadvantaged neighbourhoods amplifies the risk of substance abuse (Kogan et al., 2017).

Hasin et al. (2016) identified further community and neighbourhood factors that amplify and sustain the influence of substance abuse, viz. common environmental stressors, lack of resources, inter-individual conflict and social defeat. The authors argue that drug use surveillance data and studies of clinical populations suggest that marginalised men coping with stressful low-socioeconomic status (SES) environments experience disproportionate short- and long-term consequences from SU in their emerging adult years (Hasin et al., 2016). They therefore contend that drug use progression and its consequences are increasingly being viewed as responses to exposure to stressful environments (Hasin et al., 2016).

3.2.2.4 Socioeconomic context and culture

Redonnet et al. (2012) set out to test the role of pre-existing familial and individual characteristics of 1103 French participants between 22 and 35 years of age through self-completed mail survey design. They found that tobacco smoking, alcohol, cannabis and polysubstance use were common behaviours among young adults, particularly those experiencing socioeconomic disadvantage (Redonnet et al., 2012). They also found that the prevalence of SU tends to decrease during the 20s and 30s, with the exception of tobacco, but a significant segment of the young adult population continue using and abusing alcohol and illegal drugs (Redonnet et al., 2012). In particular, a growing number of young adults use cannabis despite having embraced social roles such as work and parenthood, possibly jeopardising their long-term health, social and economic outcomes (Redonnet et al., 2012).

Smirnov et al. (2013) assessed a range of predictors of methylenedioxy-methamphetamine (MDMA or ecstasy) initiation, including elements of participants' social environment, such as ecstasy-using social contacts and involvement in recreational settings. The study was conducted in Australia and used a population-based retrospective/prospective cohort design (Smirnov et al., 2013). The study sample included 204 ecstasy-naïve participants aged 19 to 23 years. The study found that ecstasy initiation in early adulthood is associated predominantly with social environmental factors, including ecstasy-using social contacts and attendance at dance music events, and is associated less commonly with psychological distress and early cannabis use (Smirnov et al., 2013).

Badr et al. (2014) set out to determine whether there are differences in factors contributing to substance abuse in adolescents from Lebanon versus the US, and to decipher the role of spirituality, religion and culture, among other factors, that may influence substance abuse. The study used a correlational cross-sectional design with adolescents living in Los Angeles, California and Beirut, Lebanon (Badr et al., 2014). The study found that Muslim adolescents had significantly less rates of alcohol and SU than Christians in both Lebanon and Los Angeles (Badr et al., 2014). The study also showed that more years lived in the US increases the likelihood of abuse for both Muslims and Christians (Badr et al., 2014). A further finding showed that attachment to God and family was negatively associated with substance abuse (Badr et al., 2014). These results, among others, facilitate a better understanding of the influence of socioeconomic context (SEC) and culture, as well as religion, family and personal factors, on substance abuse.

This section provided a review of the literature that focussed on contextual risk factors that influence SU. Contextual risk factors are those factors that relate to broad social and cultural factors (Hawkins et al., 1992; Stone et al., 2012) and include an individual's social and geographic environment, such as poor parenting, delinquent peers or neighbourhood risk

(Kroneman et al., 2011; Ungar et al., 2013). The contextual risk factors identified in the literature are peer environment (Durand et al., 2013; Florence, 2014; Smirnov et al., 2013), parental bonding (Brook et al., 2001; Brook et al., 2006), neighbourhood (Brook et al., 2012; Clark et al., 2011; Kogan et al., 2017), socioeconomic context and culture (Badr et al. 2014; Hasin et al., 2016; Redonnet et al., 2012).

3.3 Substance Abuse Development Paths

Brook et al. (2011) examined how specific trajectories of marijuana use are related to life-course outcomes in adulthood. Longitudinal trajectories of marijuana use from adolescence into adulthood were examined for adverse life-course outcomes amongst a sample of African-Americans and Puerto Ricans. Data for marijuana use were analysed at four points in time and on participants' personality attributes, work functioning and partner relations in adulthood using growth mixture modelling (Brook et al., 2011). The study found that each of the three marijuana-use trajectory groups (maturing-out, late-onset and chronic marijuana-users) had greater adverse life-course outcomes than a non-use or low-use trajectory group (Brook et al., 2011). The study further showed that the chronic marijuana-use trajectory group was highly associated with criminal behaviour and partners' marijuana use in adulthood (Brook et al., 2011). Specific trajectories of marijuana use were also related to adverse life-course outcomes in the domains of personality, work and partner relationships (Brook et al., 2011).

Wagner and Anthony (2002) examined the stepping-stone and gateway sequences that link the uses of alcohol, tobacco, marijuana and cocaine. They recruited 44 624 persons aged 12 to 25 years from a nationally representative and independent cross-sectional sample of US households (Wagner & Anthony, 2002). The study results indicated that users of tobacco and alcohol were more likely than non-users to have an opportunity to try marijuana, and were more likely to actually use marijuana once a marijuana opportunity had occurred. Amongst

young people with a cocaine opportunity, the study found that those who had used marijuana were more likely to use cocaine than were those with no history of marijuana use. Wagner and Anthony (2002) concluded that the observed association revealed by their study did not seem to arise solely as a result of young drug users' seeking out opportunities to use drugs. Opportunity to use cocaine was associated with prior marijuana smoking (Wagner & Anthony, 2002).

In a study known as the Michigan Study of Adolescent Life Transitions (MSALT), Peck et al. (2008) used a pattern-centred method to examine how adolescents' alcohol use and sports activities are related both to childhood sport and problem behaviour, and to heavy drinking in early adulthood. The study started in 1983, when participants were around 12 years of age, and continued into early adulthood when participants were about 28 years of age. A thousand Caucasian Americans participated in this longitudinal study. The results indicated that childhood trouble behaviour and adolescent sport participation can, but do not necessarily, presage heavy drinking in adulthood, and that pattern-centred analytical techniques are useful for revealing theoretically generated predictions (Peck et al., 2008). The Pattern-centred analysis revealed that 12-year-olds who were characterised by relatively high levels of sport participation, aggression and other behaviour problems were more likely than expected by chance to become sports participants who used more than average amounts of AODs at age 18 years (Peck et al., 2008). Similarly, there was a relationship between primarily sport participating 18-year-olds who were using more than average amounts of AODs and heavy alcohol use at age 28 years (Peck et al., 2008).

Moss et al. (2014) examined patterns of substance abuse prior to age 16 years and its association with young adult SU behaviours and SUD in a nationally representative sample of US adolescents. The study found a high prevalence of alcohol, marijuana and cigarette use in adolescence. The researchers argue that in the context of use patterns, early onset and elevated

polysubstance use behaviour among adolescents prior to age 16 years are better indicators of young adult SU behaviours and SUDs than single drug exposure (Moss et al., 2014). In a prior US study, Ellickson et al. (2003) used a longitudinal self-report measure with almost 2000 participants to compare early non-drinkers, experimenters and drinkers on the prevalence of problem behaviour at grade 7 and grade 12 levels, and at age 23 years. The study found that early drinkers and experimenters were more likely than non-drinkers to report academic problems, SU and delinquent behaviour in both middle school and high school (Ellickson et al., 2003). The study also showed that by young adulthood, early alcohol use was associated with employment problems, other substance abuse, and criminal and violent behaviour (Ellickson et al., 2003).

In a South African study, Patrick et al. (2009) used a longitudinal self-report study with 1118 Coloured adolescents in grades 8 and 9 in an urban Cape Town area. The study aimed to determine the developmental patterns of onset of SU. The authors performed latent transition analysis to identify the patterns of onset (Patrick et al., 2009). The study found that developmental patterns for SU were similar across genders and that lifetime prevalence was higher for females. Adolescents tried either cigarettes or alcohol, followed by both, then marijuana and inhalants (Patrick et al., 2009). The individual and social onset patterns found in the Patrick et al. (2009) study are not the individual and social factors that the current study is examining.

This section reviewed literature that examined different developmental paths, trajectories, gateway sequences and patterns that have been associated with the development and onset of SU. In the following section I review the literature that theorised about SU using ecological systems theory (EST).

3.4 Studies Using Ecological Systems Theory

From an ecosystemic and developmental perspective, Goulet et al. (2020) aimed to identify the risk profiles of 13-year-old adolescents, and to associate these specific profiles with school dropout risk and substance abuse at age 15 years. Data for the study were collected from 1312 Canadian adolescents using a longitudinal questionnaire design at ages 13 and 15 years. The study identified five profiles (social risk, profile global, risk profile, family risk profile, individual risk profile and normative profile) based on individual (externalised and internalised behaviour problems), school environment (behavioural problems in school and academic difficulties), social (social withdrawal and peer victimisation), and family environment (coercive parental practices and maternal distress) risk factors. Some profiles were found to present higher levels of risk factors, while others comprise risk factors that are under the sample average level. In addition, higher risk profiles showed stronger longitudinal associations with later adjustment difficulties (Goulet et al., 2020). This study contributes to our understanding that an ecosystemic perspective underlines a broad complexity of adolescent development and adaptation, as Goulet et al. (2020) show that a broad range of factors help to better understand and explain adaptive behaviour.

Conn and Marks (2017) examined social and cultural processes and mechanisms, which may influence adolescents' prescription drug beliefs and practices. They conducted semi-structured interviews with 20 diverse 13- to 17-year-olds in an adolescent psychiatric inpatient centre. The interview data were analysed using grounded theory and interpreted using a social ecological approach (Conn & Marks, 2017). The study found a myriad of important contextual influences on adolescent non-medical use of prescription drugs (NMUPD). The participants' responses reflected factors within microsystem, exosystem and macrosystem contexts, as well as important intrapersonal factors (Conn & Marks, 2017). The study also found that adolescents who identified as an ethnic minority described cultural values (e.g., religion) and culturally

based beliefs (e.g., mental health stigma) which influenced their prescription drug beliefs (Conn & Marks, 2017). The interplay between intrapersonal factors and socialisation agents, such as parents, peers and the media, influencing prescription drug behaviour was also emphasised (Conn & Marks, 2017). This study contributes to the identification of the ecological systems model as a beneficial framework for understanding adolescent NMUPD and reflects an essential approach which both deepens and progresses the current literature.

With the purpose of informing the focus of primary prevention strategies and informed by a broad EST, Rich (2017) conducted a South African study that aimed to explore the perceived reasons and the contributing risk factors for drug use in adolescents. A mixed-method concurrent embedded research design, utilising both quantitative and qualitative methods of inquiry, was applied to gather in-depth data from a purposive sample of 41 young (14 to 19 years of age) drug users, at five drug treatment centres in the WC. The study revealed clear associations between adolescent drug use and negative family functioning, such as substance abuse by parents and/or caregivers, absent fathers, domestic violence, physical abuse and compromised parent-child relationships (Rich, 2017). Other risk factors that were identified included a lack of adult after-school supervision, association with drug-using peers, school dropout and easy access to drugs within the neighbourhood/community (Rich, 2017). This study is consistent with Bronfenbrenner's (1993, 2005) ecological perspective in showing the importance of multiple social contexts in which lives are embedded, where attributes of family, peer, school and neighbourhood contexts are able to uniquely predict the development of (adolescent) drug abuse.

Using a socio-ecological perspective, Aytur et al. (2022) aimed to evaluate associations between suicidal ideation, adverse childhood experiences (ACEs), and other risk factors such as opioid or prescription drug use, food insecurity and poor nutrition. They also examined whether potentially protective factors (such as having a parent or adult to talk to, participating

in community activities, and getting recommended levels of physical activity) may attenuate relationships between ACE scores, risk factors and suicidal ideation (Aytur et al., 2022). The study used data from the 2015 Youth Risk Behaviour Survey of 9th to 12th grade students in New Hampshire (N = 14 837). The study found that the prevalence of suicidal ideation was 15.4% (girls 20.15%; boys 10.67%) and that there was a relationship between suicidal ideation and higher ACE scores (Aytur et al., 2022). This trend continued in adjusted models tests in that suicidal ideation remained positively associated with higher ACE scores (Aytur et al., 2022). This study emphasises the importance of considering interventions that span multiple levels of the social-ecological model to mitigate the impact of ACEs. It further argues that multisectoral interventions, policy changes and community support systems are needed to facilitate a reduction in risky behavioural (viz, substance abuse) choices while protecting against future health issues in adulthood.

Manu et al. (2020) conducted focus groups in order to ascertain the factors that influence adolescent marijuana use initiation in two marijuana-growing communities in the EC province of South Africa, based on the constructs of the socio-ecological model. Twelve influences of adolescent marijuana use initiation grouped under three main levels of socio-ecological influence were found (Manu et al., 2020). These were personal characteristics such as curiosity, shyness and fulfilment of personal need, micro-level influences such as peer pressure, negative school climate, presence of marijuana in households and parental or sibling marijuana use, and macro-level influences such as child labour, poverty, presence of marijuana in communities, presence of negative adult role models and breakdown in communal restrictions against marijuana use (Manu et al., 2020). This study shows the importance of using the socio-ecological perspective in studying influences behind adolescent marijuana use initiation and to inform community health education and promotion to break the cycle of adolescent marijuana use.

Thomas et al. (2021) conducted a longitudinal study with a sample of undergraduate college students of European American and African American ancestry in order to test whether various forms of social activity participation, and peer deviance environments, moderate genetic risk for cannabis use. The results showed that engagement with church activities was associated with lower probability of cannabis use, and peer deviance was associated with higher probability of cannabis use (Thomas et al., 2021). Engagement with community activities moderated the influence of the polygenic risk score in the European American sample, where the polygenic risk score was associated with recent cannabis use among those who had never engaged in community activities (Thomas et al., 2021). This effect did not replicate in African Americans. Results suggest that community activities may limit the influence of genetic risk, as associations between polygenic risk score and cannabis use were only observed among individuals who never engaged in community activities (Thomas et al., 2021). Though this study did not explicitly use an ecosystemic approach, it does show that the level of engagement with community activities represents a modifiable environmental influence that moderates the influence of an otherwise stable risk factor, the polygenic risk scores. The study thus supports Bronfenbrenner's (1993, 2005) ecological perspective.

In this section I have attempted to show that using an ecological systems approach in substance abuse research has the potential to enable researchers to gain a comprehensive understanding of the various individual and contextual factors that contribute to substance abuse, and could potentially inform prevention and intervention strategies at multiple levels. The ecological systems approach has been shown to be a valuable framework for studying substance abuse as a complex, multifaceted issue deeply intertwined with an individual's environment and relationships.

3.5 Conclusion

It is clear that considerable efforts have been made over the past two and a half decades to understand the aetiology of adolescent and early adult substance abuse. Some of this research has led to important and novel insights. However, many of these insights have been viewed in isolation and there exists a need to examine them in a far more integrated way, and in relationship to one another. The focus on multiple factors of influences of substance abuse in this study is justified by the sheer volume of interest from academic disciplines, including, amongst others, sociology, psychology, anthropology, social work, nursing and epidemiology, that have dedicated time and resources to the study of SU behaviour. To some extent each of these disciplines has considered SU through its own analytic lens. Although psychological factors are frequently explored in the psychological SU literature, Galea (2004) contends that these constructs are not collectively examined in the literature that concerns itself with the determinants of substance abuse and dependence.

Evidence from these different fields of inquiry strongly suggests that the aetiology of SU and abuse is multifactorial and that genetics, psychological and social factors are all determinants of SU (Galea, 2004). Galea (2004) further argues that the social epidemiology of SU explicitly considers the social factors that shape the population distribution of SU behaviour. As such, most of the work that has contributed to the body of knowledge that may be called the social epidemiology of SU has frequently been carried out with a different focus. Most work has investigated the two psychosocial factors – psychological and social – that may be associated with SU. Social factors are those exogenous factors that exist beyond the individual person and reflect how the person and their relations with society at large can shape health and disease (Galea, 2004). Patrick et al. (2009) further argue for a clearer understanding of the basic processes involved, and the progression through the stages of SU, as well as the conditions

under which SU begins and continues, including potential differences in SU onset by individuals of different demographic and cultural groups.

CHAPTER FOUR

THEORETICAL FRAMEWORK

4.1 Introduction

The purpose of a theory in a study is to provide a framework within which to explain connections among the phenomena under study, and to provide insights leading to the discovery of new connections and the explanation of existing connections (Tudge, et al., 2009). As such, this chapter presents an overview of the theory that is tested in the SEM, which is the crux of this study and thesis. This theoretical framework is also used to interpret and discuss the results of the SEM analysis, in Chapter Nine of this thesis. The theory laid out in the SEM diagram (the specified model in SEM language) (see Figure 7, Chapter Eight) is regarded as a representation of the "reality" of substance abusers. The theory that is being used here is Bronfenbrenner's (1977b, 1986) Ecological Systems Theory (EST).

The theory was originally proposed by Bronfenbrenner (1977b, 1986) to explain how human development occurs, focusing largely on the impact of context. Rosa and Tudge (2013) state that by using the term "ecology", Bronfenbrenner clearly viewed development, in this instance the development of SU, as emerging from the interaction of individuals and their context. EST is appropriate to use in this study as it facilitates a broad understanding of a social phenomenon and, as shown by Hong et al. (2011), is critical for understanding SU.

This chapter thus endeavours to provide an overview of the theoretical framework that is tested in the SEM analysis and that was used to interpret the results of the SEM analysis. The chapter first presents an overview of the main features of the theory, viz. Microsystem, Mesosystem, Exosystem, Macrosystem and Chronosystem (Bronfenbrenner, 1977b, 1986). This is followed by a discussion of the evolution of the theory and the relevance of the theory for the current

study. Although other aspects and features of the theory, such as person, process and time, are not used in the SEM, they are briefly discussed.

4.2 Overview of the Ecological Systems

Bronfenbrenner's (1977b, 1986, 1993) theoretical approach explained how an individual (often a child) is located within a nested structure of five interrelated "systems", which he named Microsystem, Mesosystem, Exosystem, Macrosystem and Chronosystem, discussed in detail below. His key premise was that the interaction between these systems has an impact on human development and, in order to fully understand human development, contextual factors need to be considered (Bronfenbrenner, 1993; Galvani, 2017). The guiding principle of this theory is that environmental contexts (e.g., home, school, society) interact with the individual to promote healthy behaviours or to create risk of maladaptive behaviours, such as substance abuse (Conn & Marks, 2017; Hong et al., 2011). Bronfenbrenner (1977b) also emphasised the multidimensional environmental sources that influence individuals, as well as the influence that individuals have on the environment, underscoring the dynamic and cyclical nature of the theory.

4.2.1 The microsystem

The core system in Bronfenbrenner's model (1977b) is the microsystem, defined as "the complexity of relationships between the developing person and the environment in the immediate setting containing the person" (p. 514). The microsystem contains relations between the individual and the immediate environment surrounding the individual, such as the home, school and workplace (Bronfenbrenner, 1977b; Eriksson et al., 2018). The microsystem is regarded as the most proximal setting, with particular physical characteristics, in which a person is situated and in which the developing person can interact in a face-to-face way with others (Bronfenbrenner, 1974, 1979b; Rosa & Tudge, 2013). At the microsystem level

Bronfenbrenner (1989) stressed the importance of the psychological characteristics of all the individuals present in the immediate setting in which interpersonal interactions occur. The microsystem was thus defined as a pattern of interpersonal relations experienced face-to-face in a given environment "containing other persons with distinctive characteristics of temperament, personality, and systems of belief" (Bronfenbrenner, 1989, p. 227; Rosa & Tudge, 2013).

Galvani (2017) regards the microsystem as the system in which an individual relates to their environment by assuming a particular role. Hong et al. (2011) describe the microsystem as a pattern of activities, social roles and interpersonal relations experienced by the individual or a group of individuals in a direct setting (e.g., home and school). The physical, social and symbolic features of the setting encourage or inhibit engagement in sustained, progressively more complex interactions with the immediate environment (Bronfenbrenner, 1979a, 1993).

Rus et al. (2010) explain that the microsystem is bidirectional, such that both the individual and his or her immediate environment develop together. They describe the microsystem as the most intimate, intense, durable, influential and innermost level of the different systems that make up the environment (Rus et al., 2010). Consequently, much of an individual's behaviour is learned in the microsystem (Bronfenbrenner, 1993; Rosa & Tudge, 2013). It can thus be argued that an individual is the product of his or her microsystem.

As previously stated, the relationships between the ecological systems and the individual are dynamic and influence one another, therefore it is important to note that these systems are not static. Additionally, Bronfenbrenner recognised that genetics are an important element of the ecological system (Bronfenbrenner, 1986; Rus et al., 2010). Genetic factors that predispose an individual to substance abuse are neither measured in this study nor represented in the SEM diagram.

4.2.2 The mesosystem

The mesosystem comprises interrelations between major settings containing an individual, such as relations between home and school, home and peer groups, etc. (Bronfenbrenner 1977b; Eriksson et al., 2018). The mesosystem is defined as the “relations and interrelations among two or more microsystems in which the developing person actively participates and is therefore seen as a system of microsystems” (Bronfenbrenner, 1976, p. 163; 1977a; 1978, p. 6; 1979b, p. 25; see also Galvani, 2017; Rosa & Tudge, 2013). It is formed, or widened, each time an individual enters a new setting (Bronfenbrenner, 1979b), and it is diminished when the opposite happens (Galvani, 2017; Rosa & Tudge, 2013). The developmental characteristics of the mesosystem are similar to those of the microsystem, the main difference being that rather than the activities and interpersonal roles and relations occurring within a single microsystem, they occur across settings (Bronfenbrenner, 1979b).

A mesosystem thus consists of interrelationships between two or more microsystems in which the individual is situated (e.g., the relationship between school and home). Experiences in one micro-level system, or experiences involving a direct interaction such as with peers, may influence another micro-level system interaction, such as family (Hong et al., 2011). Each mesosystem, through which an individual experiences new activities and social structures, influences development (Bronfenbrenner, 1977b; Rus et al., 2010). Mesosystems can also be dyadic systems that include interpersonal relationships. A mesosystem could manifest itself as the interpersonal bonding between the developing individual and the members of a specific microsystem. The interconnections between settings and people are not limited to those made by the developing individual, but also include those made between other people in his or her microsystems. Such interconnections could vary from connections between a child’s home and school, to his or her parents and teachers trying to coordinate their efforts to educate the child (Bronfenbrenner, 1977b; Rus et al., 2010).

4.2.3 The exosystem

The exosystem embraces social structures – major institutions of the society – such as the world of work, the mass media and public agencies (Rosa & Tudge, 2013). These social structures do not themselves contain the developing person, but impinge upon the immediate settings in which that person is found, and as such, influence what happens in these settings (Bronfenbrenner, 1977b; Eriksson et al., 2018). The exosystem, normally displayed as the third circle of the ecological model in diagrams, forms an ecological setting in which the developing person of interest is not situated, and thus does not participate actively within it, but nonetheless experiences its influence and at times can also influence it, whether formally or informally (Bronfenbrenner, 1976, 1977b, 1978, 1979a; Rosa & Tudge, 2013). This effect is indirect, such as when what occurs in a parent's workplace has a follow-on effect within the home (assuming that the child is the developing person of interest) (Bronfenbrenner, 1974, 1978; Rosa & Tudge, 2013).

An example of the exosystem provided by Bronfenbrenner (1977b) is "the major institutions of the society i.e. the world of work, the neighbourhood, the mass media, agencies of government (local, and national), and informal social networks" (p. 515). The exosystem-level therefore consists of interactions between two or more settings or interactions, one of which does not directly affect the individual (e.g., economic stress) (Galvani, 2017; Hong et al., 2011). However, the occurrence of the interaction indirectly influences processes within the immediate setting or interaction in which the individual is embedded (Bronfenbrenner, 1993; Galvani, 2017; Hong et al., 2011).

The exosystem generally surrounds the microsystems and includes all external networks, such as community and educational structures that influence the microsystems. Despite a developing individual not having direct interaction with the exosystem, it nevertheless affects the

individual's experiences. These experiences are impacted because the exosystem influences the settings of the systems in which the individual participates directly (Rus et al., 2010). Whether formal or informal, exosystems are an extension of the mesosystems and influence their social structures (Rus et al., 2010). These structures provide a foundation for the relationships of the developing person, such as values, resources and a context for their relationships in the communities (Rus et al., 2010). Health agencies, religious institutions, mass media, communities and schools are examples of exosystems in the life of the developing individual.

4.2.4 The macrosystem

Bronfenbrenner (1978) described the macrosystem as comprising of the blueprints of a particular society, such as laws and regulations, but also unprinted rules and norms. Analysing the composition of these macrosystems, as well as interactions between and within these systems and individual factors, was regarded as crucial in order to understand and explain developmental outcomes. The requirement for ecological research is to include at least two different ecological systems in the analysis to understand a particular developmental outcome (Bronfenbrenner, 1975; Eriksson et al., 2018; Hong et al., 2011).

The macrosystem differs fundamentally from the other levels of context, embracing the institutional systems of a culture or subculture, such as the economic, social, education, legal and political systems (1976, 1978). Bronfenbrenner (1977a) stated that the influence of the macrosystem on the other ecological settings is reflected in how the lower systems (e.g., family, school) function. The hallmark of the macrosystem is thus its overarching belief system or ideology (Bronfenbrenner, 1979b; Rosa & Tudge, 2013). As a result, the daily experiences of individuals in any given societal, socioeconomic, ethnic or religious group tend to be similar (Bronfenbrenner, 1977a, 1979b).

In the later development of the theory, the macrosystem was conceptualised not in terms of particular settings or contexts affecting an individual, but rather in terms of general prototypes which could be either informal and implicit or explicit, such as shared ideologies or sanctioned laws and regulations (Bronfenbrenner, 1993). The concept of the macrosystem was thus redefined as "the overarching pattern of micro-, meso-, and exosystems characteristic of a given culture, subculture, or other extended social structure" (Bronfenbrenner, 1993, p. 40; see also Rosa & Tudge, 2013). This extended structure refers to a pattern of "similar belief system, social and economic resources, hazards, life-styles, etc. such as social classes, ethnic or religious groups" (Bronfenbrenner, 1989, p. 229; see also Rosa & Tudge, 2013).

In summary, the majority of macrosystems are informal and subconsciously settled ideologies, which individuals carry and manifest every day through customs and traditions. Macrosystems thus consist of the values, laws, customs and other resources of a particular culture or subculture. Some examples of macrosystems are society, economics, political systems, culture and national identity. Macrosystems influence the form and nature of the micro-, meso- and exosystems (Bronfenbrenner, 1977b; Rus et al., 2010). Macrosystems also provide a prime example of the influence of the chronosystem.

4.2.5 The chronosystem

The chronosystem allows for the influence of "changes (and continuities) over time" (Bronfenbrenner, 1986, p. 724) within the person's environment and the impact of such changes on their development (Galvani, 2017). The chronosystem includes consistency or change (e.g., historical events) of the individual and the environment over the life course (e.g., changes in family structure) (Hong et al., 2011). This concept sees the development of the individuals as constantly changing over their lifespan and how the time period in which they live influences their approach to their environment (Rus et al., 2010).

Bronfenbrenner (1977b) highlighted the significance of time to various environmental systems. He noted that the influence of proximal processes on an individual's development and his or her environment changes as an individual ages. He evaluated chronosystems through the lens of life-altering events, described as normative or non-normative (Bronfenbrenner, 1977b). Normative transitions occur within the culturally or subculturally settled range of expected events through time in the developing person's life, such as entering school, leaving home for university, dating, getting married or reproducing (Bronfenbrenner, 1977b; Rus et al., 2010). Non-normative transitions involve culturally or subculturally unexpected disruptions affecting the developmental progress of the individual through time, such as the sudden death of a loved one, divorce, moving, major changes in income or unexpected pregnancy (Bronfenbrenner, 1977b; Rus et al., 2010). For example, parental discipline towards children's misconduct could vary based on age and cultural norms, with the expectation that behaviour would improve over time (Rus et al., 2010).

4.3 Evolution of Bronfenbrenner's Ecological Systems Theory (EST)

Ecological systems theory (EST), developed by Urie Bronfenbrenner, underwent significant changes from its first inception during the late 1970s until his death in 2005 (Eriksson et al., 2018). The evolution of Bronfenbrenner's theory has been described in different phases, from an ecological approach to human development during the initial phase (1973–1979), followed by a stronger emphasis on the role of the individual and developmental processes during 1980–1993 (Rosa & Tudge, 2013). In the final phase (1993–2006), the Process–Person–Context–Time model (PPCT) was developed and described as the most appropriate, in terms of research design, for the theory (Rosa & Tudge, 2013).

Galvani (2017) and Tudge et al. (2009) state that the earlier versions of Bronfenbrenner's theory have been critiqued by himself and others for the lack of attention given to the

individual's capacity for self-determination, and for ignoring the importance of the processes of human development. His later ecological model, PPCT, incorporated both the dynamic processes involved in interactions between people and/or organisations in their environment, as well as the agency of the individual (Galvani, 2017; Tudge et al., 2009). Rosa and Tudge (2013) identified the central aspect of the theory as proximal processes, and how a person's characteristics, context and historical time mutually influence those processes. Hong et al. (2011) argue that this theory expands the limited scope of research being conducted by social scientists by developing a fuller understanding of the multiple factors that influence problem behaviour, such as SU.

4.4 Relevance to the Current Study

Eriksson et al. (2018) argue that Bronfenbrenner's ecological theory is appealing as a conceptual tool for guiding public mental health interventions. This appeal exists in an ecological perspective offering a way to simultaneously emphasise both individual and contextual systems, and the interdependent relations between these two systems, and thus offering a variety of conceptual and methodological tools for organising and evaluating health-promotion interventions (Eriksson et al., 2018). According to Bronfenbrenner (1979b), identifying and examining patterns of behaviour within multiple contexts is fundamental for our overall understanding of developmental outcomes. Considering various "levels" of risk factors in a unified model may delineate intersecting social and cultural processes and mechanisms influencing maladaptive behaviours such as substance abuse (Conn & Marks, 2017).

Galvani (2017) argues that when applying EST, the individual would normally sit at the core of the nested systems and the application of the theory would allow consideration of the individual's contextual and systemic influences at each level. Rosa and Tudge (2013) describe

the characteristics that should be part of any ecological study, including those both of the individuals concerned and of the environments. They state that particular attention should be given to a person's "instigative characteristics", namely those that invited or discouraged reactions from the environment, either promoting or disrupting psychological growth (e.g., calm or fussy babies) and qualities that involve an active orientation or interaction with the environment, such as a child's initiative to initiate or maintain reciprocal interactions with parents or other caregivers (Rosa & Tudge, 2013). That is because "both types of developmentally instigative characteristics, when manifested over time in particular settings, tend to evoke complementary patterns of continuing environmental feedback, thus creating progressively more complex developmental trajectories that exhibit continuity through time" (Bronfenbrenner, 1989, p. 219).

EST maintains that it is vital to note that an environment and its immediate settings actively shape the outcome of an individual's life. People do not live in isolation, but rather within multifaceted structures that contain their immediate settings, social networks and traditional communities established in a wider social structure.

Within this framework, the findings of studies investigating early substance experimentation and later abuse are provided with a context which provides an understanding of the dynamics involved. Mudavanhu and Schenck (2014) argue that substance abuse usually starts by experimenting with smoking cigarettes in the school toilets during breaks and this later advances to using other drugs such as cannabis, crystal meth and alcohol. Substance abuse occurs for various reasons; there are causative issues such as family problems, influence from peers, stressful situations and the developmental stage (Mudavanhu & Schenck, 2014). Many young people appear to consider substance experimentation as standard in their development into adulthood, without realising the negative consequences of substance dependence (Madu & Matla, 2003).

While sociocultural influences, such as societal messages and media, are perceived as most distal in relation to the individual, they are no less important an influence on health-related behaviour. Such societal and distal environmental factors may have a twofold impact through direct messages, which influence an individual's own thoughts and beliefs related to drugs, as well as the thoughts and beliefs of the individual's close friends and family, which in turn may affect the individual (Conn & Marks, 2014).

Fisher and Strantz (1972) argue that drug use and abuse is part of a very complex psycho-ecological system, and whether an individual will use or abuse a particular mind-altering drug will depend upon a host of facts. Developing conceptual ecosystems models for understanding and explaining this phenomenon is not a difficult task. The difficult task is operationalising that model into specific measurable variables which makes possible the testing of the efficiency of the model without violating the basic principles of the model. This is what this study set out to achieve.

4.5 Conclusion

The ecological model is a theoretical framework frequently employed and adapted for studying health risk and substance abuse risk factors (Bronfenbrenner, 1979b; Conn & Marks, 2017; Golden & Earp, 2012). Eriksson et al. (2018) state that, from a public (mental) health perspective, ecological thinking is appealing as it encompasses several contexts in a very broad sense, including trends such as globalisation, urbanisation and environmental change, together with (but not solely focusing on) attributes and behaviours of individuals – all relevant aspects for understanding and determining public health. Rosa and Tudge (2013) state that the bioecological theory in its current or mature form specifies that researchers should study the settings in which a developing individual spends time and their relations with others in the same settings, the personal characteristics of the individual (and those with whom he or she

typically interacts), both development over time and the historical time in which these individuals live, and the mechanisms that drive development (proximal processes).

CHAPTER FIVE

METHODOLOGY

5.1 Introduction

This chapter details the practical methodological steps followed in recruiting participants and data collection, as well as the theoretical assumptions that informed the choice of the specific strategy. This chapter also provides a detailed discussion of the different studies that endeavoured to ensure that the questionnaire used to collect data, the South African Substance Use Contextual Risk Instrument (SASUCRI), was reliable and valid. Numerous authors of social research texts (Babbie & Mouton, 2001; Bless et al., 2013; Bryman, 2012; Terre Blanche et al., 2006) have commented on the fact that one of the most prominently contentious issues that exist in social science research debates hinges on the concept of research methodology. Pretorius (2007) asserts that research methodology means different things to different people, but that it is used in a manner which assumes that there is consensual meaning attached to it. He states that the term "methodology" refers to the concrete modus operandi of doing research, as well as the theories that influence the concrete research decisions (Pretorius, 2007).

Nachmias and Nachmias (1996) state that methodology is as centrally concerned with how researchers conceptualise, theorise and make abstractions as it is with techniques or methods that are utilised to assemble and analyse information. Methodology therefore connotes a set of rules and procedures to guide research against which its claims can be evaluated and understood. Daly (2003) argues that it is crucial to realise that methods and techniques are chosen as part of a broader package because it is widely accepted that the method involves a set of standards that should be aspired to. Less widely acknowledged is the fact that assumptions and values underlie all methods, as well as a particular view of how we are to

understand the social world (Daly, 2003; Gelo et al., 2008). Methodology is thus a set of rules and principles to be followed when undertaking a research study, irrespective of the nature of the study (empirical, meta-analytical or systematic reviews). It is fundamental to the construction of all forms of knowledge and provides the tool with which understanding is created (Daly, 2003).

Traditionally, methodological approaches can be subsumed under two main approaches, namely qualitative and quantitative (Bryman, 2012; Daly, 2003; Gelo et al., 2008; Terre Blanche et al., 2006). Rabinowitz and Weseen (2001) note that qualitative and quantitative methods have been variously defined and the debates about the value and use of each have swirled within and around psychology and social science research for decades. Primarily, the distinctions are made on the level of research technique as well as theoretical underpinnings. On the quantitative side, research methods have come to mean randomised experiments, quasi-experiments, paper and pencil objective test, multivariate statistical analyses, sample surveys and the like. In contrast, qualitative methods include ethnography, case studies, in-depth interviews and participant observations (Babbie & Mouton, 2001; Bless et al., 2013; Bryman, 2012; Gelo et al., 2008; Rabinowitz, & Weseen, 2001; Terre Blanche et al., 2006). However, Denzin and Lincoln (1994) make a distinction at the epistemological level. Qualitative researchers, in their opinion, stress the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the situational constraints that shape the research. In contrast, quantitative researchers emphasise the measurement and analysis of causal relationships as much between variables as between the processes (Denzin & Lincoln, 1994). Babbie and Mouton (2001) suggest that the selection of a method is dependent on the aims and objectives of the study, the nature of the phenomenon and the underlying theory.

This study aimed to collect primary data from patients/clients of substances abuse treatment centres across various locations in the EC (Gqeberha, previously named Port Elizabeth) and WC (Cape Metropolitan). The purpose for gathering data from this population was to collect social science data from the criterion population in an effort to test the contribution each of the individual and socio-ecological factors have on an individual's substance abuse, and to build a model that explains this contribution and the interaction of the contributions of each of the measured factors. The study further aimed to measure the magnitude of the contribution of each independent variable (IV) and the relationship and interaction between the variables. Using a quantitative approach was therefore ideally suited for this study.

The hypotheses that are tested by the specified model in Figure 7 (see Chapter Eight) are:

H_0: The Microsystem in which an individual interacts does not significantly predict substance abuse.

H_1: The Microsystem in which an individual interacts significantly predicts substance abuse.

H_0: The Mesosystem in which an individual interacts does not significantly predict substance abuse.

H_2: The Mesosystem in which an individual interacts significantly predicts substance abuse.

H_0: APTD (Exosystem) does not significantly predict substance abuse.

H_3: APTD (Exosystem) significantly predicts substance abuse.

H_0: The Macrosystem in which an individual interacts does not significantly predict substance abuse.

H_4: The Macrosystem in which an individual interacts significantly predicts substance abuse.

H_0: CFF (Chronosystem) does not significantly predict substance abuse.

H_5: CFF (Chronosystem) significantly predicts substance abuse.

5.2 Design

This study is explanatory in nature in that the study aimed to establish (causally determine) which individual and/or contextual factors and/or combination of individual and contextual factors predict substance abuse. This study is also explanatory in that it provides an understanding and explanation of the variables that predict substance abuse. Bless et al. (2013) state that explanatory research is appropriate when a causal relationship between variables can be stated and an explanation can be provided for the variation of at least one variable. They further explain that when employing an explanatory research method, the researcher is able to acquire a deeper understanding of the relationship between variables (Bless et al., 2013).

The specific research design that was used in this study was a correlational questionnaire design. This research design was deemed appropriate because variables were observed without any manipulation in order to establish the existence of relationships and to describe these relationships in the building of a SEM (Gravetter & Forzano, 2009). Mouton and Marais (1991) state that a correlational study is one in which descriptions are constructed by means of the relationships between variables within the correlational design. This design requires the administration of a questionnaire, and in this study the questionnaire used was the SASUCRI (discussed below). A correlational questionnaire design can be implemented using a self-administered, face-to-face or group administration procedure. The administration procedure for data collection using the SASUCRI is discussed below.

It is apparent that the correlational questionnaire design is not ideal for establishing causal relationships because this design lacks the rigour that experimental research designs offer. Causality has also become a contentious issue in social science research, as such various statistical techniques have been developed to compensate for the lack of rigour that correlational and quasi-experimental designs have in relation to experimental research designs.

This study therefore proposes to use SEM, also known as path analysis, to build a model (see Figure 7, Chapter Eight) for examining and understanding the direct, indirect and interrelationships between the perceived individual and contextual factors and substance abuse amongst substance abusers. Bless et al. (2013) also assert that a causal hypothesis can be expressed as a prediction or future outcome.

5.3 Sample and Sampling Procedure

To accomplish the aim of building a model for understanding the contribution that perceived individual and contextual factors contribute to substance abuse, a sample of people who sought the services of a substance abuse treatment facility was necessary. Sampling can be defined as the process through which individuals or sampling units are selected from the sample frame (Martínez-Mesa et al., 2016). Quantitative research prioritises the use of a range of probability sampling strategies where random sampling is regarded as the gold standard in the range. This being due to random sampling having the reputation of obtaining samples that are representative of the population being studied and therefore increasing the study's generalisability. However, selecting a representative sample from the study population can be a ubiquitous issue in quantitative research. While random sampling strategies are the gold standard, in practice, random sampling of participants is not always feasible, nor necessarily the optimal choice (van Hoeven et al., 2015). Babbie et al. (2017) state that random sampling is ideal, but much interesting social research requires the selection of samples from populations that cannot be easily listed for sampling purposes. Substance abusers who are receiving either inpatient and/or outpatient treatment for their substance abuse can be regarded as a population that cannot be easily listed. Bless et al. (2013) also state that a major constraint of simple random sampling is the availability of a complete list of elements or units because such complete lists often do not exist. As no complete list of substance abusers exists within the context of the current study, a multi-stage cluster sampling strategy was used.

Babbie et al. (2017) recommend that cluster sampling be used when it is either impossible or impractical to compile an exhaustive list of the elements composing the target population. Cluster sampling is classified as a probabilistic sampling strategy where groups such as households, health facilities, schools, etc., are sampled (Babbie et al., 2017; Martínez-Mesa et al., 2016; Wilson & MacLean, 2011). Cluster sampling is a probability sampling technique that identifies clusters of individuals and then randomly samples an appropriate number of clusters, every member of the cluster being entered into the sample. Bryman (2012) states that with cluster sampling the primary sampling unit (the first stage of the sampling procedure) is not the units of the population to be sampled, but groupings of those units. It is the latter groupings or aggregations of population units that are known as clusters. Bryman (2012) states that once households, health facilities, schools, etc., are sampled, the participants in them are randomly selected, but Wilson and MacLean (2011) state that every individual that meets the study criteria is included. In this study, once the clusters of substance abuse treatment facilities were selected, every individual receiving treatment from these facilities, whether inpatient or outpatient, was asked if they would consent to be part of the study by completing a questionnaire.

Breakwell et al. (2012) caution that multi-stage cluster sampling is a complex sampling design and that cluster sampling increases the potential for standard error. However, this can be negated by recruiting large samples which will increase the statistical power of the statistical test. Sampling error can also be reduced by an increase in sample size and an increased homogeneity of the participants being sampled. In summary, as I was not able to randomly select substance users because such a population is not readily available, I identified clusters of individuals and then sampled from these. Following cluster selection, all individuals in each cluster were asked to consent to complete the questionnaire. Care was taken to ensure that participants did not complete the questionnaire twice.

The sampling procedure for the EC followed a convenience sampling strategy in that substance abuse treatment facilities were selected based on what was available. This is because the EC had fewer substance abuse treatment centres than the WC. Once treatment centres were selected, all the clients were individually asked to consent to complete the questionnaire.

5.4 Procedure

In this section I discuss the practical procedures followed for sample selection and for data collection by separating the procedures into the processes followed for the WC and EC, respectively. The processes detailed below are related to the process that was followed after receiving ethical clearance from Rhodes University Ethics Committee (see Appendix A) to conduct the study. A list of registered substance abuse treatment centres was obtained from the respective webpages for the departments of Health and Social Development in the WC and EC.

5.4.1 Western Cape sampling procedure

In the WC part of the study, I selected treatment centres using the random cluster strategy. This involved importing the obtained list of treatment centres into Microsoft Excel and then applying the random number selection process. The list only included treatment centres that were registered with the Department of Social Development (DSD) as the Department of Health (DoH) did not grant me permission to conduct the study with treatment centres that were registered with them. This refusal of permission was based on their assumption that I wanted to gain access to, and collect data within, psychiatric hospitals for which they were responsible. Fortunately, the DSD was more accommodating and, though they did not grant me permission to collect data from treatment centres registered with them, they informed me that I should negotiate permission and access with each treatment centre directly. The City of Cape Town also granted permission to collect data at City Clinics that offer outpatient substance abuse treatment (see Appendix C).

The randomly selected treatment centres were contacted in person and asked if they would permit me to collect data from their clients. I informed them that they could either use the questionnaire as a part of their intake forms, or that they or I could administer the questionnaire face-to-face in a group setting. Some treatment centres who initially agreed to meet with me declined to grant permission for me to collect data at their centres. As such, I returned to the list and selected more treatment centres to make up the shortfall. The majority of the treatment centres that granted me permission to collect data from their clients opted to use the questionnaire as part of their intake forms and to personally ask their clients if they would consent to participate in the study. Within these treatment centres I did four rounds of data collection over a period of 11 months. This meant that I collected completed questionnaires and delivered new questionnaires every five or six weeks. This culminated in me obtaining 11 months' worth of intake data from these treatment centres. Only one centre agreed to allow me to administer the questionnaire in a group administration setting on two occasions, with an eight-month gap between the two occasions.

In total, 24 of 36 treatment centres located in the Cape Metropolitan region were selected and approached for permission to collect data from their clients (see Appendix B for a copy of the letter requesting permission to conduct research). Of these, 19 assented to me collecting data from their clients and four centres respectfully declined to participate in the study. One centre, although assenting to participate, returned the questionnaires without them being completed. Every participant that completed the questionnaire from the remaining 18 treatment centres received an information sheet and a consent form (see Appendices E and F). Only clients who completed and signed the consent form were permitted to participate in the study by completing the questionnaire provided.

I distributed 1000 questionnaires to the treatment centres located in the Cape Metropolitan region. Some treatment centres opted to take between 10 and 15 questionnaires because they

had a low monthly client intake, while other treatment centres were willing to take between 80 and 150 questionnaires because they had a high monthly intake. Because I stayed in close contact with the treatment centres, I was able to retrieve 100% of the questionnaires distributed, with only 46 questionnaires being incomplete.

5.4.2 Eastern Cape sampling procedure

The EC DSD granted me permission to collect data from treatment centres registered with them (see Appendix D for the permission letter). I did not seek permission from the EC DoH as oversight of treatment centres are the responsibility of the DSD in the EC province. Because there are fewer treatment centres in the EC, I conveniently selected all the centres from the list that I obtained from the DSD. I negotiated access and permission with all the centres and personally informed clients about the requirement and merits of the study at two treatment centres, requesting their consent before handing them the questionnaire for completion. At these two treatment centres I negotiated a convenient time for the centre staff and participants, and administered the questionnaire to each group of respondents, gathered at the same place at the same time. The remaining treatment centres used the questionnaire as part of their intake forms. They were provided with an information sheet and consent form (Appendices E and F) and asked to ensure that their clients sign the consent form before handing them the questionnaire. I also kindly asked that both the consent form and questionnaire, whether complete or incomplete, be returned.

All seven of the treatment centres located in Port Elizabeth/Gqeberha that were approached for assent to participate in the study agreed to participate. Though all the treatment centres agreed to participate, one centre misplaced the questionnaires while they were moving premises. As with the data collection procedure in the Cape Metropolitan region, only clients who completed

and signed the consent form were permitted to participate in the study by completing the questionnaire provided.

Because there are only a few treatment centres in the EC, I only distributed 500 questionnaires to the treatment centres located in Gqeberha. Of the 500 questionnaires that were distributed, 300 were lost when one of the Gqeberha treatment centres moved premises. In hindsight, it was naive of me to leave that many questionnaires at one treatment centre. In my defence, I was keen for participants and the manager of the treatment centres assured me that they could easily have 300 completed questionnaires because of their high intake volume. At the other six treatment centres I was authorised to leave between 10 and 80 questionnaires per intake period. Of the 200 retrieved questionnaires, four were incomplete and 56 indicated that their age was younger than 18 years. As such only 140 questionnaires were used from Gqeberha.

5.5 Method of Data Collection

This study used a questionnaire (often incorrectly referred to as a survey) to collect information/data from individuals who were receiving inpatient or outpatient treatment for substance abuse. Breakwell et al. (2012) argue that questionnaires offer the potential to answer a range of research questions that have for the most part remained in the realm of speculation. Haslam and McGarty (2019) state that questionnaires are typically used by researchers to obtain information about a number of different variables of interest and to identify the relationship between those variables. Questionnaires are also used to identify the extent and nature of any association between different variables (Haslam & McGarty, 2019). Some of the advantages and attractions of using a questionnaire is that it is usually easy to administer and it can be used to examine the relationship between variables that would be difficult to isolate using other techniques. A further important feature of questionnaires is that, coupled with appropriate statistical methodology (e.g., SEM), they allow researchers to make and test

predictions about the relationship between variables. As such, questionnaires are widely used and common across different disciplines because they can identify relationships between variables and identify areas that require attention for intervention. Researchers make use of questionnaires when they are interested in measuring relationships between variables. Using questionnaires also allows the researchers to examine stable long-term states or conditions.

Babbie et al. (2017) state that the use of questionnaires in research is perhaps the most frequently used strategy in the social sciences. They are chiefly used in studies that have individual people as the unit of analysis who have been selected through carefully planned probability sampling that provides a group of respondents whose characteristics may be taken as those of the larger population (Babbie et al., 2017). Carefully constructed and standardised questionnaires provide data in the same form from all respondents. Respondents are either asked to complete the questionnaire themselves or the questionnaire can be administered to a group of respondents gathered in the same place at one time. Questionnaires that are delivered and collected have a higher completion rate, 50% being an adequate rough guide (Babbie et al., 2017; Denzin & Lincon, 1994).

Because a research design relates directly to the answering of a research question and the fact that the literature suggests that this method of data collection does not allow one to make any causal inferences, the use of an appropriate questionnaire is of paramount importance. McQueen and Knussen (1999) state that real cause and effect relationships can be examined with the use of a carefully planned questionnaire. The specific questionnaire that was used is discussed below.

5.6 Data Collection Instrument

The questionnaire used to collect data for the current study is an instrument developed in South Africa, specifically designed to measure individual and contextual factors associated with

adolescent SU in low SES communities in the WC, South Africa. Within Bronfenbrenner's (1986) ecological theoretical framework, the questionnaire was conceptualised, incorporating a range of risk and protective factors. The questionnaire was initially named the South African Substance Use Contextual Risk Questionnaire (SASUCRQ). The questionnaire has undergone several phases of piloting and validation, which subsequently led to a re-naming of the questionnaire to the South African Substance Use Contextual Risk Instrument (SASUCRI, see Appendix G for a sample of the questionnaire). A brief discussion of the studies (Bester, 2017; Carels, 2012; Florence, 2014; Hendricks, 2018; Masiza, 2016; Nkwanyana, 2018; Rawoot, 2015; Rawoot & Florence, 2017) that contributed to the validation of the questionnaire follows.

In the developmental phases of the questionnaire, which were regarded as the pre-questionnaire stages, Carels (2012) evaluated the content validity of the dimensions of the proposed self-administered questionnaire in terms of the Bio-Ecological Systems Theoretical Framework. Carels's (2012) content validity was guided by Messick (1989) who asserts that content validity involves determining whether the content of the measure accurately reflects the behaviour domain being measured. As such, Carels (2012) developed two study aims, these were 1) to evaluate the content validity of the dimensions of the newly constructed questionnaire that assessed the factors that influence adolescent SU in low SES communities, and 2) to use the gathered information to inform further item-writing of the questionnaire. The data used for the content validation were collected using a self-administered ranking scale that ranked a range of factors identified in the literature and prior stages of the broader study that have been shown to be associated with adolescent SU. Responses to items were initially on a five-point likert response scale, namely, "always", "frequently", "occasionally", "seldom" and "never". However, after the pilot study, only four response categories remained, namely, "always", "often", "seldom" and "never" (Carels, 2012). "Always" was defined as 100% of the time, "often" as more than 50% of the time, "seldom" as less than 50% of the time and "never" as

0% of the time. Respondents were asked to think back over the last thirty days in reference to each of the questions (Carels, 2012). Further data were collected via focus group discussion with participants who comprised of two groups of community leaders within two different communities on the Cape Flats.

The study found that the dimensions listed in the blueprint of the proposed questionnaire were deemed important factors associated with adolescent SU. See Table 5.1 below for the dimensions that formed the blueprint of the proposed questionnaire.

Table 5.3

Blueprint Dimensions

DOMAINS (ECOSYSTEMS)	DIMENSIONS (FACTORS)	SUB-DIMENSIONS
INDIVIDUAL LEVELS	Racial/cultural identity	Alienation
	Self-identity	Self-efficacy Ambitions and plans for the future Coping mechanisms/ability to cope/resilience
	Desirable effects of drugs	
MICROSYSTEM		
Family	Family functioning	Violence & conflict* Divorce and step-parenting* Parental criminal activity Single parenting
	Parenting	Monitoring* Tolerance of substances Communication & social support* Economic pressure
	Parental involvement with drugs	Drug use Drug trade
Peers	Peer acceptance & support* Experimentation*	
School	Experience of school*	As supportive* As a stressor*
Neighbourhood	Access to after-school activities	Boredom*
	Drug accessibility	Ease of access and affordability*

		Exposure to trade
MESOSYSTEM	Anti-drug messages versus parental use or tolerance of drugs*	Confusion based on desensitisation*
	Community acceptance of gang culture confusing to children*	Feelings about community gang identity* Feelings about community tolerance of drugs*
EXOSYSTEM	Social transformation	
MACROSYSTEM	Family finances and unemployment	
	Tolerance of soft drugs	Contradictory values
CHRONOSYSTEM	Socio-political history Hope for the future	

Adapted from Carels (2012).
*Dimensions and sub-dimensions that measure proximal processes as defined by Bronfenbrenner's Bioecological Systems Theoretical Framework.

Carels (2012) concluded that all factors presented in the Content Validity Questionnaire (CVQ) are important factors associated with adolescent SU in the two low SES communities that were analysed in both the quantitative and qualitative components of the study. Carels's (2012) finding satisfies the criteria suggested by Sireci (1998) that holds that the items (and tasks) contained in the questionnaire are representative of the targeted content domain, it must be clearly understood and that it should be consistent across testing situations. Carels's (2012) findings show that in all testing situations, the content domain measured would be clearly understood, and it demonstrated that the test adequately measures the specified domains (Sireci, 1998).

Following Carels's (2012) content analysis, and as part of the next phase in the broader study, Florence (2014) sought to contribute to the validation of SASUCRQ by examining the internal consistency (reliability) and construct validity. To establish construct validity, Florence (2014) used procedures of structural and external evidence. In this early phase of questionnaire development, 147 items were written for the original 23 scales of SASUCRQ. The items were written in English and translated into Afrikaans. The four response categories determined by Carels (2012) were used, namely, "always", "often", "seldom" and "never". Florence (2014)

then group-administered the instrument to Afrikaans and English home language-speaking school-going adolescents, aged 12 to 21 years. After data collection and data capturing, Florence (2014) started the process of item selection on the Afrikaans version of the instrument and the results were applied to the English version. Florence (2014) followed an iterative exploratory factor analysis approach at the item and scale levels to select and reassign items and scales. Further second order factors were explored to evaluate the extent to which the instrument measures the hypothesised systems levels of the theoretical framework (Florence, 2014). The final reliability and construct validity results of the English version of SASUCRI for Florence's (2014) study are presented in Table 5.2 below.

Table 5.4

Internal Consistency Coefficients

Systems levels	**Scales (20)**	**Cronbach's alphas**
		Eng
Individual systems level	Social identity	.735
	Sense of belonging	.813
	Self-efficacy	.839
	Effects of drugs	.929
	Religiosity	.820
Micro (family) systems levels	Family functioning	.859
	Communication and social support	.847
	Parental monitoring	.746
	Economic pressure in family	.884
Micro (community) systems level	Peer support	.782
	Peer influence	.845
	School as a support	**.646**
	School as a stressor	**.639**
	Neighbourhood	.751
Mesosystems levels	Contradictions	.882
	Mixed messages	.860
Macrosystems levels	Tolerance for child and adolescent drug	.847
	Tolerance for soft drugs	**.681**
Chronosystems	Hopelessness individual	**.491**

levels	Hope for the future	.630

Adapted from Florence (2014).

As can be seen from the results in Table 5.2 above, 20 of the original scales were retained along with most of their items, as shown in Carels (2012). The Micro (community) system level, "School as support" and "School as a stressor" presented with a low Cronbach alpha of .646 and .639 respectively. The "Tolerance for soft drugs" scale within the Macrosystem level also presented with a low Cronbach alpha of .681. The last scales identified, "Hopelessness individual" and "Hopelessness community" were within the Chronosystems level domain. These presented a low Cronbach alpha of .491 and .628, respectively (Florence, 2014, p. 236). It was indicated that these scales would need to be revised because of their low reliability (Florence, 2014). Some of the items were either revised or additional items were added. Some items were removed in the item selection process and these had to be replaced to improve the reliability in these sub-scales.

Florence (2014) then reports the Bartlett's test of sphericity and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO). These tests were employed to assess the assumptions of multicollinearity and to test the adequacy of the sample at the scale level for the English version of the SASUCRQ (Florence, 2014).

Table 5.3 below presents the results of these tests for this version of the instrument.

Table 5.3

Factorability of Scale Data

KMO	**Bartlett's test df**	**Significance of Bartlett's test**
.809	190	< .001

Adapted from Florence (2014).

The results above indicate that the scale level data for this version of the instrument was factorable (Florence, 2014). The KMO is considered outstanding (between .8 and .9) and the Bartlett's test of sphericity was significant, proving that these data are adequate for exploratory factor analysis (EFA). This ensures structural evidence which is essential to proceed to the evaluation and demonstration of the construct validity of the instrument.

Because of the satisfactory KMO and Bartlett's test, second-order CFA was performed on the totals of these scales to assess the dimensionality of the instrument. This analysis yielded four factors, and the items and scales were further reduced based on this factor structure (128 items in 20 scales). These results are shown in Table 5.4 below.

Table 5.4

English Sub-Scales Cronbach Alpha

System level	Sub-scale	Cronbach alpha
Microsystem	School as support	0.646
	School as stressor	0.639
Macrosystem	Tolerance for soft drugs	0.681
Chronosystem	Hopelessness individual	0.491
	Hopelessness community	0.628

Adapted from Florence (2014).

The results of the second order factor analysis indicated that the instrument is measuring four constructs, labelled the Micro-Individual Protective-Type, the Micro-Individual Risk-Type, the Macro-level and the Meso-level factors. Florence (2014) argues that while the scales do not load into the systems levels as expected, according to the ecological theoretical framework, it

is clear that the factors seem to divide into risk- and protective-type factors. The SASUCRQ thus does not appear to be measuring one construct (contextual factors that have an impact on adolescent SU), nor does it appear to be measuring the systems levels of the ecological theoretical framework as hypothesised (Florence, 2014).

Based on Florence's (2014) finding and recommendation, Rawoot (2015) endeavoured to contribute to the validation argument for the SASUCRQ by investigating item bias on the six scales which proved not to be equivalent by Florence (2014). In order to achieve this aim and to cross-validate results, Rawoot (2015) applied ordinal logistic regression and the Mantel-Haenszel statistical procedures to assess item bias and to cross-validate the SASUCRQ, which then became known as the SASUCRI. A total of 28 items across six scales were analysed. Rawoot's (2015) analysis showed that there were discrepancies between the results obtained across the two methods. All items which were flagged by either of the two methods (ordinal logistic regression and the Mantel-Haenszel procedure) as presenting with moderate to large differential item functioning (DIF) were flagged for rewriting, or for removal from the questionnaire (Rawoot, 2015). Table 5.5 below shows the identified biased items.

Table 5.5

Biased Items

Item No.	**English items**	**Afrikaans items**	**Direction of bias**	**Chi Square**		$\hat{D}_i$	95% CI $\hat{D}_i$	
			Religiosity scale					
5	I felt school is useful because I learnt a lot.	Het ek gevoel dat skool nuttig is omdat ek baie daar leer.	English	**27.136***	**DIF**	**1.84**	**1,154**	**2,528**
			School as a support scale					
9	I felt school is useful because I learnt a lot.	Het ek gevoel dat skool nuttig is omdat ek baie daar leer.	English	**25.318***	**DIF**	**1.781**	**1,090**	**2,474**
			School as a stressor scale					
11	I did not understand the work being taught at school.	Het ek nie die skoolwerk verstaan nie.	Low ability English-High ability Afrikaans	20.449*	DIF	-1.325	-1,896	-0,757

12	Children at school made fun of me.	Het kinders by die skool my gespot.	Low ability English-High ability Afrikaans	**176.631***	**DIF**	**4.175**	**3,526**	**4,831**
13	I felt under pressure to do well at school.	Het ek gevoel dat ek te veel gedruk word om goed te doen in my skoolwerk.	Afrikaans	**76.984***	**DIF**	**-2.46**	**-3,010**	**-1,906**
15	My school did not offer activities that I was interested in.	Het my skool nie aktiwiteite aangebied waarin ek belang gestel het nie.	Afrikaans	**82.903***	**DIF**	**-2.66**	**-3,243**	**-2,076**
16	Teachers at my school did not really care about the learners.	Het onderwysers by my skool nie regtig omgegee vir die kinders nie.	English/Afrikaans	**85.295***	**DIF**	**2.566**	**2,016**	**3,121**
Contradictions scale								
20	The people in my community sent the wrong message to young people by using drugs.	Het mense in my gemeenskap die verkeerde boodskap aan jong mense gestuur deurdat hulle dwelms gebruik het.	Afrikaans	**8.327***	**DIF**	**-1.56**	**-2,585**	**-0,534**
Hopelessness individual scale								
21	I felt that people in my community who are addicted to drugs could not help becoming addicted.	Het ek gevoel dat mense in my gemeenskap wat aan dwelms verslaaf is, dit nie kon help om verslaaf te raak nie.	Afrikaans	**20.978***	**DIF**	**-1.5**	**-2,150**	**-0,860**

Adapted from Rawoot (2015).
*p < 0.01.

Rawoot (2015) contends that the removal or revision of these items from the instrument may increase the validity and provide evidence for equivalence across the two language versions. In a subsequent publication, Rawoot and Florence (2017) assessed the construct equivalence and item bias across different language versions of the scale. Exploratory factor analysis, equality of reliabilities and the Tucker's phi coefficient of congruence were employed to assess whether the two language versions were equivalent at a scale level (Rawoot & Florence, 2017). Rawoot and Florence (2017) report that the English version proved to be more problematic than the Afrikaans version of the scale when basing the item reduction on the results for the

Afrikaans version. This related specifically to the sub-scales: “School as a support”, “School as a stressor”, “Contradictions”, “Hopelessness individual” and “Hope for the future” (Rawoot & Florence, 2017). Rawoot and Florence (2017) recommend that a qualitative pre-test be conducted on both language versions of the biased items in the target population, especially the items in the “School as a stressor” sub-scale. Rawoot and Florence (2017) further advise that decisions need to be made about whether to exclude these items from the relevant sub-scales or to rewrite them in order to continue the ongoing process of validating the SASUCRI.

Over more or less the same period, Bester (2017) examined the previously collected data for N = 1959 English and Afrikaans home language, school-going adolescents, aged 12 to 21 years. Bester (2017) sought to further examine the external validity of the newly named SASUCRI in order to provide evidence supporting the validity argument pertaining to the instrument. External validity procedures were conducted using Discriminant Function Analysis (DFA) to evaluate the extent to which the SASUCRI could discriminate between substance using and non-using adolescents (Bester, 2017). Of importance to the current study are the results for the standardised canonical discriminant function coefficient. These discriminant function coefficients indicate the importance of the sub-scale totals predicting a variable (Field, 2013), SU in this instance.

Table 5.6 below shows the results for the SASUCRI sub-scales that are predicting SU in Bester’s (2017) study.

Table 5.6

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	-0.02
	Effects of Drugs	**0.535**

	Religiosity	**0.13**
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**
Mesosystem	Contradictions	0.156
	Mixed Messages	**0.146**
Macrosystem	**Tolerance of Adolescent Drug Use**	**0.19**
	Tolerance of soft drugs	-0.051
Chronosystem	**Hopelessness in Community**	**0.084**
	Hopelessness in Individual	0.039
	Hope for the Future	0.043

Adapted from Bester (2017).
Values in bold identify the sub-scales that predict SU.

Bester's (2017) DFA results revealed that nine of the SASUCRI sub-scales can act as significant predictors to SU among adolescents based on the predictive validity of sub-scales. The table shows that 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" are significant predictors of SU. Bester's (2017) results demonstrate that the SASUCRI sub-scales can be considered valid and the study thus contributes to the external validity evidence of the instrument. See Bester (2017) for a detailed discussion of the results; suffice to say that Bester's (2017) findings indicate that the SASUCRI contains sub-scales that can act as contributors to the discriminant function and can be used in research to assess its predictive power. Bester's (2017) classification results showed that the SASUCRI does well at classifying substance-using and non-using adolescents, as 75.3% of cases were correctly grouped.

Based on Rawoot and Florence's (2017) recommendation, Hendricks (2018) undertook to qualitatively pre-test both the English and the Afrikaans revised sub-scales of the SASUCRI. The sub-scales that were pre-tested by Hendricks (2018) were "School as support" (6 items), "School as a stressor" (6 items), "Tolerance for soft drugs" (6 items), "Hopelessness individual" (11 items) and "Hopelessness community" (5 items). Participants for Hendricks's (2018) study were sampled from two schools located in low SES communities. The study recruited 32 high school learners who participated in four focus group discussions conducted in Afrikaans and English at both schools. Hendricks (2018) found that participants experienced comprehension issues at item level, as participants expressed that they could not understand some of the items that were pre-tested. Participants also found some items to be unclear and they identified additional items to be revised, which were not originally selected by Hendricks (2018) for the pre-testing or identified by Rawoot and Florence (2017). Hendricks (2018) suggests that the Afrikaans sub-scales of SASUCRI need to contextualise the dialect used in the instrument, emphasising colloquialism and translation issues. This does not have a bearing on the current study as this study used the English version of the SASUCRI to collect data.

Finally, it is worth mentioning that Masiza (2016) and Nkwanyana (2018) also took an interest in the development of the English version of the SASUCRI and examined the validity of the questionnaire across English and *isiXhosa* mother tongue speakers. Masiza (2016) assessed the scalar equivalence and Nkwanyana (2018) assessed the item bias. Though both these studies contributed to the overall development of SASUCRI, they are not deemed relevant to the current study because the participants in the current study were primarily drawn from the South African Coloured population.

Data for this study were collected using an adapted version of the final SASUCRI (see Appendix H). The adaptions that were made were related to changing the questions from "in the last six months" to "thinking back to the time when you started using substances". Other

changes were the removal of types of substances used scale, problem use scale and the OTHER scale. This was deemed necessary since the participants sampled in this study were from a problem use population in that they were receiving inpatient or outpatient treatment for substance abuse. The OTHER scale was removed because all the items for the scale had below 0.70 Cronbach's Alpha values.

In the section below I discuss the process of labelling the factors used in the SEM diagram, followed by a discussion of the central tendency of the constructs and their underlying frameworks.

5.7 Factor/Variable Identification

Following the initial assessment of the questionnaire reliability and exploratory factor analysis, a list of items with high factor scores were selected as indicators of the construct of interest. Only the best three indicators, i.e., indicators with factor loadings higher the .70, were used as indicators for the underlying construct. Each of the factors then needed to be named or labelled. The naming or labelling of factors is what Pretorius (2007) describes as an intellectual exercise undertaken by the researcher. As part of the factor naming process, the list was then shared with a group of psychology honours students, colleagues, co-researchers on the broader study and other experts in the field who have extensively used EST in research. These individuals and groups were asked to read the various items/statements and to provide a label or term that they thought best captured the gist of the items/statements. The labels and terms provided by these individuals were then assessed and coded according to the degree of agreement and discrepancy of the labels and/or terms. In instances where there was a high degree of agreement between assessors, the label or term provided was automatically adopted as the name for the construct. In instances where there was low agreement, the label or term provided by co-researchers and experts was adopted. This approach to factor naming was an alternative to the

recommendation made by Pretorius (2007), which is to use the indicator with the highest loading to provide an indication of the possible meaning of the factor and therefore its name.

Table 5.7 below provides the specific items, the associated factor name and the EST domain that it is deemed to be related to.

Table 5.7

Factor Naming Process

Question/Item/Observed Variables	**Factor/Manifest/Latent variable**	**2nd Order/latent structure/Eco systemic factor**
I was able to make my own decisions about things that impacted on my life.	Self-efficacy (SE)	MICRO
I was determined to solve my problems, even when faced with difficulties.		
I was capable of solving the problems that came up in my life.		
My parent(s)/guardian(s) were concerned with how I was feeling.	Intra-Family Communication (IFC)	
We were able to share our concerns and feelings in healthy ways in my family.		
We talked about the different ways we as a family could deal with problems or concerns.		
I felt that my friends are "there for me" when I need them.	Healthy/positive peer support (PPS)	
I felt comfortable when I was amongst my friends.		

My friends were good listeners.		
I was calmer than usual after using drugs.		
I had more energy than usual after using drugs.		
I was able to cope better than usual after using drugs.		
I felt confused about the people in my community who tolerated gang activity.	Ambiguities about criminal behaviour (AACB)	MESO
I felt confused about the people in my community who tolerated criminal activity.		
I felt confused about the people in my community who tolerated drug trade.		
I felt the need to hide my true opinion about something from my friends.	Fitting in (FI)	
I pretended that I agree with my friends just to avoid being teased.		
I changed my behaviour when I was with my friends in order to "fit in".		
I prayed daily.	Religiosity (Rel)	
My faith provided meaning and purpose in my life.		
I was active in my faith or church.		
It would have been easy to buy drugs in my neighbourhood community.	Access/proximity to drugs (APTD)	EXO
I found that drugs were a cheaper option than any other activity I wanted to do.		

It was common for people to sell drugs in my neighbourhood community.		
I enjoyed spending time with others in my community who practiced the same traditions as I did.	Community traditions and belonging (CTB)	MACRO
I was proud to be a South African citizen.		
Being part of my community's traditions made me feel like I belong.		
I was upset to see children playing near to people using alcohol and/or *dagga*.	Public displays of SU (PDSU)	
I was upset to see children and/or teens smoking cigarettes or *dagga* in public.		
I was upset to see children or teens drinking alcohol in public.		
I felt discriminated against.	Risk of exclusion (REP)	
I felt left out of things that others in my community were doing.		
I felt like I had to do what my friends wanted to do, even though I did not want to do it.		
I felt positive about the future of my community.	Concerns for future (CFF)	CHRONO
I had nobody to talk to about my future.		
I was clear about my plans for my future.		

Table 5.7 above displays all the items used in the SEM analysis, the factor that they are theorised to reflect and the domain of the EST that they are theorised to represent. The microsystem is comprised of four constructs: Self-efficacy (SE), Intra-family communication

(IFC), Healthy/positive peer support (PPS) and Positive effects of drugs (PED). The mesosystem comprises of three constructs: Ambiguities about criminal behaviour (AACB), Fitting in (FI) and Religiosity (Rel). Access/proximity to drugs (APTD) is associated with the exosystem. There are a further three constructs, Risk of exclusion (REP), Public displays of SU (PDSU) and Community traditions and belonging (CTB), that are associated with the macrosystem. Finally, Concerns for future (CFF) is associated with the chronosystem. Section 5.8 below discusses the nature and mean scores of these constructs.

It is important to bear in mind that Table 7.2 below reflects all the items that had high factor loadings (as established by the reliability analysis, Section 7.3) and the constructs associated with it as determined through the consultative process and axial coding. Further, CFA and discriminant and convergent validity analysis were conducted on these constructs, as discussed in Chapter Seven.

5.8 Mean Scores of Constructs/Variables

As discussed in Chapter Five (Section 5.6), all the constructs in this study were measured on a four-point Likert scale, namely "always", "often", "seldom" and "never". "Always" was defined as 100% of the time, "often" as more than 50% of the time, "seldom" as less than 50% of the time, and "never" as 0% of the time. Respondents were asked to think back to the time when they first started using substances in relation to each of the questions. This is accepted practice and was done to ensure a standard recall period for all participants (Field, 2013; Malhotra et al., 2017).

A presentation of the means, standard deviations and percentages of the response for each item and the construct follows. The results are presented in order of their location in the ecological (viz. from the individual to the chronosystem) systems framework and the SEM diagram.

5.8.1 Self-efficacy

Self-efficacy (SE) refers to the belief that a person can successfully regulate his or her own behaviour. Bandura (1977) conceptualised efficacy expectancy as the belief that one can successfully execute behaviours needed to produce a desired outcome. SE is thus one's perceived ability to accomplish a particular task (Bandura, 1977; Bandura & Cervone, 1986). The concept of "self-efficacy" is a core element of social learning theory, which was recently renamed "social cognitive theory", and is regarded as the most important explanatory element related to the acquisition, maintenance and change in addictive behaviour. The construct "self-efficacy", presented by SE in the CFA and SEM diagrams and tables, measures whether the participants felt and considered themselves to be competent and resilient. This construct was initially used as an individual factor in EST. It is used here as the third indicator of the Micro factor in the theory. Low means scores (<4) on this construct indicate low SE.

Table 5.8

Mean Scores for Self-Efficacy (SE)

Label	Question/ Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
Self-efficacy 22	I was able to make my own decisions about things that impacted on my life.	3.11	1.26	59	140	343	527	2	23	1094
				5.40%	12.80%	31.40%	48.20%	0.20%	2.10%	1.001
Self-efficacy 25	I was determined to solve my problems, even when faced with difficulties.	2.95	1.32	66	193	382	424	2	26	1093
				6.00%	17.60%	34.90%	38.80%	0.20%	2.40%	0.999
Self-efficacy 28	I was capable of solving the problems that came up in my life.	2.73	1.32	87	270	380	326	3	28	1094
				8.00%	24.70%	34.70%	29.80%	0.30%	2.60%	1.001
Overall		2.93	1.30							

Note. M = mean. Σ = standard deviation.

The central tendency measures for the three items in Table 5.8 above indicate an overall mean of 2.93 and a standard deviation of 1.30. The descriptive statistics related to each of the items suggest that the majority of the participants ticked the boxes "seldom" and "never" for the first two statements. Of all the participants, 48.2% indicated that they never felt that they were able

to make their own decisions about things that impact on their life; 38.8% indicted that they never felt determined to solve their problems even when faced with difficulties; 34.7% indicated that they seldom felt that they were capable of solving problems that came up in their lives; and 29.8% indicated that they never felt capable of solving problems that came up in their lives. Cumulatively it is safe to say that 65% felt incapable of solving problems that came up in their lives, while 33% felt capable of solving problems that came up in their lives. The low means scores ($\mu = 2.93$) on this construct suggests that participants did not regard themselves as being competent and resilient and were therefore at high risk of substance abuse.

5.8.2 Intra-family communication

The construct "intra-family communication", represented by IFC in the CFA and SEM diagrams and tables, assesses the extent to which the participants felt that there were opportunities for them to speak about their experiences in their family, and that their family was concerned about how they were feeling. This construct is one of the latent constructs associated with the microsystem, which is a second order factor in the latent factor model. There is substantial literature indicating that greater frequency and quality of general parent-child communication and communications with other significant members in the family are negatively associated with adolescent SU (Kafka & London, 1991; Stoker & Swadi, 1990). Conversely, there is evidence that suggests that perceived difficulty talking to parents about problems is associated with increased risk of SU in both males and females (Ackard et al., 2006; Luk et al., 2010). This suggests that an individual is at greater risk of abusing substances if they have the impression that they cannot speak about their experiences with members of their family, and a lower risk if they believe they are able to speak about their experiences. In Table 5.9 below, low mean scores (< 4) are indicative of lack of communication within the family.

Table 5.9

Mean Scores for Intra-Family Communication (IFC)

Label	Question/ Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
CommampSS57	My parent(s)/guardian(s) were concerned with how I was feeling.	2.97	1.46	75	153	323	503	2	38	1094
				6.90%	14.00%	29.50%	46.00%	0.20%	3.50%	1.001
CommampSS61	We were able to share our concerns and feelings in healthy ways in my family.	2.74	1.50	108	235	295	415	1	40	1094
				9.90%	21.50%	27.00%	37.90%	0.10%	3.70%	1.001
CommampSS62	We talked about the different ways we as a family could deal with problems or concerns.	2.70	1.50	111	244	306	391	1	41	1094
				10.10%	22.30%	28.00%	35.70%	0.10%	3.70%	0.999
Overall		2.80	1.49							

Note. M = mean. Σ = standard deviation. CommampSS = Communication and social support.

The central tendency measures for the three items in Table 5.9 above indicate an overall mean of 2.80 with a standard deviation of 1.49. The descriptive statistics related to each of the items suggest that most of the participants indicated that they felt that their parents or guardians were never (46%) and seldom (29.5%) concerned with how they were feeling; 37.9% indicated that they never felt that they were able to share their concerns and feelings in healthy ways in their families; and 27% indicated that they seldom felt that they were able to share their concerns and feelings in healthy ways in their families. On the third item for this construct, viz. *we talked about the different ways we as a family could deal with problem or concerns*, participants indicated that they seldom (28%) and never (35.7%) felt this way. The percentages of the responses to each of the questions for this construct indicate that participants felt that there were few opportunities for them to speak about their experiences in their family and that their family was not really concerned about how they were feeling.

5.8.3 Positive peer support

The construct "positive peer support", represented by PPS in the CFA and SEM diagrams and tables, assesses the extent to which the participants felt that their friendship groups were positive and supportive. This construct is another that forms part of the microsystem in EST.

This construct is important because peers of any age group have been found to be highly influential in convincing one another to try alcohol, tobacco or other drugs for the first time (e.g., Bryant et al., 2003; Svensson, 2000) or to persist in SU and abuse (Godley et al., 2005). Peer support is defined as negative or positive social emotional support that is mutually offered or provided by individuals (Solomon, 2004). Negative peer support usually involves influence that sways people toward risky activity such as criminal behaviour, under-age drinking, drug use and an overall unhealthy lifestyle. PPS, on the other hand, has the opposite effect. Piko (2000) conducted multivariate analyses with data obtained from a sample of 1039 Hungarian adolescents in secondary schools (age range: 15–19 years) and found that friend/peer support was positively related to most types of SU. The way that the questions are phrased for this construct suggest that low means scores (<4) would indicate a lack of positive peer support. This was also a protective factor.

Table 5.10

Mean Scores for Positive Peer Support (PPS)

Label	Question/Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
Peer Support 74	I felt that my friends are "there for me" when I need them.	2.77	1.41	82	227	386	361	2	36	1094
				7.50%	20.70%	35.30%	33.00%	0.20%	3.30%	1
Peer Support 75	I felt comfortable when I was amongst my friends.	2.99	1.43	53	150	373	478	2	38	1094
				4.80%	13.70%	34.10%	43.70%	0.20%	3.50%	1
Peer Support 76	My friends were good listeners.	2.66	1.44	92	250	394	315	3	40	1094
				8.40%	22.90%	36.00%	28.80%	0.30%	3.70%	1.001
Overall		2.81	1.43							

Note. M = mean. Σ = standard deviation.

The central tendency measures for the three items in Table 5.10 above indicate an overall mean of 2.81 and a standard deviation of 1.43. The descriptive statistics related to each of the items suggest that most of the participants felt that their peer groups where not supportive and positive. Participants indicated that they seldom (35.3%) and never (33%) felt that their friends

were there for them when they needed them; 43.7% indicated that they never felt comfortable when they were amongst their friends; and 34.1% indicated that they seldom felt comfortable among their friends. The final indicator for the construct PPS revealed that 36% of the participants indicated that they seldom felt that their friends were good listeners and 28.8% indicated that they felt that their friends were never good listeners. The percentages of the responses to each of the questions for this construct and the low mean scores ($\mu = 2.81$) indicate that participants felt that their friendship groups were not positive and supportive.

5.8.4 Ambiguities about criminal behaviours

The construct “ambiguities about criminal behaviours”, represented by AACB in the CFA and SEM diagrams and tables, assesses the extent to which the participants felt that illicit substances were relatively easy to access, due to the proximity of drug dealers in their neighbourhoods and the relatively low cost of drugs. In two separate studies, both Keyes et al. (2011) and Tucker et al. (2013) examined the correlation between neighbourhoods' disorganisation and the onset of drug use, based on the hypothesis that the onset for both alcohol and marijuana may be more likely among adolescents who come from a poor neighbourhood, with greater residential instability and a poor perception of cohesion and safety. They found that residing in a neighbourhood characterised by a high rate of unemployment is the most influential factor in adolescent onset of marijuana use, whereas the environmental perception of disapproval of marijuana use is related to lower rates of adolescent cannabis use (Keyes et al., 2011; Tucker et al., 2013). Low scores (<2) on this construct suggest that participants felt ambiguous about criminal activity in their communities. This construct is theorised to form part of the mesosystem of EST.

Table 5.11

Mean Scores for Ambiguities About Criminal Behaviour (AACB)

Label	Question/Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
Mixed Mess 96	I felt confused about the people in my community who tolerated gang activity.	2.54	1.78	124	181	325	384	9	71	1094
				11.30%	16.50%	29.70%	35.10%	0.80%	6.50%	0.999
Mixed Mess 97	I felt confused about the people in my community who tolerated criminal activity.	2.63	1.73	112	169	344	398	6	65	1094
				10.20%	15.40%	31.40%	36.40%	0.50%	5.90%	0.998
Mixed Mess 98	I felt confused about the people in my community who tolerated drug trade.	2.61	1.75	121	172	323	405	6	67	1094
				11.10%	15.70%	29.50%	37.00%	0.50%	6.10%	0.999
Overall		2.59	1.75							

Note. M = mean. Σ = standard deviation. Mixed Mess = Mixed Messages.

The central tendency measures for the three items in Table 5.11 above indicate an overall mean of 2.59 and a standard deviation of 1.75. The descriptive statistics related to each of the items suggest that most of the participants did not feel ambiguous about criminal behaviour in their communities. For instance, 35.1% of the participants indicated that they never felt confused about the people in their community who tolerated gang activity, and 11.3% indicated that they always felt confused about this; 36.4% also indicated that they never felt confused about people tolerating criminal activity; and 10.2% indicated that they always felt confused about this. The trend followed that of the third item/question. These questions are identical, but the discriminant analysis (discussed in the next chapter) found it to discern sufficiently. The mean score of 2.59 suggests that the participants hardly felt ambiguous about criminal activity in their communities.

5.8.5 Fitting in

Saladino et al. (2021) argue that social interactions and the sense of acceptance are important factors for individuals who often see drug use as a way to develop or maintain social bonds.

As such, the construct "fitting in", represented by FI in the CFA and SEM diagrams and tables, assesses the extent to which the participants felt that they needed to fit in with their peer groups. The idea with this set of questions was to determine if they had agency or if they experimented with substances to fit in with the group. As such a mean score of more than 2 would indicate a need to fit in. This construct is also theorised to form part of the mesosystem of EST.

Table 5.12

Mean Scores for Fitting In (FI)

Label	Question/Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
Peer Influence 80	I felt the need to hide my true opinion about something from my friends.	2.66	1.47	122 11.20%	230 21.00%	359 32.80%	342 31.30%	2 0.20%	39 3.60%	1094 1.00 1
Peer Influence 82	I pretended that I agree with my friends just to avoid being teased.	2.41	1.49	181 16.50%	252 23.00%	378 34.60%	237 21.70%	2 0.20%	44 4.00%	1094 1
Peer Influence 83	I changed my behaviour when I was with my friends in order to "fit in".	2.36	1.52	220 20.10%	252 23.00%	318 29.10%	258 23.60%	2 0.20%	44 4.00%	1094 1
Overall		2.48	1.49							

Note. M = mean. Σ = standard deviation.

The central tendency measures for the three items in Table 5.12 above indicate an overall mean of 2.48 and a standard deviation of 1.49. The descriptive statistics related to each of the items suggest that most of the participants never felt the need to hide their true feelings and opinions and adapted their behaviour to fit in with their peer groups. Combined 64.1% (32.8% seldom and 31.3% never) of participants indicated that they felt they did not need to hide their true opinions about something; 56.3% combined (34.6% seldom and never 21.7%) also indicated that they did not need to pretend to agree with their friends as a way to avoid being teased by them; and 52.7% (29.1% seldom and never 23.6%) indicated that they did not need to change their behaviour when they were with their friends in order to fit in. The mean score of 2.48

suggests that the majority of participants in this sample used substances as a way to fit in with their peer groups.

5.8.6 Religiosity

The construct "religiosity", represented by REL in the CFA and SEM diagrams and tables, assesses the extent to which the participants where committed to their faith and relied on their faith for meaning and purpose. Allen and Lo (2010) explain that religiosity refers to how religious a person is from primarily a social and doctrinal perspective. Common measures of religiosity include denominational identification, frequency of participation in religious services, the degree of religion's meaningfulness to an individual and the degree of the individual's closeness to members of a religious group (Berkel et al., 2004; Chitwood et al., 2008; Neff, 2006; Pullen, Modrich-Talbott, West, & Muenchen, 1999; Pullen, Modrich-Talbott, West, Fenske, & Muenchen, 1999). The concept religiosity thus reflects an assessment of a person's religion based on social and doctrinal criteria, which can be measured via such features as the frequency of attendance at worship services and the relative fundamentalism of a person's religious views (Fetzer Institute, 2003; Miller, 1998). The intention of this construct was to determine if religion served as a protective factor. This construct is theorised to form part of the mesosystem of EST. A mean score of 3 or more would indicate moderately religious and a mean score of less than 3 would indicate not being religious.

Table 5.13

Mean Scores for Religiosity (REL)

Label	Question/Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
Religiosity 40	I prayed daily.	2.48	1.40	197	291	282	294	1	29	1094
				18.00%	26.60%	25.80%	26.90%	0.10%	2.70%	1.001
Religiosity 41	My faith provided meaning and purpose in my life.	2.66	1.45	129	267	291	371	1	35	1094
				11.80%	24.40%	26.60%	33.90%	0.10%	3.20%	1
Religiosity 42	I was active in my faith or church.	2.49	1.44	196	287	265	313	1	32	1094

				17.90%	26.20%	24.20%	28.60%	0.10%	2.90%	0.999
Overall		2.54	1.43							

Note. M = mean. Σ = standard deviation.

The central tendency measures for the three items in Table 5.13 above indicate an overall mean of 2.54 and a standard deviation of 1.43. The descriptive statistics related to each of the items suggest that they were not very religious. For instance, more participants indicated that they seldom (25.8%) and never (26.9%) prayed daily, and 24.2% and 28.6% indicated that they were seldom and never active in their church or faith. Conversely, 26.2% indicated that they were often active in their faith or church. The mean score of 2.54 suggests that this group of participants was not very religious.

5.8.7 Access or proximity to drugs

Mennis et al. (2016) argue that relative ready access to substances lowers the barriers to acquiring, using and abusing substances, thus facilitating SU initiation and potential abuse. The construct “access or proximity to drugs”, represented by APTD in the CFA and SEM diagrams and tables, assesses the extent to which the participants felt that illicit substances were relatively easy to access due to the proximity of drug dealers in their neighbourhoods and the relatively low cost of drugs. This construct is theorised to comprise the exosystem in EST. The questions on this construct are reverse scored and, as such, a low mean score (<3) would indicate that the participants had easy access to illicit substances.

Table 5.14

Mean Scores for Access/Proximity to Drugs (APTD)

Label	Question/Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
Neighbourhood 85	It would have been easy to buy drugs in my neighbourhood community.	1.45	1.42	600 54.80%	217 19.80%	127 11.60%	87 8.00%	5 0.50%	58 5.30%	1094 1
Neighbourhood 86	I found that drugs were a cheaper option than any other activity I wanted to do.	1.86	1.59	381 34.80%	268 24.50%	209 19.10%	168 15.40%	9 0.80%	59 5.40%	1094 1
Neighbourhood 87	It was common for people to sell drugs in my neighbourhood community.	1.55	1.45	556 50.80%	227 20.70%	148 13.50%	102 9.30%	5 0.50%	56 5.10%	1094 0.999

Overall	1.62	1.49

Note. M = mean. Σ = standard deviation.

The central tendency measures for the three items in Table 5.14 above indicate an overall mean of 1.62 and a standard deviation of 1.49. The descriptive statistics related to each of the items suggest that most of the participants perceived that substances were readily available in their communities. As can be seen from the table, 54.8% of participants indicated that it was always easy for them to buy drugs in their neighbourhoods and 19.8% indicated that it often was easy for them to buy drugs in their neighbourhoods. Combined this amounts to 70.6% who perceived that it would be easy for them to buy drugs in their neighbourhoods compared to 8% who indicated that it was never easy for them to buy drugs in their neighbourhoods. Opposed to other recreational activities, 34.8% and 24.5% indicated that they always and often found that using drugs was a cheaper activity to do to pass the time. Further, 50.8% and 20.7% indicated that it was always and often common for people to sell drugs in their communities. Combined, this amounts to 71.5% who perceived that it was common for people to sell drugs in their communities, compared to 9.3% who indicated that it was never common for people to sell drugs in their communities. With a mean score of 1.62 it is clear that the participants felt that illicit substances were relatively easy to access due to the proximity of drug dealers in their neighbourhoods.

5.8.8 Community traditions and belonging

The construct "community traditions and belonging", represented by CTB in the CFA and SEM diagrams and tables, aims to assess whether the participants felt and considered themselves to be part of the communities in which they reside. Moshier et al. (2012) argue that illicit drug use frequently occurs in a context of a drug subculture characterised by social ties with other drug users, feelings of excitement and effectiveness deriving from illicit activities, and alienation from mainstream society. This derived sense of belonging, defined as the extent to

which individuals feel personally accepted, respected, included and supported by others in a social environment, has long been considered to be influential in the initiation of drug use (Goodenow, 1993; Sibanda & Batisai, 2021). Research has shown that identification with and fostering a sense of belonging with peer groups, cultures or communities can serve as either a risk or a protective factor for deviant behaviours (Battistich & Hom, 1997; Duncan et al., 2005; Nasim, Belgrave et al., 2007; Nasim, Corona et al., 2007). Sibanda and Batisai (2021) also caution that lack of a sense of belonging and the desire to belong should not be underestimated when looking at different determinants of drug use disorder in youth and adults. CTB is theorised to form part of the macrosystem in EST.

Table 5.15

Mean Scores for Community Traditions and Belonging (CTB)

Label	Question/Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
Sense of B 13	I enjoyed spending time with others in my community who practiced the same traditions as I did.	1.59	2.78	59	142	246	368	6	273	1094
				5.40%	13.00%	22.50%	33.60%	0.50%	25.00%	1
Sense of B 14	I was proud to be a South African citizen.	1.83	2.90	41	98	121	555	7	272	1094
				3.70%	9.00%	11.10%	50.70%	0.60%	24.90%	1
Sense of B17	Being part of my community's traditions made me feel like I belong.	1.46	2.72	70	164	286	291	8	275	1094
				6.40%	15.00%	26.10%	26.60%	0.70%	25.10%	0.999
Overall		1.63	2.80							

Note. M = mean. Σ = standard deviation.

The central tendency measures for the three items in Table 5.15 above indicate an overall mean of 1.63 and a standard deviation of 2.80. The descriptive statistics related to each of the items suggest that the majority of the participants indicated that they never felt proud to be a South African citizen (50.7%). Further, 33.6% indicated that they never enjoyed spending time with others in their community who practiced the traditions as they did, and 26.6% marked never to the question "being part of my community traditions made me feel like I belong". Low mean ($\mu = 1.63$) scores indicate that participants lacked the sense of being part of the communities in which they reside. A concern with this construct is the relatively high percentage of participants

who did not answer the questions. In fact this was the only section on the questionnaire that had a high no response rate.

5.8.9 Public displays of substance use

Though Freisthler, Gruenewald et al. (2005) have cautioned that the most naïve approach one can take to understanding high incidents of drug use in a specific setting or group is to consider drug use as directly related to illegal drug access. It is undeniable that SU and access are interrelated and that the one partially reflects the other in the complex dynamics of community systems (e.g., including policing activities and norms against use) (Freisthler, Lascala et al., 2005). This is primarily because illicit drug markets would not exist without demand, nor would the demand for illicit drugs exist without the drugs supplied by the markets (Freisthler, Gruenewald et al., 2005; Freisthler, Lascala et al., 2005). As such, drug sales are often concentrated in neighbourhoods with higher levels of unemployment and economic disadvantage, greater population density, and higher concentrations of historically exploited and oppressed groups. The construct "public displays of substance use", represented by PDSU in the CFA and SEM diagrams and tables, assesses the extent to which the participants felt upset with public displays of SU, especially in the vicinity of children and teens. PDSU is characteristic of the communities in which the participants live, viz. densely populated, low-cost government housing, and high unemployment of youth and young adults. This construct also forms part of the macrosystem of EST.

Table 5.16

Mean Scores for Public Displays of Substance Use (PDSU)

Label	Question/Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
Tolerance AU 101	I was upset to see children playing near to people using alcohol and/or *dagga*.	1.65	1.58	446	273	187	115	3	70	1094
				40.80%	25.00%	17.10%	10.50%	0.30%	6.40%	1.001
Tolerance AU 102	I was upset to see children and/or teens	1.79	1.59	405	266	214	144	1	64	1094

	smoking cigarettes or *dagga* in public.			37.00%	24.30%	19.60%	13.20%	0.10%	5.90%	1.001
Tolerance AU 103	I was upset to see children or teens drinking alcohol in public.	1.77	1.61	421	256	198	151	2	66	1094
				38.50%	23.40%	18.10%	13.80%	0.20%	6.00%	1
Overall		1.74	1.59							

Note. M = mean. Σ = standard deviation.

The central tendency measures for the three items in Table 5.16 above indicate an overall mean of 1.74 and a standard deviation of 1.59. As can be seen from the descriptive statistics related to each of the items, most of the participants indicated that they always felt upset with public displays of SU. For instance, 40.8% indicated that they always felt upset to see children playing near people using alcohol and/or *dagga*, while 25% indicated often for the same item; 37% of the participants also indicated that it was upsetting to see children and or teens smoking cigarettes or *dagga* in public, while 24.3% indicated they often felt upset by this. In the same way, 38.5% indicated that it was always upsetting and 23.4% indicated that they often found it upsetting to see children and teens drinking alcohol in public. This is interesting as they are substances abusers themselves and were not asked if they themselves used substances in public places and in the vicinity of children and teens. It is difficult to determine from these questions whether or not the respondents are upset about children and teens using substances generally, or if they are upset that it is not done covertly. The low mean ($\mu = 1.74$) score indicates that the participants generally felt upset with public displays of SU in the vicinity of children and teens.

5.8.10 Concerns for the future

The construct "concerns for the future", represented by CFF in the CFA and SEM diagrams and tables, measures the extent to which the participants felt that there was hope for the future of their communities and for themselves. CFF can be described as questions an individual has or had about what the future holds for them. Ozerkmen (2005) found that CFF was the primary stated reason for using substances amongst Turkish men. In this study, CFF was operationally defined as comprising of lack of spiritual values and curiosity (Ozerkmen, 2005). The real

intention with this construct was to measure if participants had a sense of purpose in life. Earlier research associated lack of future plans and general lack of direction or meaning in life with lack of PIL (Mills & Noyes, 1984; Newcomb & Harlow, 1986).

Kim et al. (2020) used data from 3535 middle-aged adults from the Midlife in the United States Study (MIDUS) who were not misusing drugs at baseline to test whether higher sense of purpose in life was associated with lower drug misuse 9 to 10 years later. In the study, purpose in life (PIL) was operationally defined as the extent to which individuals see their lives as having meaning, a sense of direction, and broader goals to live for. Kim et al. (2020) found that people in the highest quartile of purpose (versus lowest quartile) had substantially lower likelihood of future drug misuse. The study concludes by suggesting that sense of purpose can be increased, and that purpose may emerge as a novel target for drug misuse prevention and intervention efforts (Kim et al. 2020). Chen et al. (2019) defined purpose as a self-sustaining source of motivation and meaning that creates and sustains health and well-being and suggest that purpose may be a promising target for intervention strategies aimed at improving health and well-being among young adults. Abramoski et al. (2018) suggest that PIL promotes positive development and is associated with decreased SU. They show that PIL is a multifaceted construct with three distinct categories, viz. broad other-promoting, narrow self-promoting, and broad self-promoting. Abramoski et al. (2018) also argue that SU prevention strategies specifically incorporate a broad other-promoting PIL, as this was found to offer protection against SU behaviour and shown to be an important tool in helping avoid risk behaviour and holistically support positive development and thriving.

CFF can thus be regarded as synonymous with PIL and is theorised to form part of the chronosystem of EST. A means score of equal to and more than 3 is indicative of hope for the future and scores less than 3 are indicative of lacking hope for the future.

Table 5.17

Mean Scores for Concerns for the Future (CFF)

Label	Question/Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
Hope 110	I felt positive about the future of my community.	2.87	1.76	54	131	309	527	3	70	1094
				4.90%	12.00%	28.20%	48.20%	0.30%	6.40%	1
Hope 112	I had nobody to talk to about my future.	2.06	1.77	265	239	276	229	7	78	1094
				24.20%	21.80%	25.20%	20.90%	0.60%	7.10%	0.998
Hope 114	I was clear about my plans for my future.	2.33	1.81	161	262	260	330	2	78	1093
				14.70%	23.90%	23.80%	30.20%	0.20%	7.10%	0.999
Overall		2.42	1.78							

Note. M = mean. Σ = standard deviation.

The central tendency measures for the three items in Table 5.17 above indicate an overall mean of 2.42 and a standard deviation of 1.78. The descriptive statistics related to each of the items suggest that most of the participants had a negative outlook for the future of their communities, in that 48.2% indicated that they never felt positive about the future of their community. Most of the participants were also not clear about the plans for their own future, in that 30.2% indicated that they never felt clear about their plans for their future, and 23.8% indicating they seldom felt clear about their future. In relation to whether they had someone to talk to about their future, the responses were more or less evenly spread, with 20.9% indicating that they never had someone to speak to about their future and 24.2% indicating that they always had someone to talk to about their future. The overall mean score of 2.42 suggests that the group had little hope for the future, for themselves and their communities.

5.8.11 Risk of exclusion from participation

The construct "risk of exclusion from participation", represented by REP in the CFA and SEM diagrams and tables, measures the extent to which an individual felt part of their communities or if they felt alienated from their communities. Although there is no universally agreed upon definition or benchmark for social exclusion, lack of participation in society is at the heart of

most definitions (Deckman et al., 2014; Hales et al., 2015; Preller et al., 2016). Overall, social exclusion describes a state in which individuals are unable to participate fully in economic, social, political and cultural life, as well as the process leading to and sustaining such a state. "Social exclusion is what can happen when people or areas suffer from a combination of linked problems such as unemployment, poor skills, low incomes, poor housing, high crime, poor health and family breakdown" (Social Exclusion Unit, 2004, p. 2). It affects both the quality of life of individuals and the equity and cohesion of society as a whole (Levitas et al., 2007, p. 9). Researchers have found that substances such as alcohol, marijuana and psilocybin (a key chemical in hallucinogenic mushrooms) dull the immediate sting of social exclusion (Deckman et al., 2014; Hales et al., 2015; Preller et al., 2016). Further, Hales et al. (2015) found that SU (i.e., alcohol consumption) is most effective for dulling the pain of exclusion in casual users. In this regard, Wesselmann and Parris (2021) have argued that social exclusion should be treated as a form of trauma and that certain individuals abuse substances to cope. This construct is theorised to form part of the macrosystem of EST.

Table 5.18

Mean Scores for Risk of Exclusion from Participation (REP)

Label	Question/Statement	*M*	*Σ*	always	often	seldom	never	N/A	missing	Total
Identity 4	I felt discriminated against.	2.64	1.53	140	234	293	380	6	41	1094
				12.80%	21.40%	26.80%	34.70%	0.50%	3.70%	0.999
Identity 5	I felt left out of things that others in my community were doing.	2.50	1.46	190	262	280	321	8	33	1094
				17.40%	23.90%	25.60%	29.30%	0.70%	3.00%	0.999
Identity 6	I felt like I had to do what my friends wanted to do, even though I did not want to do it.	2.36	1.34	233	305	289	238	4	25	1094
				21.30%	27.90%	26.40%	21.80%	0.40%	2.30%	1.001
Overall		2.50	1.44							

Note. M = mean. Σ = standard deviation.

The central tendency measures for the three items in Table 5.18 above indicate an overall mean of 2.50 and a standard deviation of 1.44. The descriptive statistics related to each of the items

suggest that the majority of the participants disagreed with the first two statements. For instance, 34.74% of the respondents indicated that they never felt discriminated against. Similarly, 29.3% indicated that they never felt left out of things that others in their communities were doing. Conversely, 27.9% indicated that they often felt like they had to do what their friends wanted to do, even though they did not want to do it. The ambiguous responses to these items could be the reason why the validity of the construct was below the thresholds and was not included in the final testing and analysis of the structural model. The low means score (μ = 2.50) for this construct suggests that the participants did not experience discrimination or alienation from their communities and that they largely felt part of their communities.

5.8.12 Positive effects of drugs/Substance abuse

The construct "positive effects of drugs" assesses what the participants experienced after using substances. It asks whether the participants felt and considered themselves competent and resilient. Though this construct is theorised to be comprised of the microsystem, it is used as the dependent/outcome variable as it provides an indication of SU. The central tendency measures for the three items in Table 5.19 below indicate an overall mean of 2.92 and a standard deviation of 1.50.

Table 5.19

Mean Scores for Positive Effects of Drugs (PED)

Label	Question/Statement	*M*	*Σ*	never	seldom	often	always	N/A	missing	Total
Effects of drugs 35	I was calmer than usual after using drugs.	2.80	1.51	121	163	314	445	15	36	1094
				11.10%	14.90%	28.70%	40.70%	1.40%	3.30%	1.001
Effects of drugs 36	I had more energy than usual after using drugs.	3.09	1.50	93	92	237	623	14	35	1094
				8.50%	8.40%	21.70%	56.90%	1.30%	3.20%	1
Effects of drugs 37	I was able to cope better than usual after using drugs.	2.86	1.49	108	153	307	472	21	33	1094
				9.90%	14.00%	28.10%	43.10%	1.90%	3.00%	1
Overall		2.92	1.50							

Note. M = mean. Σ = standard deviation.

The descriptive statistics related to each of the items suggest that the majority of the participants indicated that they agreed with the statements. As can be seen, 40.7% and 28.7% indicated that they always and often felt calmer after using drugs, while 56.9% and 21.7% indicated that they always and often had more energy than usual after using drugs. Combined, this equals a total of 78.6%. Lastly, 43.1% and 28.1% indicated that they always and often were able to cope better than usual after using drugs.

As mentioned above (see Section 5.6), the purpose of SASUCRI is to identify risk factors for SU in the general population and therefore contained measures for identifying problematic SU. Because this study sampled people receiving treatment for substance abuse, the problematic SU scale would have been redundant and was removed from the questionnaire. The removal of the problem use scale meant that the original dependent variable (DV) was no longer applicable. The construct PED was thus identified as the closest indicator of SU and was therefore used as the DV in the SEM analysis and is labelled as SA in Figure 7 (see Chapter Eight). The necessary removal of the problematic SU scale suggests that the dependent/endogenous variable in this study is not a measure substance abuse directly but merely an indication of SU. This implies that the five hypotheses statements above really test whether the IVs predict the positive effects of drugs, and not substance abuse, as would be measured using a more traditional problem substance abuse scale.

5.9 Data Analysis

The data collected were captured in Windows Excel and analysed using the latest versions of SPSS and AMOS software (IBM SPSS Inc., 2008). Initial data screening, cleaning and descriptive analysis, along with the checks for normality, skewness and kurtosis in the data, were conducted in SPSS. The more advanced inferential statistics and path analysis/SEM was conducted in AMOS. SEM is a causal modelling approach to exploring the correlations within

a defined network of variables. SEM has two primary related goals, the first being to gain an understanding of the patterns of correlations among the variables and the second is in explaining as much of the variation as possible with a specified model. The focus in SEM is usually on a decision about the whole model, whether to reject, modify or accept the model. Byrne (2010) states that the term "structural equation modelling" conveys two important aspects of the procedure: 1) that the causal processes under study are represented by a series of structural (i.e., regression) equations, and 2) that their structural relations can be modelled pictorially to enable a clearer conceptualisation of the theory under study. The hypothesised model can be tested statistically in a simultaneous analysis of the entire system of variables to determine the extent to which it is consistent with the data. If goodness-of-fit is adequate, the model argues for the plausibility of postulated relationship among variables. If it is inadequate, the tenability of such relations is rejected. The next chapter provides a detailed discussion of the purpose, logic, and process of using SEM.

5.10 Ethical Considerations

Ethical clearance to conduct this study was requested and obtained from Rhodes University Ethics Committee (see Appendix A). As discussed in point 5.4.1 and 5.4.2 above, permission to conduct this study was requested from the DSD in the EC and WC. The DSD EC granted permission to conduct the study (see Appendix D) and informed me to negotiate further permission with each treatment centre. The DSD WC advised that I negotiate access with treatment centres that are registered with them directly. The City of Cape Town granted permission to conduct research with City Clinics that offer substance abuse treatment (see Appendix C).

The information sheet and consent form provided to the treatment centres and individual participants informed and assured participants that participation in the research was completely

voluntary and that they were under no obligation to complete the questionnaire, even after signing the consent form. Participants were also informed that the information provided on the questionnaire would not be disclosed to any member of staff at the treatment facility or any other person. Anonymity was ensured by not asking for any identification information on the questionnaire and by keeping the questionnaire and consent form separate. Respect for the dignity and privacy of treatment centres and participants was assured through the entire research process.

5.11 Conclusion

In this chapter, I discussed the practical and theoretical logic that informed the various decisions for identifying and recruiting participants, collecting data, and the selection of the instrument used for the data collection. I explained why this study is considered to be an explanatory study as opposed to an exploratory or descriptive study. I also explained that the study design was a correlational questionnaire design, and that a multi-stage cluster sampling strategy was used in the WC, and a convenience sampling strategy was used in the EC, to identify and recruit participants who would provide the necessary information to answer the research question and to achieve the study's objectives. Further, I discussed the different studies that contributed to the overall development of the questionnaire, as well as describing the process followed in identifying and labelling the factors used in the SEM diagram. This was followed by discussing the central tendency measures of the items and construct as well as detailing their underlying structure. I only briefly discussed how the data were analysed, as the next chapter (Chapter Six) provides a more detailed discussion of the rationale for using SEM and the SEM analysis process and procedure.

CHAPTER SIX

STRUCTURAL EQUATION MODELLING

6.1 Introduction

Dastgeer et al. (2012) argued that though statistical data analysis can be very tricky to handle at times, it is extremely critical for value-added research outputs. In research methodology each statistical technique has its own nuts and bolts that the researcher must take care of. SEM has become one of the important multivariate techniques that simultaneously estimates and tests a series of hypothesised inter-related dependency relationships between a set of latent constructs (Blunch, 2012; Byrne, 2010; Reisinger & Mavondo, 2007). SEM encompasses such diverse statistical techniques as path analysis, CFA, causal modelling with latent variables (LVs), and even analysis of variance and multiple linear regression (Antonakis et al., 2010; Hayduk et al., 2007). SEM can therefore be tricky to handle and has a range of "nuts and bolts" that need attending to. In this chapter I provide a brief overview of the fundamental features that one is required to be acquainted with regarding how SEM works, why it was used as the analysis strategy, and the process and steps followed to produce reliable research results that can be interpreted with confidence.

6.2 Why SEM?

Several aspects of SEM set it apart from older generations of multivariate procedures (Antonakis et al., 2010; Byrne, 2010; Hayduk et al., 2007). Not least is the fact that it takes a confirmatory rather than explanatory approach to data. Another feature is, whereas traditional multivariate procedures are incapable of either assessing or correcting for measurement error, SEM provides explicit estimations of their error variance parameters (Blunch, 2012; Byrne, 2010). Thus, while regression and general linear models (GLM) ignore or fail to recognise

these errors, in that they use observed measurements only, SEM uses both unobserved (latent) and observed variables. Probably the most appealing feature of SEM is that it is ideal for modelling multivariate relationships and that it displays all the relationships (i.e., model specification discussed under sub-section 6.5.1 below) in a model in diagrammatic form (Blunch, 2012; Byrne, 2010). Dastgeer et al. (2012) and Reisinger and Mavondo (2007), state that SEM can be used to examine the nature and magnitude of postulated dependence relationships and at the same time assess the direct and indirect relations. Byrne (2010) argues that SEM models provide an efficient and convenient way of describing the latent structure underlying a set of observed variables. Expressed either diagrammatically or mathematically via a set of equations, such models explain how the observed and LVs are related to one another (Byrne, 2010).

Using SEM was appealing for this study because SEM has the ability to model complex relationships between multivariate data. Using SEM, a researcher can conceptually answer any research question involving the indirect or direct observation of one or more IVs, or one or more DVs, as is the case for the current study. The primary goal of SEM is to determine and validify a proposed causal process and/or model. To achieve this goal, parameters are estimated and compared with the sample covariance matrix. The goodness of fit statistics are then calculated, indicating whether the model is appropriate or needs further revision. SEM can also be used to compare multiple theories that are specified a priori. The researcher can then conclude if the model is adequate or not. Further, SEM can tell the researcher if the amount of variance in the DVs – both manifest and latent DVs – is accounted for by the IVs. It can also indicate the reliability of each of the measured variables. In addition, SEM allows the researcher to examine mediation and moderation, which can include indirect effects.

6.3 Basic Concepts of SEM

It seems appropriate at this point to detail some of the basic concepts and nomenclature used when undertaking SEM. These include concepts and terms such as latent versus observed variables, exogenous versus endogenous variables, factor analytic model (EFA and CFA), measurement model and full LV model.

6.3.1 Latent versus observed variables

In the social and behavioural sciences, researchers are often interested in studying theoretical constructs that cannot be observed directly. These abstract phenomena are termed factors, or (in the context of SEM) LVs. Because LVs are not observed directly, it follows that they cannot be measured directly. The researcher must therefore operationally define the LV of interest in terms of behaviour believed to represent it (Hair et al., 2017). As such, the unobserved variable is linked to one that is observable, thereby making its measurement possible. Assessment of the behaviour, then, constitutes the direct measurement of an observed variable, albeit the indirect measurement of an unobserved variable (i.e., the underlying construct) (Hair et al., 2017). It should be obvious that the term "behaviour" is used here in the very broadest sense to include scores on a particular measuring instrument. In this case, scores on the SASUCRI. These measured scores (i.e., measurements) are termed "observed" or "manifest" variables (within the context of SEM methodology), serving as indicators of the underlying construct which they are presumed to represent (Blunch, 2012; Byrne, 2010; Hair et al., 2017). Although the choice of psychometrically sound instruments bears importantly on the credibility of all study findings, such selection becomes even more critical when the observed measure is presumed to represent an underlying construct. I followed the suggestion made by Hayduk and Littvay (2012) that recommends the use of the few best indicators and argues that one or two indicators are often sufficient, and that more than three indicators are rarely warranted because

additional redundant indicators provide less research benefit. I therefore only used the three best indicators as opposed to multiple indicators to represent the underlying factor in the model.

6.3.2 Exogenous versus endogenous latent variables

It is helpful in working with SEM models to distinguish between LVs that are exogenous and those that are endogenous (Hair et al., 2017). Exogenous LVs are synonymous with IVs because they "cause" fluctuations in the values of other LVs in the model (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005). Changes in the values of exogenous variables are not explained by the model. Rather, they are considered to be influenced by other factors external to the model. Demographic variables such as gender, age and SES are examples of such external factors (Hair et al., 2017). Endogenous LVs are synonymous with DVs and, as such, are influenced by the exogenous variables in the model, either directly or indirectly (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005). Fluctuation in the values of endogenous variables is said to be explained by the model because all LVs that influence them are included in the model specification (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005).

6.3.3 The factor analytic model

The factor analytic model (EFA or CFA) focuses solely on how, and the extent to which, the observed variables are linked to their underlying latent factors (Albright, 2009; Black et al., 2015; Byrne, 2010; Devlieger & Rosseel, 2017). More specifically, it is concerned with the extent to which the observed variables are generated by the underlying latent constructs, and thus the strength of the regression paths from the factors to the observed variables (the factor loadings) are of primary interest. Although inter-factor relations are also of interest, any regression structure among them is not considered in the factor analytic model (Albright, 2009;

Black et al., 2015; Devlieger & Rosseel, 2017). Because the CFA model focuses solely on the link between factors and their measured variables, within the framework of SEM it represents what has been termed a "measurement model" (see Figure 7, Chapter Eight).

6.3.4 The full latent variable model

In contrast to the factor analytic model, the full LV model allows for the specification of regression structure among the LVs (Blunch, 2012; Bollen, 2011; Byrne, 2010; Devlieger & Rosseel, 2017). That is to say, the researcher can hypothesise the impact of both a measurement model and a structural model: the measurement model depicting the links between the LVs and their observed measures (i.e., the CFA model), and the structural model depicting the links among the LVs themselves. Additionally, a full LV model that specifies direction of cause from one direction only is termed a "recursive model"; one that allows for reciprocal or feedback effects is termed a "nonrecursive model" (Blunch, 2012; Bollen, 2011; Byrne, 2010). This is a counter intuitive explanation as one would expect a nonrecursive model to not have reciprocal or feedback effects.

6.3.5 The general structural equation model symbol notation

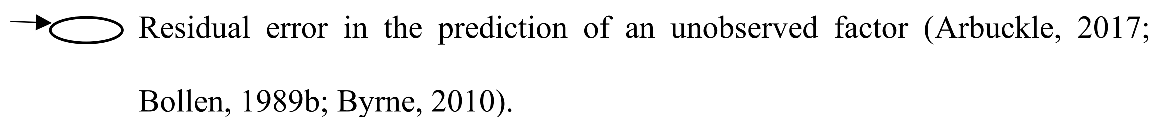
Structural equation models are schematically portrayed using particular configurations of four geometric symbols – a circle (or ellipse), a square (or rectangle), a single-headed arrow, and a double-headed arrow (Arbuckle, 2017; Blunch, 2012; Byrne, 2010; Devlieger & Rosseel, 2017). By convention, circles (or ellipses) represent unobserved LVs, squares (or rectangles) represent observed variables, single-headed arrows (→) represent the impact of one variable on another, and double-headed arrows (↔) represent covariances or correlations between pairs of variables. In building a model of a particular structure under study, researchers use these symbols within the framework of four basic configurations, each of which represents an

important component in the analytic process. These configurations, each accompanied by a brief description, are as follows:

Path coefficient for regression of an observed variable onto an unobserved LV (or factor).

Path coefficient for regression of one factor onto another factor.

Measurement error associated with an observed variable.


Residual error in the prediction of an unobserved factor (Arbuckle, 2017; Bollen, 1989b; Byrne, 2010).

6.4 Approaches to SEM

As previously stated, SEM is usually viewed as a confirmatory rather than exploratory procedure. As such, the researcher can employ one of three approaches, viz. a confirmatory approach, a development/generation approach, and an alternative model's approach (Albright, 2009; Blunch, 2012; Byrne, 2010; Hair et al., 2017; Kline, 2016). A strictly confirmatory approach is where a model is tested using SEM goodness of fit tests to determine if the pattern of variances and covariances in the data is consistent with a hypothesised model (Albright, 2009; Byrne, 2010).

The model development approach combines the confirmatory and exploratory analysis. A model is tested, and if found to be unacceptable, an alternative model is tested based on changes suggested by modification indexes. A cross-validation strategy is then applied when the model is developed using a calibration data sample and then confirmed on an independent validation sample (Albright, 2009; Byrne, 2010; Schumacker & Lomax, 2016).

Alternative models' approach involves the testing of several causal models to determine which has the best fit (Albright, 2009; Byrne, 2010). Schumacker and Lomax (2016) further state that model generation is where an initial theoretical model is specified, but when the data do not fit

this initial model, modification indices are used to add or delete paths in the model so as to arrive at a final fitting model. The goal in model generation is to find a model that fits well with a practical and substantive theoretical model (Hair et al., 2022; Schumacker & Lomax, 2016). This study used the model generation/development approach in that it attempted to generate a model for predicting substance abuse using aspects of Bronfenbrenner's (1986) EST.

6.5 Steps in SEM

Steps involved in SEM include: model specification, model identification, model estimation, model testing and model modification (Blunch, 2012; Byrne, 2010; Kline, 2016; Schumacker & Lomax, 2016). A discussion of each of these follows below.

6.5.1 Model specification

The use of SEM entails some uncertainty, particularly with cross-sectional data that are not collected under controlled conditions, as is the case in the current study. For this reason, SEM software programmes require researchers to be very explicit in specifying models; models that fit the data well can only be provisionally accepted, while models that do not fit the data well can be absolutely rejected (Fan et al., 1999; Hayduk, 2014b; J. McDonald, 2009; Savalei, 2012). Model specification thus refers to the formal path model and/or mathematical specification of the relationships embedded in the model. The model specification process consists of all steps necessary to specify the relationships among the latent constructs and to determine how the latent constructs are to be measured (Hayduk, 2014a; J. McDonald, 2009). This is considered as the most important, difficult and crucial step because everything else follows from it. It is therefore imperative that the researcher clearly states which parameters are fixed, constrained and free (Albright, 2009; Byrne, 2010; Hayduk, 2014a).

The parameters of an SEM are the estimated loadings, error variances and covariances in the measurement model, as well as the estimated directed arc coefficients and disturbance

variances and covariances in the path model (Blunch, 2012; Byrne, 2010; Schumacker & Lomax, 2016). Fixed parameters specify values a priori and are not estimated as part of the model; constrained parameters are unknown and estimated by the model; free parameters have unknown values, are not constrained to be equal to any other parameter, and need to be estimated. Variable parameters correspond to arrows in the model, while null parameters correspond to an absence of an arrow. Arbuckle (2017) argues that IBM SPSS Amos accepts a path diagram as a model specification and displays parameter estimates graphically on a path diagram. A path diagram is used for model specification and those that display parameter estimates are of presentation quality. Model specification is merely drawing a theoretically informed path model that will be tested to determine if it fits the data or not.

6.5.2 Model identification

Model identification is possibly one of the most complex and exciting topics in SEM, while also being difficult to explain without becoming technical (Byrne, 2010). In broad terms, the issue of identification focuses on whether there is a unique set of parameters consistent with the data (Blunch, 2012; Byrne, 2010; Schumacker & Lomax, 2016). This question bears directly on the transposition of the variance–covariance matrix of observed variables (the data) into the structural parameters of the model under study. Model identification refers to the assessment of the extent to which the information provided by the data is sufficient to enable parameter estimation or allow a unique solution to be found for the equations constrained in the theoretical model (Blunch, 2012; Byrne, 2010; Kline, 2016; Schumacker & Lomax, 2016). The model is identified if every parameter is identified and the model's degrees of freedom are greater than or equal to zero (Blunch, 2012; Byrne, 2010; Kline, 2016 ; Schumacker & Lomax, 2016). If some of the parameters are not identified, then a model is not identified. Here is where it starts to become technical. A necessary condition for the identification is the equation "*ts*", where t = number of independent parameters, s = number of elements of the sample matrix of

covariances among the observed variables, $s = 1/2(p + q)(p + q + 1)$, p = number of y-variables, q = number of x-variables (Blunch, 2012; Schumacker & Lomax, 2016). If a unique solution for the values of the structural parameters can be found, the model is considered to be identified. As a consequence, the parameters are considered to be estimable and the model therefore testable. If, on the other hand, a model cannot be identified, it indicates that the parameters are subject to arbitrariness, thereby implying that different parameter values define the same model; such being the case, attainment of consistent estimates for all parameters is not possible, and, thus, the model cannot be evaluated empirically (Blunch, 2012; Schumacker & Lomax, 2016). In this regard, structural models may either be just-identified, over-identified, or under-identified (Blunch, 2012; Byrne, 2010; Hair et al., 2017; Kline, 2016; Schumacker & Lomax, 2016; SPSS-SA, 2005).

6.5.2.1 Just-identified models

A just-identified model is one in which there is a one-to-one correspondence between the data and the structural parameters (Byrne, 2016; Hair et al., 2017; SPSS-SA, 2005). That is to say, the number of data variances and covariances equals the number of parameters to be estimated. However, despite the capability of the model to yield a unique solution for all parameters, the just-identified model is not scientifically interesting because it has no degrees of freedom and therefore can never be rejected (Byrne, 2016; Hair et al., 2017; SPSS-SA, 2005).

6.5.2.2 Over-identified models

An over-identified model is one in which the number of estimable parameters is less than the number of data points (i.e., variances and covariances of the observed variables) (Byrne, 2016; Hair et al., 2017; SPSS-SA, 2005). This situation results in positive degrees of freedom that allow for rejection of the model, thereby rendering it of scientific use. The aim in SEM, then,

is to specify a model in such a way that it meets the criterion of over-identification (Byrne, 2016; Hair et al., 2017; SPSS-SA, 2005).

6.5.2.3 Under-identified models

Finally, an under-identified model is one in which the number of parameters to be estimated exceeds the number of variances and covariances (i.e., data points) (Byrne, 2016; Hair et al., 2017; SPSS-SA, 2005). As such, the model contains insufficient information (from the input data) for the purpose of attaining a determinate solution of parameter estimation; that is, an infinite number of solutions are possible for an under-identified model (Schumacker & Lomax, 2016). It is important to note that the specification of an over-identified model is a necessary, but not sufficient, condition to resolve the identification problem. Indeed, the imposition of constraints on particular parameters can sometimes be beneficial in helping the researcher to attain an over-identified model (Byrne, 2016; Hair et al., 2017; SPSS-SA, 2005).

6.5.2.4 Sources of identification problems

Schumacker and Lomax (2016) list the most common sources of identification problems as: (1) too few indicators for one or more of the LVs in the model; (2) the presence of such features as reciprocal paths, feedback loops and correlated residuals; and (3) mistakes – such as neglecting to fix the scale of a LV. As to (1), if you always have three or more indicators per LV, which is a good idea anyway, you should rarely be in trouble (Blunch, 2012; Byrne, 2010; Loehlin, 2004; Schumacker & Lomax, 2016). A case to watch out for is a LV measured by a single indicator. As for (2), features like these are sometimes of central theoretical interest, and if so, they should be included in the model (Blunch, 2012; Byrne, 2010; Loehlin, 2004; Schumacker & Lomax, 2016).

6.5.3 Model estimation

The discussion of model estimation is lengthy, considering that when reporting the results of SEM the researcher only has to state which estimation approach was used. Model estimation refers to whether the parameter estimates are consistent with the covariance/correlation matrix of the observed variables (Blunch, 2012; Byrne, 2010; Kline, 2016; Schumacker & Lomax, 2016). It involves choosing the estimation technique for the specified model (Andreassen et al., 2006). Choosing the appropriate estimation technique depends on the variable scale and the distributional property of the variables used in the model (Blunch, 2012; Byrne, 2010; Kline, 2016; Schumacker & Lomax, 2016). Schumacker and Lomax (2016) further state that, considering that structural models test the parameter estimates in the structural equation for statistical significance, a key issue in estimating a model parameter is the associated standard error. If the standard error is biased or inflated, then the test of statistical significance of a parameter is affected. A model parameter is tested for statistical significance by dividing the parameter estimate by its standard error (Andreassen et al., 2006; Blunch, 2012; Byrne, 2010; Kline, 2016). A discussion of the different estimation methods available in the AMOS programme follows below.

6.5.3.1 Maximum likelihood (ML)

Maximum likelihood (ML) estimation is the preferred estimation method in SEM. Parameters are estimated as the values that have the largest probability of producing the sample covariance matrix, specified as **S** (Andreassen et al., 2006; Bollen, 1989a). ML estimators have several important properties, not least is the fact that the properties are asymptotic so that they hold in large samples (Andreassen et al., 2006; Blunch, 2012; Byrne, 2010; Kline, 2016; Schumacker & Lomax, 2016). Although ML estimators may be biased in small samples, they are asymptotically unbiased and consistent, suggesting that they are asymptotically efficient so

that, among consistent estimators, none has a smaller asymptotic variance. Furthermore, the distribution of the estimator approximates a normal distribution as sample size increases (i.e., they are asymptotically normally distributed) (Andreassen et al., 2006; Blunch, 2012; Byrne, 2010; Kline, 2016; Schumacker & Lomax, 2016). This last property suggests that if you know the standard error of the estimated parameters, then the ratio of the estimated parameter to its standard error should approximate a Z-distribution for large samples.

6.5.3.2 Unweighted least squares (ULS)

Unweighted least squares (ULS) is analogous to ordinary least squares (OLS) in traditional regression: OLS minimises the sum of squared errors and ULS minimises the sum of squared values in the residual matrix (Andreassen et al., 2006; Byrne, 2016; Fan et al., 1999; SPSS-SA, 2005). Like OLS, ULS does not make any distributional assumptions, and ULS is consistent but it is not asymptotically most efficient; one cannot be sure that $C = (n - 1)F\ ULS$ is not evenly asymptotically distributed. ULS also uses an iterative procedure (as do all estimation methods in AMOS) (Andreassen et al., 2006; Arbuckle, 2017; Byrne, 2016; SPSS-SA, 2005).

6.5.3.3 Generalised least squares (GLS)

Just as ULS is analogous to OLS, generalised least squares (GLS) is analogous to weighted least squares (WLS) in traditional regression. OLS gives equal weight to all observations in calculating the regression coefficients (Andreassen et al., 2006; Byrne, 2016; Fan et al., 1999; SPSS-SA, 2005). This will result in inefficient estimates if all observations do not have about the same error variance. The solution to this problem is WLS, where each observation is given a weight proportional to the error variance *Var*(# *i*) (Andreassen et al., 2006; Arbuckle, 2017; Byrne, 2016; SPSS-SA, 2005). In much the same way, GLS weights all elements in the residual matrix, taking variances and covariances of the elements into consideration. GLS has the same asymptotic qualities as ML, and consequently the same tests can be performed. It is worth

noting that GLS can be derived under less restrictive assumptions than ML (Andreassen et al., 2006; Arbuckle, 2017; Byrne, 2016; SPSS-SA, 2005).

6.5.3.4 Scale-free least squares (SLS)

You could say that scale-free least squares (SLS) is ULS based on the correlation matrix and not the covariance matrix, and the two algorithms will therefore give identical results if the correlation matrix is used for ULS estimation (Andreassen et al., 2006; Byrne, 2016; Fan et al., 1999; SPSS-SA, 2005). If used on the covariance matrix, SLS is scale-invariant while ULS is not, i.e., if using ULS, linear transformations of scale for manifest variables will result in solutions that are not directly comparable (Andreassen et al., 2006; Arbuckle, 2017; Byrne, 2016; SPSS-SA, 2005).

6.5.3.5 Asymptotically distribution-free (ADF) estimation

Asymtotically distribution-free (ADF) seems promising as such an estimation method should make it possible to avoid building analysis and conclusions on doubtful assumptions (Andreassen et al., 2006; Fan et al., 1999). ADF estimation requires that the manifest variables have an eight-moment matrix, and it requires a sample size measured in thousands (Andreassen et al., 2006; Arbuckle, 2017; Byrne, 2016; SPSS-SA, 2005).

6.5.4 Model fit/model testing

Hu and Bentler (1999), Kline (2016) and West et al. (2012) distinguish between types of fit indices, sometimes using terms such as absolute fit indices, relative (or comparative) fit indices, parsimony fit indices, and those based on the noncentrality parameter. Kline (2011) makes the distinction between two main classes of fit statistics that he describes as model test statistics (hypothesis testing) and approximate fit indexes (descriptive test statistics). Others (Bollen & Long, 1993; Hu & Bentler, 1995; Kenny, 2019; Schumacker & Lomax, 1996) have argued that these categories are not mutually exclusive because some indexes can be classified under more

than one category. Because of the inconsistency in the literature related to the different classes of fit indices, I have opted to use the categories specified in the AMOS user's manual (Arbuckle, 2017). Generally, the fit criteria of a SEM indicate to what extent the specified model fits the empirical data.

Fit measures in Amos outputs/results are reported for each model specified and for two additional models, called the saturated model and the independence model (Arbuckle, 2017; Blunch, 2012; Byrne, 2010; Schumacker & Lomax, 2016). In the saturated model, no constraints are placed on the population moments and, as such, the saturated model is the most general model possible (Arbuckle, 2017; Blunch, 2012; Byrne, 2010). It is a vacuous model in the sense that it is guaranteed to fit any set of data perfectly. Any Amos model is therefore a constrained version of the saturated model (Arbuckle, 2017; Blunch, 2012; Byrne, 2010). The independence model goes to the opposite extreme. In the independence model, the observed variables are assumed to be uncorrelated with each other (Arbuckle, 2017; Blunch, 2012; Byrne, 2010). When means are being estimated or constrained, the means of all observed variables are fixed at 0 (Byrne, 2010; Schumacker & Lomax, 2016). The independence model is so severely and implausibly constrained that it would provide a poor fit to any interesting set of data (Blunch, 2012; Byrne, 2010).

6.5.4.1 Absolute fit indices

The absolute fit measures indicate the extent to which the model as a whole, both path and measurement together, provides an acceptable fit to the data with no adjustment for overfitting; they do not use an alternative model as a base for comparison (Reisinger & Mavondo, 2007). Absolute fit measures thus judge the fit of a model without reference to other models that could be relevant in the situation. This means that there is no standard or basis relative to which the actual model could be judged (Blunch, 2012; Reisinger & Mavondo, 2007). Schumacker and

Lomax (2016) state that absolute fit indexes are generally interpreted as proportions of the covariances in the sample data matrix explained by the model. For example, if the value of an absolute fit index is .85, then we can say that the model explains 85% of the observed covariances. These indexes are analogous to the r^2 statistics except that they concern model–data matrix correspondence, not explanatory power for individual outcomes. The absolute fit measures discussed here and reported in the results are CMIN/DF, GFI and SRMR. The SRMR results are not automatically provided in Amos but have to be requested using the SRMR plugin.

6.5.4.1.1 CMIN/DF

In AMOS, the chi-square value is called CMIN (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005). If the chi-square is not significant, the model is regarded as acceptable, meaning that the observed covariance matrix is similar to the predicted covariance matrix (i.e., the matrix predicted by the model) (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005). Because the chi-square has several limitations, many practitioners disregard this index (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005). For instance, the chi-square fit index is inaccurate when the assumption of multivariate normality is violated. The chi-square test tends to indicate acceptable fit with complex models (i.e., models with many parameters to be estimated) (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005). Lastly, the chi-square index is sensitive to sample size in that substantively trivial discrepancies can lead to the rejection of an otherwise highly satisfactory model with large enough samples (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005). Conversely, with small enough samples, the chi-square index can be nonsignificant even in the face of gross misfits (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005). Therefore, the CMIN/DF is used

instead (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005). The CMIN/DF value equals the chi-square index divided by the degrees of freedom. This index is less sensitive to sample size and the criterion for acceptance varies across researchers, ranging from less than 2 (Ullman, 2001), less than 3 and less than 5 (Schumacker & Lomax, 2004). The mathematical formulae is:

$$\frac{\hat{C}}{d}$$

Or just simply *CMIN/DF*.

6.5.4.1.2 Goodness-of-Fit index (GFI)

The Goodness-of-Fit index (GFI) is calculated using the weighted sum of squared residuals from a covariance matrix and weighted sums of squared variances and covariances (Arbuckle, 2017; Miles & Shevlin, 2007; Mulaik, 2007; Steiger, 2007). It is similar to the familiar R^2 measure used in OLS regression (Miles & Shevlin, 2007; Mulaik, 2007; Steiger, 2007). The formulae for GFI is:

$$GFI = 1 - \frac{\hat{F}}{\hat{F}_b}$$

OR

$$GFI = 1 - \frac{e'We}{s'Ws}$$

GFI = 1 indicates a perfect fit (Schumacker & Lomax, 1996)

6.5.4.1.3 Standardised Root Mean Square Residual (SRMR)

The Standardised Root Mean Square Residual (SRMR) is an index of the average of standardised residuals between the observed and the hypothesised covariance matrices (Chen, 2007). This absolute fit index can be indicated as follows:

$$SRMR = \sqrt{\frac{\sum_{i=1}^{p}\sum_{j=1}^{i}\left[\left(s_{ij} - \hat{\sigma}_{ij}|s_{ii}s_{jj}\right)\right]^2}{\mathrm{p}(p+1)/2}}$$

where s_{ij} indicates a component of **S** sample covariance matrix and σ_{ij} shows a component of Σ (θ) hypothesised model whereas p is the number of observed variables. SRMR does not give any information about the direction of discrepancies between **S** and Σ (θ) (Kline, 2011; Schermelleh-Engel et al., 2003). Although SRMR indicates the acceptable fit when it produces a value smaller than 0.10, it can be interpreted as the indicator of good fit when it produces a value lower than 0.05 (Hu & Bentler, 1999; Kline, 2011; Schermelleh-Engel et al., 2003). One of the reasons for preferring SRMR index in studies is its relative independence from sample size (Chen, 2007).

6.5.4.2 Relative fit indices

Relative fit indices compare the incremental fit of the model tested to a null model (also called a baseline or independence model) (Reisinger & Mavondo, 2007). Most of these fit indices are computed by using ratios of the model chi-square and the null model chi-square and degrees of freedom for the models. All of them have values that range between approximately 0 and 1.0. Some are "normed" and their values cannot be below 0 or above 1 (e.g., NFI, CFI). Others are "nonnormed" because they may be larger than 1 or slightly below 0 (e.g., TLI, IFI) (Reisinger & Mavondo, 2007). The conventional cutoff for these indices is 0.90 for good fitting models, though there is an argument that this value should be increased to 0.95 (Arbuckle, 2017; Schumacker & Lomax, 1996). Blunch (2008) argues that relative fit measures introduce an explicit basis model, which usually is rather unrealistic, but which nevertheless serves the purpose of making it possible to judge the fit of different models on a common basis.

6.5.4.2.1 Comparative Fit Index (CFI)

The Comparative Fit Index (CFI) compares performance of the specified model to the performance on baseline ("null" or "independence") model (Ding et al., 1995; Gerbing & Anderson, 1992; Schermelleh-Engel et al., 2003). The baseline model assumes zero correlation between all observed variables. The CFI is a more efficient estimator (smaller standard error) because its distribution discards values that the population index cannot possibly take on (Ding et al., 1995; Gerbing & Anderson, 1992; Schermelleh-Engel et al., 2003). The CFI is preferable for reporting the fit of a single model and is straight- forward to interpret and not affected by N (Ding et al., 1995; Gerbing & Anderson, 1992; Schermelleh-Engel et al., 2003). CFI is given by the formulae below, and values close to 1 indicate a very good fit (Ding et al., 1995; Gerbing & Anderson, 1992; Schermelleh-Engel et al., 2003).

$$CFI - 1\frac{\max\left(\hat{C} - d,0\right)}{\max\left(\hat{C}_b - d_b, 0\right)} = 1 - \frac{NCP}{NCP_b}$$

where $\hat{C}$, d, and NCP are the discrepancy, the degrees of freedom, and the noncentrality parameter estimate for the model being evaluated, and $\hat{C}_b$, d_b , and NCP_b are the discrepancy, the degrees of freedom, and the noncentrality parameter estimate for the baseline model.

OR

$$CFI = \frac{\max(x_0^2 - df_0) - \max(x_k^2 - df_k, 0)}{\max(x_0^2 - df_0, 0)}$$

Here max indicates the maximum value of the values given in brackets; χ_0^2 and χ_k^2 are test statistics of the independence model and the target model respectively. The df_0 and df_k are the degrees of freedom of the independence model and the target model in relation to chi-square test statistics respectively (Ding et al., 1995; Gerbing & Anderson, 1992; Schermelleh-Engel et al., 2003).

6.5.4.3 Parsimony

Parsimony adjusted measures introduce a "punishment" for complicating the model by increasing the number of parameters in order to improve the fit (Blunch, 2012; Byrne, 2010). Parsimonious Models with relatively few parameters (and relatively many degrees of freedom) are sometimes said to be high in parsimony, or simplicity. Models with many parameters (and few degrees of freedom) are said to be complex or lacking in parsimony (Blunch, 2012; Reisinger & Mavondo, 2007). The use of the terms "simplicity" and "complexity" does not always conform to everyday usage. For example, the saturated model would be called "complex", while a model with an elaborate pattern of linear dependencies but with highly constrained parameter values would be called "simple" (Blunch, 2012). While one can inquire into the grounds for preferring simple, parsimonious models, there does not appear to be any disagreement that parsimonious models are preferable to complex ones (Blunch, 2012; Byrne, 2010; Reisinger & Mavondo, 2007). When it comes to parameters, all other things being equal, less is more. At the same time, well-fitting models are preferable to poorly fitting ones. Many fit measures represent an attempt to balance these two conflicting objectives viz. simplicity and goodness of fit. I opted to report the Parsimony Goodness-of-Fit Index (PGFI) because of the relative complexity of the model that is being tested.

6.5.4.3.1 Parsimony Goodness-of-Fit Index (PGFI)

The PGFI, suggested by Mulaik et al. (1989), is a modification of the GFI that takes into account the degrees of freedom available for testing the model, where d is the degrees of freedom for the model being evaluated, and d_b is the degrees of freedom for the baseline zero model.

$$PGFI = GFI \frac{d}{d_b}$$

$$d_b = \sum_{g=1}^{G} \text{p}^{*(g)}$$

PGFI values larger than 0.60 are considered to be satisfying (Arbuckle, 2017; Schumacker & Lomax, 1996).

6.5.4.4 Noncentral

Blunch (2012) states that fit measures based on the noncentral chi-square distribution have as their starting point the fact that no model is "correct", that it can only be "approximately correct". Noncentrality-based indices test the degree of rejection of an incorrect model (Arbuckle, 2017; Blunch, 2012; Byrne, 2010; Reisinger & Mavondo, 2007). I report on the root mean square error of approximation (RMSEA) as the noncentrality fit measure despite its having been variously classified by other authors.

6.5.4.4.1 Root mean square error of approximation (RMSEA)

The RMSEA is an index of the difference between the observed covariance matrix per degree of freedom and the hypothesised covariance matrix which denotes the model (Chen, 2007; Savalei, 2012). RMSEA incorporates no penalty for model complexity and will tend to favour models with many parameters (Arbuckle, 2017; Chen, 2007; Savalei, 2012). In comparing two nested models it will never favour the simpler model. In the Amos results the columns labeled LO 90 and HI 90 contain the lower limit and upper limit of a 90% confidence interval on the population value of RMSEA. The formulae for RMSEA is:

$$RMSEA = \sqrt{\frac{\hat{\lambda}_N}{df}} = \sqrt{\frac{max(\chi^2 - df, 0)}{df\ (N-1)}}$$

$$OR$$

$$population\ RMSEA = \sqrt{\frac{F_0}{d}}$$

$$estimated\ RMSEA = \sqrt{\frac{\hat{F}_0}{d}}$$

The limits are given by:

$$LO\ 90 = \sqrt{\frac{\delta_L/n}{d}}$$

$$HI\ 90 = \sqrt{\frac{\delta_U/n}{d}}$$

RMSEA of less than .05 is considered good fit (Arbuckle, 2017; Chen, 2007; Savalei, 2012; Schumacker & Lomax, 1996).

6.5.4.5 Information theoretical fit

Fit measures based on information theory are not used for judging the fit of a single model, but are used in situations where it is necessary to choose among several realistic but different models (Arbuckle, 2017; Blunch, 2012; Byrne, 2010; Reisinger & Mavondo, 2007). I report the Consistent Akaike Information Criterion (CAIC) as the information based theoretic fit index because CAIC is reported only for the case of a single group where means and intercepts are not explicit model parameters.

6.5.4.5.1 Consistent Akaike Information Criterion (CAIC)

Bozdogan's (1987) CAIC is given by the formulae:

$$CAIC = \hat{C} + q(\text{In } N^{(1)} + 1)$$

OR

$$CAIC = f + [1 + \text{In}(N)k$$

CAIC assigns a greater penalty to model complexity than either AIC or BCC, but not as great a penalty as does BIC. I opted to use CAIC because I am only analysing a single group and the construct means are not explicit model parameters.

6.5.5 Modification

The final step in SEM is to modify the model to improve the model fit (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005). SEM software programmes provide modification indices when the sample data does not fit the specified theoretical model. Amos produces results containing modification indices that allows the researcher to evaluate many potential modifications in a single analysis. These results contain suggestions for model modifications that are likely to pay off in smaller chi-square values. The modification index (MI) indicates how much the model-fit chi-square will be reduced if a path is added in the model. Generally, the MIs with the largest values are selected and paths added, followed by a re-run of the analysis (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005).

There are at least two reasons for modifying a SEM model: to improve fit (especially in exploratory work) and to test hypotheses (in theoretical work). In this study, after confirming the measurement model, no modifications were required for the specified latent factor

structural model (Blunch, 2012; Byrne, 2016; Hair et al., 2017; Schumacker & Lomax, 1996; SPSS-SA, 2005).

6.6 Conclusion

SEM has acquired hegemony among multivariate techniques and is the preeminent multivariate method of data analysis among the multivariate techniques. It has been, and continues to be, the technique that is undergoing the most refinements and extensions (Hershberger, 2003). In this chapter I aimed to provide a brief but comprehensive introduction to SEM and to explain the justification for using SEM as the preferred technique for analysing the study data. I explained the basic concepts and types of applications of SEM. I also explained the steps involved in SEM, including model specification, model identification, model estimation, model testing and model modification (Blunch, 2012; Byrne, 2010; Kline, 2016; Schumacker & Lomax, 2016) – with model testing being the primary focus of a study.

It is important to bear in mind that after model testing (model fitting), the specified SEM model can never be accepted, it can only fail to be rejected. This leads researchers to provisionally accept a given model. SEM researchers recognise that in most instances there are equivalent models that fit equally as well as their own provisionally accepted model. Any of these models may be "correct" because they fit the data as well as the preferred model. SEM practitioners do their best to eliminate alternative models, and by extension, alternative explanations. While this is not always possible, it was achieved in this study.

CHAPTER SEVEN

DESCRIPTIVE AND CFA RESULTS

7.1 Introduction

In this chapter the descriptive results of the study are presented, starting with statistics related to the demographics (i.e., age, gender and geographical location) of the participants. This is followed by a discussion of the reliability analysis of the constructs and a presentation of the CFA results. The CFA results are presented and discussed in relation to the initial CFA model, the respecified CFA model, and the second-order CFA model. These models were tested to determine the adequacy of the measuring instrument and to determine if there is evidence to suggest the presence of second-order factors as related to the Ecological Systems theoretical framework that was used to inform the full latent factor SEM that is being tested. Second-order CFA can be used to test the assumption that the correlations among a set of first-order factors is accounted for one or more higher-order factors (Brown, 2006).

7.2 Demographic Descriptive Results

Data were collected from substance abuse treatment centres in the Cape Metropolitan and Gqeberha region, formerly Port Elizabeth. Though 1500 questionnaires were distributed only a sample size of N = 1094 was retained for analysis in this study. Of the missing 406 (27,07%) of the questionnaires, 300 were lost when one of the Gqeberha substance abuse treatment centres moved premises. Data for 56 participants were not included in the analysis due to the participants either being younger than 18 years of age, or the questionnaires being incomplete and/or statistical outliers. Across the sample the average age of the participants was 30 years (std = 8) with the oldest participant being 66 years old. For ease of presentation, in Table 7.1 below, I split the age variable into participants aged 18 to 30 years of age and those aged 31

years of age and older. Though this age split was not theoretically informed and was done for convenience, it is consistent with the WHO Global Health Observatory metadata coding convention (WHO, 2021). This coding convention accommodates for the classification of a wide range of age categories, including the following codes and the related age ranges: AGE18-29 for 18 to 29 years, AGE21-30 for 21 to 30 years and AGE31-50 for 31 to 50 years. Cumulatively, 599 (54.8%) were aged 30 or younger and 495 (45.2%) were 31 or older. In terms of gender across the two provinces 73.4% (n = 803) were males and 26.6% (291) were females. Finally, across the provinces 954 (87%) of the participants were from the Cape Metropolitan region and 140 (13%) from Gqeberha.

Table 7.1

Demographic Descriptive Results

		Province				Total	
		WC		EC			
		N	%	N	%	N	%
Gender	Female	273	28.6%	18	12.9%	291	26.6%
	Male	681	71.4%	122	87.1%	803	73.4%
Age	< 30	511	53.6%	88	62.9%	599	54.8%
	> 31	443	46.4%	52	37.1%	495	45.2%
Total		954	100.0%	140	100.0%	1094	100.0%

7.3 Reliability of Constructs

Reliability is defined as the extent to which a questionnaire produces consistent, stable, or dependable results (Field, 2013; Pretorius, 2007). It encompasses various aspects, and internal consistency is just one component of reliability (Field, 2013; Pretorius, 2007). Internal consistency assesses the consistency of responses across items within the same instrument (Field, 2013; Pretorius, 2007). Crudely put, this is the extent to which all items on a

questionnaire are positively related one to the other, and to the total score (Pretorius, 2007). Internal consistency is often assessed using reliability coefficients, such as Cronbach's alpha, which is the most widely used and reported measure of reliability (Field, 2013; Pretorius, 2007). This coefficient ranges from 0 to 1, where higher values indicate greater internal consistency, that is to say a Cronbach's alpha value above 0.70 should be considered very reliable (Anastasi, 1982; Field, 2013; Pretorius, 2007).

The Cronbach's alpha was thus used to measure the internal reliability of the various constructs contained in the questionnaire. The results of the analysis are presented in Table 7.2 below.

Table 7.2

Internal Consistency of the Constructs

Construct	*No. Items*	*Cronbach alpha*
Intra-Family Communication (IFC)	3	0.90
Healthy/positive peer support (PPS)	3	0.92
Self-efficacy (SE)	3	0.82
Substance Abuse (SA)	3	0.81
Fitting in (FI)	3	0.89
Religiosity (Rel)	3	0.89
Community traditions and belonging (CTB)	3	0.97
Public displays of SU (PDSU)	3	0.94
Ambiguities about criminal behaviour (AACB)	3	0.95
Risk of exclusion (REP)	3	0.68
Access/proximity to drugs (APTD)	3	0.86
Concerns for future (CFF)	3	0.84

The results displayed in Table 7.2 above show that Cronbach's alpha values range between .68 (REP) and .965 (CTB). To achieve construct reliability, the Cronbach's alpha value should exceed 0.7 (Anastasi, 1982; Field, 2013). The results presented in Table 7.2 show that, except for the construct REP (= .675), all the Cronbach's alpha values computed for the constructs are

above the 0.7 threshold. This demonstrates that, with the exception of REP, the remaining items achieved high internal consistency in measuring their respective constructs. Measurement reliability can therefore be confirmed for the remaining 11 constructs used in the model.

The following section reports on CFA results that are presented in two phases following the recommendations made by Anderson and Gerbing (1988) and others (Hair et al., 2010; Hoyle & Isherwood, 2013; Kline, 2016) who recommend that SEM be conducted using a two-step approach.

7.4 Confirmatory Factor Analysis Results

Though SEM theory and programmes are equipped to simultaneously analyse a measurement model (factor analysis) and structural model (path analysis), theorists and practitioners recommend that the analysis of a SEM with latent factors be done in two stages (Anderson & Gerbing, 1988; Hair et al., 2010). That is, to test the measurement part (CFA) of the model followed by testing the structural part of the model. Though conducting CFA is not the focus of this study, it is important to conduct CFA and report the results of the CFA for two reasons. Firstly, it is recommended that CFA be conducted when using LVs in a model, and secondly, to ensure that the questionnaire used in the study measures what it claims to measure, i.e., construct validity. Conducting CFA is thus important as it ensures that the researcher can be confident in the claims made regarding the nature and relationships between the variables in the study. Further, the estimated model relationships, viz. the estimated strength of the relationships between the LVs, can only be meaningfully interpreted if construct validity is established (Peter & Churchill, 1986). Researchers therefore have to ensure that the measurement model being tested captures what they intend to measure (Campbell & Fiske, 1959). Consequently, researchers must employ different construct validity subtypes to evaluate their results, e.g., discriminant validity and convergent validity (Sarstedt & Mooi, 2014).

According to Kline (2023), discriminant validity concerns the prediction that scores from two or more tests claimed to measure different constructs should not appreciably covary, and convergent validity involves the hypothesis that scores from two or more tests claimed to measure the same construct should appreciably covary.

Different fit indices should also be assessed to determine if the model is a satisfactory fit for the data (Byrne, 2016; Kline, 2023). Besides assessing the model fit indices for the first order CFA models (see Figure 3 and Figure 4 below), I also present and discuss the results for the discriminant validity and convergent validity analysis of the first order CFA models. This is followed by a discussion on the second order CFA (Figure 5). Before discussing the results, we first need to understand what discriminant validity and convergent validity is, why it is necessary to conduct these analyses and what tests and information to look out for.

7.4.1 Discriminant validity

Hair et al. (2014) define discriminant validity as the extent to which constructs in a conceptual model are conceptually distinct from each other. Discriminant validity is regarded as one of the key building blocks of model evaluation and its assessment has become common practice in SEM studies. Establishing discriminant validity ensures that a construct measure is empirically unique and represents phenomena of interest that other measures in a structural equation model do not capture (Hair et al., 2010; Shah & Goldstein, 2006; Shook et al., 2004).

Discriminant validity requires that a factor or construct not correlate too highly with other factors or constructs from which it is supposed to differ (Campbell, 1960; Henseler et al., 2015). If discriminant validity is not established, it suggests that the constructs have an influence on the variation of more than just the observed variables to which they are theoretically related. The researcher therefore cannot be certain that the results confirming hypothesised structural

paths are real or whether they are a result of statistical discrepancies (Farrell 2010; Hair et al. 2010).

Discriminant validity in SEM is also assessed by evaluating the heterotrait-monotrait ratio of correlations (HTMT), which is a relatively new method for assessing discriminant validity (Gaskin et al., 2019). The HTMT criterion clearly outperforms classic approaches to discriminant validity assessment, such as Fornell-Larcker criterion and (partial) cross-loadings, which are largely unable to detect a lack of discriminant validity (Gaskin et al., 2019).

7.4.2 Convergent validity

Convergent validity is the extent to which the construct converges in order to explain the variance of its indicators (Byrne, 2016; Kline, 2023). The metric used for evaluating a construct's convergent validity is the average variance extracted (AVE) for all indicators on each construct (Byrne, 2016; Kline, 2023). The AVE indicates how much of the indicators' variance can be explained by the latent unobserved variable (Kline, 2023). An AVE greater than 0.50 provides empirical evidence for convergent validity (Bagozzi & Yi, 2012), as the corresponding latent variable explains more than half of the variance in the belonging indicators (Kline, 2023). According to Kline (2023), poor convergent validity is evidenced in instances where loadings for indicators of the same factor are not uniformly positive, and relatively high in the standardised solution suggests that the model has too few factors.

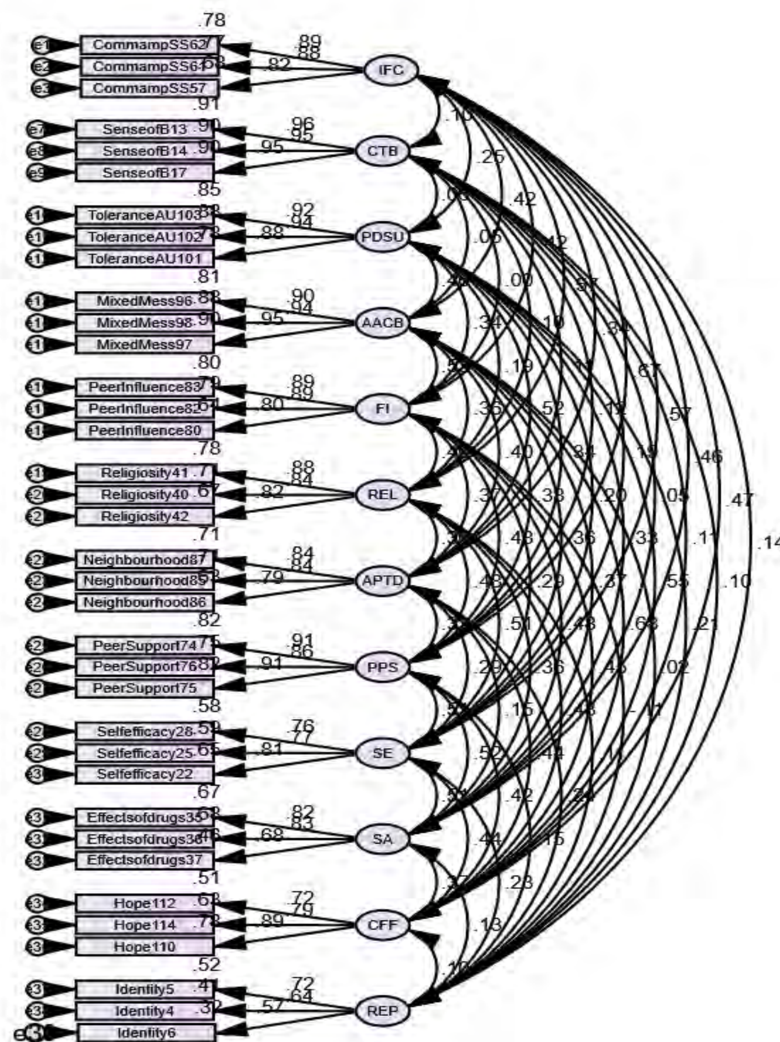
7.4.3 Discriminant validity and convergent validity results

In order to assess the instrument's discriminant validity and convergent validity, the AMOS Master Validity plugin developed by Gaskin et al. (2019) was used. This plugin produces outputs that contain CR, AVE and HTMT values. Below I present and discuss the discriminant validity and convergent validity results for the initial CFA (Figure 3), the respecified CFA (Figure 4) and the second order CFA (Figure 5) models.

Figure 3 below displays the specified initial CFA model which contains 36 observed indicators, 36 errors variances, 36 factor loadings, 12 latent factors and 132 inter-factor correlations. The model thus contains 702 distinct sample moments, 174 distinct parameters to be estimated that equal 528 degrees of freedom (702 – 174 = 528); the model is thus recursive.

Figure 3

Initial CFA Model



At this stage, a detailed discussion of the model in Figure 3 above is not necessary. It is sufficient to mention at this stage, based on the pattern/structure coefficients, that the loadings indicate strong relationships between the first-order factors and their indicators. (See Appendix I for the full factor results and the inter-factor correlations for the initial CFA model.) The inter-factors correlation also falls within the acceptable range.

The model fit statistics for the initial CFA model shown in Table 7.3 below is related to Figure 3 above.

Table 7.3

Model Fit Statistics for the Initial CFA Model

	Initial CFA		
Measure	Estimates	Threshold	Interpretation
CMIN	1117.00	--	--
DF	528.00	--	--
CMIN/DF	2.12	Btw* 1 and 3	Excellent
CFI	0.98	>0.95	Excellent
SRMR	0.03	<0.08	Excellent
RMSEA	0.03	<0.06	Excellent
PClose	1	>0.05	Excellent

* Between

As seen in the results in Table 7.3 above, the model is an excellent fit to the data (CMIN/DF = 2,12, CFI = 0.98, SRMR = 0.03 and RMSEA 0.03). Further discriminant and convergent validity results were thus assessed for their appropriateness, as presented in the proceeding discussion.

Table 7.4 below shows the composite reliability (CR), average variance extracted (AVE) and maximum reliability (MaxR(H)) of the 12 latent constructs. The square root of the AVE is shown on the diagonals in bold face, which indicates the convergent validity.

Table 7.4

Validity Analysis

	CR	AVE	MSV	MaxR(H)	IFC	CTB	PDSU	AACB	FI	REL	APTD	PPS	SE	SA	CFF	REP
IFC	0.90	0.75	0.45	0.90	**0.86**											
CTB	0.97	0.90	0.04	0.97	0.10**	**0.95**										
PDSU	0.94	0.84	0.30	0.94	0.26***	0.06†	**0.91**									
AACB	0.95	0.86	0.46	0.95	0.42***	0.05	0.46***	**0.93**								
FI	0.90	0.74	0.29	0.91	0.42***	0.01	0.34***	0.53***	**0.86**							
REL	0.89	0.72	0.32	0.89	0.57***	0.10**	0.20***	0.36***	0.40***	**0.85**						
APTD	0.87	0.68	0.27	0.87	0.34***	0.12***	0.52***	0.40***	0.37***	0.30***	**0.83**					
PPS	0.92	0.80	0.45	0.92	0.67***	0.12***	0.34***	0.38***	0.48***	0.48***	0.33***	**0.89**				
SE	0.82	0.61	0.32	0.82	0.57***	0.19***	0.20***	0.36***	0.30***	0.51***	0.29***	0.51***	**0.78**			
SA	0.82	0.60	0.27	0.83	0.46***	0.05	0.33***	0.37***	0.48***	0.36***	0.15***	0.52***	0.51***	**0.78**		
CFF	0.84	0.64	0.46	0.87	0.48***	0.11***	0.55***	0.68***	0.46***	0.43***	0.44***	0.42***	0.44***	0.37***	**0.80**	
REP	0.68	0.42	0.06	0.69	0.14***	0.10**	0.21***	0.02	0.11**	0.11**	0.24***	0.16***	0.28***	0.14***	0.10**	**0.65**

Note. CR = Composite Reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Variance; MaxR(H) = McDonald Construct Reliability; AVE = (∑ squared standardised loadings) / (∑ squared); CR = (∑ standardised loading) standardised loading + ∑ IME)2 / (∑ standardised loading)2 + ∑ IME) where IME (indicator measurement error) = 1 – standardised loading. The square root of the AVE is shown on the diagonal in bold face.
† $p < 0.100$. * $p < 0.050$. ** $p < 0.010$. *** $p < 0.001$.

As can be seen from Table 7.4 above, the construct REP shows discriminant validity and convergent validity concerns. This is evident by the CR = 0.68 (< 0.70) and the AVE = 0.41 (< 0.50) for REP both being lower than the required criteria (CR ≥.70 and AVE ≥ .50 respectively), suggesting that there are concerns with the measurement of the latent factor. This supports the reliability results in Table 7.2 above for construct REP that showed a Cronbach's alpha of .68, which is less than the recommended .70. The modification suggestion to drop the indicator Identity6 to improve the CR and AVE was not statistically and theoretically helpful, as a result the alternative approach, viz. dropping the construct REP, was considered. I have not included the lower and upper-level confidence tables associated with Figure 3 above because the construct REP is shown to have discriminant validity and convergent validity concerns.

Though the CR and AVE for the factor REP were lower than the required cut-off values, the other constructs still had good discriminant validity, as indicated by the values in the HTMT analysis and shown in Table 7.5 below.

Table 7.5

HTMT Analysis

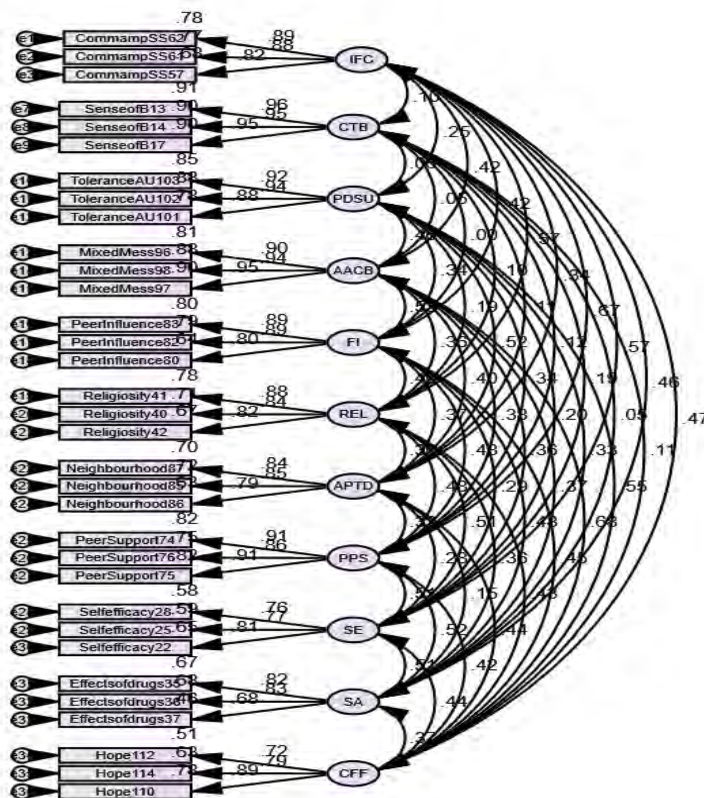
	IFC	CTB	PDSU	AACB	FI	REL	APTD	PPS	SE	SA	CFF
CTB	0.10	---									
PDSU	0.26	0.05	---								
AACB	0.43	0.05	0.46	---							
FI	0.43	0.01	0.36	0.55	---						
REL	0.58	0.10	0.19	0.36	0.42	---					
APTD	0.35	0.11	0.52	0.40	0.38	0.30	---				
PPS	0.68	0.12	0.34	0.38	0.50	0.48	0.33	---			
SE	0.57	0.19	0.20	0.36	0.30	0.52	0.29	0.51	---		
SA	0.48	0.05	0.34	0.39	0.53	0.39	0.17	0.53	0.50	---	
CFF	0.47	0.10	0.54	0.67	0.48	0.42	0.44	0.42	0.42	0.38	---
REP	0.14	0.11	0.21	0.02	0.00	0.11	0.25	0.15	0.23	0.13	0.08

As can be seen from the values in the HTMT analysis table (Table 7.5) above, the scales still had good discriminant validity, as indicated by all the values in the matrix being less than the ideal cut-off value of 0.85 (Byrne, 2016; Gaskin et al., 2019; Kline, 2023).

Due to the CR and AVE concerns with the construct REP discussed above, as well as the fact that only the three best indicators were retained to measure it (as discussed in Section 6.3.1 in Chapter Six), the logical solution was to drop the factor from the model. As such the model was respecified, excluding REP, and then tested again as shown in Figure 4 below.

Figure 4

Respecified CFA Model



The respecified CFA model in Figure 4 above contains 33 observed indicators, 33 errors variances, 33 factor loadings, 11 latent factors and 110 inter-factor correlations. The model thus contains 594 distinct sample moments, 154 distinct parameters to be estimated that equals 440 degrees of freedom (594 – 154 = 440) and the model is recursive. The factor loadings and inter-factor correlations are attached in Appendix J. The factor loadings are all above .70 and the inter-factor correlations are within the acceptable range.

The model fit statistics for the respecified CFA model are shown in Table 7.6 below and is related to Figure 4 above.

Table 7.6

Fit Indices for the Respecified CFA

	Respecified CFA		
Measure	Estimates	Threshold	Interpretation
CMIN	955.79	--	--
DF	440.00	--	--
CMIN/DF	2.17	Btw* 1 and 3	Excellent
CFI	0.98	>0.95	Excellent
SRMR	0.03	<0.08	Excellent
RMSEA	0.03	<0.06	Excellent
PClose	1	>0.05	Excellent

* Between

As can be seen, the fit indices (CMIN/DF = 2,17; CFI = 0.98; SRMR = 0.03; and RMSEA = 0.03) show that the model is an excellent fit to the data. Before the model in Figure 4 above can be retained, the discriminant validity and convergent validity results must be examined.

Table 7.7 below contains the discriminant validity and convergent validity results for the respecified CFA model related to Figure 4 above.

Table 7.7

Modified Validity Analysis

	CR	AVE	MSV	MaxR(H)	IFC	CTB	PDSU	AACB	FI	REL	APTD	PPS	SE	SA	CFF
IFC	0.9	0.75	0.45	0.90	0.86										
CTB	0.97	0.9	0.04	0.97	0.10**	0.95									
PDSU	0.94	0.84	0.30	0.94	0.26***	0.058†	0.91								
AACB	0.95	0.86	0.46	0.95	0.42***	0.05	0.46***	0.93							
FI	0.9	0.74	0.29	0.91	0.42***	0.01	0.34***	0.53***	0.86						
REL	0.89	0.72	0.32	0.89	0.57***	0.10**	0.19***	0.36***	0.40***	0.85					
APTD	0.87	0.68	0.27	0.87	0.34***	0.11***	0.52***	0.40***	0.37***	0.30***	0.83				
PPS	0.92	0.8	0.45	0.92	0.67***	0.12***	0.34***	0.38***	0.48***	0.48***	0.33***	0.89			
SE	0.82	0.61	0.32	0.82	0.57***	0.19***	0.20***	0.36***	0.29***	0.51***	0.29***	0.51***	0.78		
SA	0.82	0.6	0.27	0.83	0.46***	0.05	0.33***	0.37***	0.48***	0.36***	0.15***	0.52***	0.51***	0.78	
CFF	0.84	0.64	0.46	0.87	0.47***	0.11***	0.55***	0.68***	0.46***	0.43***	0.44***	0.42***	0.44***	0.37***	0.80

Note. CR = Composite Reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Variance; MaxR(H) = McDonald Construct Reliability; AVE = (∑ squared standardised loadings) / (∑ squared); CR = (∑ standardised loading) standardised loading + ∑ IME)2 / (∑ standardised loading)2 + ∑ IME) where IME (indicator measurement error) = 1 – standardised loading. The square root of the AVE is shown on the diagonal in bold face.
† $p < 0.100$. * $p < 0.050$. ** $p < 0.010$. *** $p < 0.001$.

As can be seen from the Table 7.7 above, the discriminant validity and convergent validity issues for the 11 latent constructs were resolved by dropping the construct REP. This is evidenced by all the CRs being > 0.7 and all the AVEs > 0.5 showing very good discriminant validity and convergent validity, respectively. The discriminant validity between the latent constructs is also established, as shown by all the values on the diagonal being greater than the inter-construct correlations. For example, viewing the correlation matrix, it is clear that the construct CTB is the only factor that has negligible and nonsignificant correlations with other latent factors, specifically the factors PDSU = *r .058, p > .05*; AACB = *r .05, p > .05*; FI = *r .01, p > .05* and SA = *r .05, p > .05.*

Table 7.8 below shows the upper and lower confidence intervals for the CRs and AVEs. This is another way of determining if the results are significant or not.

Table 7.8

Modified Validity Analysis and Confidence Intervals

	CR	AVE	Lower 95% CR	Upper 95% CR	Lower 95% AVE	Upper 95% AVE
IFC	0.90	0.75	0.86	0.93	0.67	0.82
CTB	0.97	0.90	0.95	0.98	0.87	0.93
PDSU	0.94	0.84	0.91	0.96	0.78	0.89
AACB	0.95	0.86	0.93	0.97	0.81	0.91
FI	0.90	0.74	0.86	0.93	0.67	0.81
REL	0.89	0.72	0.84	0.92	0.64	0.79
APTD	0.87	0.68	0.82	0.90	0.60	0.76
PPS	0.92	0.80	0.89	0.95	0.72	0.85
SE	0.82	0.61	0.75	0.87	0.50	0.70
SA	0.82	0.60	0.75	0.87	0.51	0.69
CFF	0.84	0.64	0.79	0.88	0.56	0.71

As stated above, another way to determine if the results are significant is to interpret the lower and upper confidence interval for each of the CRs and AVEs individually. As is evident for

both the CRs and AVEs, none of the latent factors' lower to upper bound values pass through zero, suggesting that they are all significant.

The HTMT analysis tables, as well as the associated lower and upper confidence intervals, show that the constructs have sufficient discriminant validity because, at the very least, we need values less than .9, with values less than .85 in the HTMT analysis being more robust.

Table 7.9

HTMT Analysis

	IFC	CTB	PDSU	AACB	FI	REL	APTD	PPS	SE	SA
IFC	---									
CTB	0.10	---								
PDSU	0.26	0.05	---							
AACB	0.43	0.05	0.46	---						
FI	0.43	0.01	0.36	0.55	---					
REL	0.58	0.10	0.19	0.36	0.42	---				
APTD	0.35	0.11	0.52	0.40	0.38	0.30	---			
PPS	0.68	0.12	0.34	0.38	0.50	0.48	0.33	---		
SE	0.57	0.19	0.20	0.36	0.30	0.52	0.29	0.51	---	
SA	0.48	0.05	0.34	0.39	0.53	0.39	0.17	0.53	0.50	---
CFF	0.47	0.10	0.54	0.67	0.48	0.42	0.44	0.42	0.42	0.38

These tables confirm that there is good discriminant validity between the latent constructs, as shown by all the values of the HTMT analysis being less than the ideal cut-off value of 0.85.

Table 7.10 below shows the lower and upper confidence intervals for the HTMT analysis for Figure 4 above.

Table 7.10

HTMT Analysis Lower and Upper Confidence Intervals

	IFC	CTB	PDSU	AACB	FI	REL	APTD	PPS	SE	SA
IFC	---									
CTB	0.03 ~ 0.17	---								
PDSU	0.16 ~ 0.36	0.00 ~ 0.12	---							
AACB	0.34 ~ 0.51	0.00 ~ 0.12	0.36 ~ 0.54	---						
FI	0.32 ~ 0.53	0.00 ~ 0.08	0.25 ~ 0.45	0.47 ~ 0.61	---					
REL	0.48 ~ 0.64	0.03 ~ 0.17	0.08 ~ 0.29	0.26 ~ 0.45	0.31 ~ 0.51	---				
APTD	0.23 ~ 0.44	0.03 ~ 0.18	0.44 ~ 0.58	0.29 ~ 0.48	0.25 ~ 0.46	0.18 ~ 0.40	---			
PPS	0.60 ~ 0.74	0.06 ~ 0.19	0.24 ~ 0.43	0.28 ~ 0.48	0.40 ~ 0.59	0.38 ~ 0.57	0.20 ~ 0.44	---		
SE	0.47 ~ 0.64	0.12 ~ 0.26	0.06 ~ 0.30	0.26 ~ 0.44	0.15 ~ 0.42	0.41 ~ 0.60	0.15 ~ 0.39	0.41~ 0.60	---	
SA	0.37 ~ 0.57	0.00 ~ 0.13	0.25 ~ 0.43	0.29 ~ 0.44	0.44 ~ 0.61	0.25 ~ 0.50	0.01~ 0.30	0.43 ~ 0.61	0.36 ~ 0.59	---
CFF	0.38 ~ 0.55	0.02 ~ 0.18	0.44 ~ 0.61	0.60 ~ 0.72	0.38 ~ 0.55	0.33 ~ 0.50	0.33 ~ 0.52	0.33 ~ 0.50	0.31 ~ 0.51	0.26 ~ 0.48

As can be seen from Table 7.10 above, the lower and upper confidence intervals for the HTMT analysis confirms what was stated above, which is that the construct CTB is the only factor that has negligible and nonsignificant correlations with the factors PDSU = .05 (95% CI: 0.00 ~ 0.12, p > .05), AACB = .05 (95% CI: 0.00 ~ 0.00) p > .05, FI = .01 (95% CI: 0.00 ~ 0.08) and SA = 0.05 (95% CI: 0.00 ~ 0.13). The HTMT analysis shows that there is good discriminant validity between the latent constructs.

7.5 Assessment of Multicollinearity

Following this process, I also assessed if there were multicollinearity concerns between the LVs. This is another important procedure as the test for multicollinearity allows the researcher to determine if there is inter-correlation between the LVs. To assess multicollinearity, we need to assess the Tolerance values, the variance inflation factor (VIF) values, Eigenvalues and the conditioned index values. These are all displayed in the tables below.

Table 7.11

Coefficients

Model		Unstandardised Coefficients		Standardised Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-4.15E-17	0.02		0.00	1.00		
	SE	0.443	0.03	0.44	15.26	0.00	0.48	2.09
	PPS	0.173	0.03	0.18	5.67	0.00	0.40	2.53
	APTD	-0.276	0.03	-0.28	-10.75	0.00	0.59	1.68
	REL	-0.053	0.03	-0.06	-1.96	0.05	0.52	1.94
	FI	0.332	0.03	0.34	12.54	0.00	0.54	1.86
	AACB	0.007	0.03	0.01	0.23	0.82	0.41	2.46
	PDSU	0.248	0.03	0.26	9.32	0.00	0.51	1.96
	CTB	-0.034	0.02	-0.04	-1.77	0.08	0.94	1.07
	IFC	0.044	0.03	0.05	1.34	0.18	0.35	2.87
	CFF	-0.061	0.03	-0.06	-1.78	0.08	0.33	3.06

In the coefficients table (Table 7.11) above, we are looking for Tolerance values > 0.2 and VIF < 5.0 as evidence that there is no multicollinearity between the IVs. Examination of the respective columns show that all the IVs have a Tolerance value > 0.2 and VIF < 5.0, indicating that there are no multicollinearity issues between the IVs in the study.

In the collinearity table (Table 7.12) below, we need to examine the Eigenvalue column for values close to zero (e.g., 0.001) and the conditioned index column for values < 15. Eigenvalues provide an indication of how many distinct dimensions there are among the IVs. When several Eigenvalues are close to zero, the variables are highly intercalated and a small change in the value leads to a large change in the estimation of the coefficients' means, therefore the Eigenvalues must not be close to zero. If these are in order, then the full SEM is valid.

Table 7.12

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions										
				(Constant)	SE	PPS	APTD	REL	FI	AACB	PDSU	CTB	IFC	CFF
1	1	4.753	1	0	0	0	0.01	0.01	0	0.01	0.01	0	0	0.01
	2	1.288	1.921	0	0.1	0	0.05	0.04	0	0.03	0.1	0.05	0	0.01
	3	1.009	2.17	0	0	0	0.03	0.01	0	0	0.02	0.75	0	0
	4	1	2.18	1	0	0	0	0	0	0	0	0	0	0
	5	0.657	2.69	0	0	0	0.25	0	0.1	0.18	0.08	0.09	0	0.03
	6	0.592	2.834	0	0.1	0.1	0.02	0.01	0.4	0.03	0.01	0.08	0	0.08
	7	0.518	3.029	0	0	0.2	0.28	0.32	0	0	0.1	0	0	0
	8	0.397	3.459	0	0.2	0	0.26	0.49	0	0.06	0.28	0.01	0	0.01
	9	0.335	3.767	0	0.6	0	0.05	0	0.2	0.07	0.12	0.01	0.3	0.02
	10	0.233	4.513	0	0	0.3	0.01	0.11	0.2	0.51	0	0	0.3	0.33
	11	0.217	4.677	0	0	0.4	0.04	0	0	0.12	0.29	0.01	0.4	0.52

[a] Dependent Variable: SA.

Looking at the Eigenvalues column in the table (Table 7.12) above, we see that none of the values in the Eigenvalues column are close to 0. The conditioned index column also shows that all the values are < 15. We can therefore be certain of the validity of the instrument used and the constructs, and we can interpret the SEM analysis with confidence.

7.6 CFA Difference Test

Before we move on to the analysis of the second order factors, we need to analyse the main difference in the fit indices for the two models and determine if the difference between the two models is statistically significant. As can be seen from Table 7.13 below, there are differences in the chi-square (CMIN), the DF and the CMIN/DF between the two models. This table is a combination of Table 7.3 and Table 7.6 and was produced for ease of reference.

Table 7.13

Side-by-Side Fit Indices for Initial and Respecified CFA

	Initial CFA	Respecified CFA		
Measure	Estimates	Estimates	Threshold	Interpretation
CMIN	1117.00	955.79	--	--
DF	528.00	440.00	--	--
CMIN/DF	2.12	2.17	Btw* 1 and 3	Excellent
CFI	0.98	0.98	>0.95	Excellent
SRMR	0.03	0.03	<0.08	Excellent
RMSEA	0.03	0.03	<0.06	Excellent
PClose	1	1	>0.05	Excellent

* Between

The difference between the CMIN, DF and CMIN/DF for the initial CFA and respecified CFA is due to the differences in the number of distinct sample moments and the number of distinct parameters that are estimated. To determine if the two CFA models are significantly different from each other we can use the following formulae:

$$\chi^2_{diff} = \chi^2_{Initial\ CFA} - \chi^2_{Respecified\ CFA}$$

$$df_{diff} = df_{Initial\ CFA} - df_{Respecifed\ CFA}$$

$$\chi^2{}_{diff} = 1117.00 - 955.79 = 161.21$$

$$df_{diff} = 528 - 440 = 88$$

The $\chi^2{}_{diff}$ and df_{diff} values were inserted into https://www.socscistatistics.com/pvalues/chidistribution.aspx and produced a P-Value < .00001 and showed that the result is significant at $p < .05$. Since the initial CFA and the respecified CFA are shown to be significantly different from each other, and since it is logical to retain the respecified CFA model because it proved to have better construct validity, I was interested to see if there was evidence for second order constructs. This was also important since the full latent SEM is theorised to contain second order factors that are theorised to present the domains of EST.

7.7 Second Order Factor Analysis

After establishing that the questionnaire had satisfactory construct validity and because the full latent path model in Figure 5 (see below) contains second order factors (Micro, Meso, Macro), an examination of the second order factors commenced. This was deemed appropriate even though the inter-factor correlation of the respecified CFA was not more than 0.70 (see Appendix J for the correlation estimates for the respecified CFA in Figure 4).

Figure 5, specified below, was specifically done to examine the presence of second order factors. The model was estimated using ML estimation. The model contains 24 indicators, 34 error terms, eight first order factors, three second order factors, 32 regression paths and three correlations. The model has 324 distinct sample moments, 75 distinct parameters to be estimated, 249 degrees of freedom (324 – 75 = 249), and the model is recursive.

Figure 5

Second Order Factor Model

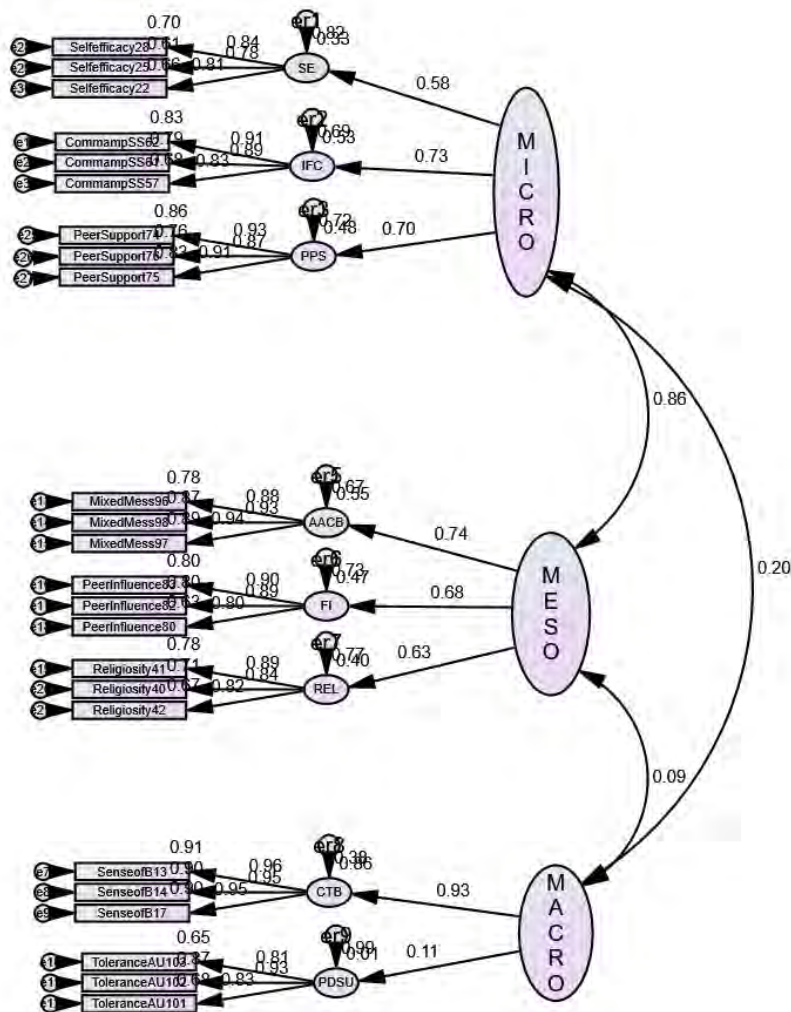


Figure 5 above represents a second order CFA model displaying standardised estimates. As can be seen, the standardised factor loadings associated with the second-order factors ranges from moderate (Micro to SE = .58) to substantial (Macro to CTB = .93), with the exception of the second order factor Macro and the first order factor PDSU that have a factor loading of 0.11. There is a strong positive correlation (r = .86) between Micro and Meso, and a small

positive correlation (r = .20) between Micro and Macro – modest positive correlation (r=.30). There is negligible positive correlation (r = .09) between Meso and Macro.

The model fit indices for the second order factor model suggest that the model is a poor fit to the data. Table 7.14 below shows the fit indices for the second order model with the interpretation.

Table 7.14

Second Order Factor Model Fit Indices

	Second Order CFA		
Measure	Estimates	Threshold	Interpretation
CMIN	1299.82	--	--
DF	249	--	--
CMIN/DF	5.22	Btw* 1 and 3	Poor
CFI	0.95	>0.95	Acceptable
SRMR	0.12	<0.08	Poor
RMSEA	0.06	<0.06	Acceptable
PClose	0	>0.05	Poor

* Between

As can be seen, the model shows poor model fit to the data. This was expected since the inter-factor correlation of the respecified CFA model were not exceedingly high (See Appendix K). We therefore examine the standardised regression estimates and the bootstrap estimates to assess where the possible issues are that are resulting in the poor model fit indices. From Figure 5 above it seems that the high correlation between Micro and Meso, and the low factor loading from Macro to PDSU, are potentially problematic. Table 7.15 below contains the normal theory regression estimates for the second order factor model.

Table 7.15

Second Order CFA

			Estimate	S.E.	C.R.	P
SE	<---	M_I_C_R_O	0.576			
IFC	<---	M_I_C_R_O	0.726	0.108	13.89	***
PPS	<---	M_I_C_R_O	0.695	0.1	13.744	***
AACB	<---	M_E_S_O	0.74			
FI	<---	M_E_S_O	0.684	0.051	16.884	***
REL	<---	M_E_S_O	0.634	0.047	15.719	***
CTB	<---	M_A_C_R_O	0.926			
PDSU	<---	M_A_C_R_O	0.106	0.014	3.049	0.002

*** = P < 0.001

From Table 7.15 above we can see that the standard errors, critical ratio's and p-values are not calculated for Micro to SE, Meso to AACB and Macro to CTB. This is because those parameters needed to be restricted for the model to be tested. This was done to achieve identifiability at the second level (Byrne, 2016; Kline, 2023). Even though the fit indices for the second order CFA shows poor fit to the data, Table 7.15 shows that none of the estimates for the second order factors are greater than one (> 1.) and are significant ($p < 0.01$). Further, though there are no clear acceptable guides for what the S.E. scores should be, the literature suggests that the values should not be too high or too low, which is interpreted as > .95 and < .01 (Byrne, 2016; Hancock & Liu, 2012; Kline, 2023). Because C.R. is regarded as a *Z*-score, values ≥ 1.96 are regarded as significant (Byrne, 2016). As such, all the relationships are significant, this being confirmed by the P values column ($p < .01$). Even though there are low inter-factor correlations (as in the respecified CFA) and the poor model fit indices (as with the second order CFA), the regression estimate results suggest that it would be acceptable to test for the presence of second order factors under normal theory conditions if there is a theoretical reason to do so. In this instance the theoretical reason to test for the presence of second order factors is that the primary purpose of the study is to assess whether the specified SE model that is informed by EST adequately fits the data.

Next, I assess the bootstrap estimates, since the data does not meet the assumption of a normal distribution of scores (Byrne, 2016; Hancock & Liu, 2012; Kline, 2023). Table 7.16 below contains the results of the bootstrap analysis. As can be seen, the first column, labelled *S.E.*, contains bootstrap estimates of standard errors. These estimates may be compared to the approximate standard error estimates obtained by normal theory maximum likelihood estimation in Table 7.16. The second column, labelled *S.E.-S.E.*, gives an approximate standard error for the bootstrap standard error estimate itself. The column labelled *Mean* represents the average parameter estimate computed across bootstrap samples. It is important to note that the bootstrap mean does not necessarily need to be identical to the original estimate. The column labelled *Bias* gives the difference between the original estimate and the mean of estimates across bootstrap samples. If the mean estimate across bootstrapped samples is higher than the original estimate, then *Bias* will be positive. The column, labelled *S.E.-Bias*, gives an approximate standard error for the bias estimate.

Table 7.16

Second Order CFA Bootstrap Estimates

Parameter			**SE**	**SE-SE**	**Mean**	**Bias**	**SE-Bias**	**Estimate**	**Lower**	**Upper**	**P**
SE	<---	MICRO	0.05	0	0.57	-0.006	0	0.58	0.455	0.65	0.004
IFC	<---	MICRO	0.03	0	0.72	-0.004	0	0.73	0.658	0.77	0.004
PPS	<---	MICRO	0.03	0	0.69	-0.004	0	0.7	0.617	0.75	0.004
AACB	<---	MESO	0.03	0	0.74	-0.001	0	0.74	0.683	0.78	0.004
FI	<---	MESO	0.03	0	0.68	-0.002	0	0.68	0.615	0.74	0.004
REL	<---	MESO	0.05	0	0.63	-0.007	0	0.63	0.527	0.71	0.004
CTB	<---	MACRO	0	0	0.93	0	0	0.93	0.92	0.93	0.004
PDSU	<---	MACRO	0.05	0	0.11	0.001	0	0.11	-0.001	0.21	0.053

The bootstrap estimates confirm the normal theory estimates showing the potential for the presence of three second order factors. The indicator for Micro to SE = 0.58 (95% CI: 0.46 ~ 0.65), $p < .01$; Micro to IFC = 0.73 (95% CI: 0.66 ~ 0.77), $p < .01$; Micro to PPS = 0.7 (95% CI: 0.62 ~ 0.75), $p < .01$; Meso to AACB = 0.74 (95% CI: 0.68 ~ 0.78), $p < .01$; Meso to FI =

0.68 (95% CI: 0.62 ~ 0.74), p < .01; Meso to REL = 0.63 (95% CI: 0.53 ~ 0.71), p < .01. Macro to CTB = 0.93 (95% CI: 0.92 ~ 0.93), p < .01; Macro to PDSU = 0.11 (95% CI: -0.001 ~ 0.21), p > .05. As can be seen, only Macro to PDSU is not significant. With two first order factors there seems to be no evidence to support the presence of the Macro second order factor. All the other indicators are significant, as can been seen by the fact that none of the lower and upper confidence levels pass zero, and from all the p < .01. These results confirm that the low factor loading between Macro and PDSU is what is contributing to the poor fit statistics. Even so, all the other statistics suggest that it would be acceptable, if there is a theoretical reason, to specify and test for the presence of second order factors.

Table 7.17 below shows the standardised and bootstrap correlation estimates for the second order CFA. The purpose of presenting this is to further determine what parts of the second order CFA are contributing to the poor fit indices shown in Table 7.14 above.

Table 7.17

Correlation

	Estimate	**SE**	**SE-SE**	**Mean**	**Bias**	**SE-Bias**	**Lower**	**Upper**	**P**
MICRO <--> MESO	0.86	0.06	0.002	0.859	-0.001	0.003	0.74	0.967	0.004
MACRO <--> MESO	0.088	0.05	0.001	0.087	-0.001	0.002	-0.007	0.18	0.058
MACRO <--> MICRO	0.196	0.04	0.001	0.198	0.002	0.002	0.112	0.284	0.004

As can be seen from these results, the correlation between Micro and Meso = 0.86 (95% CI: 0.74 ~ 0.97), p < .01 and Macro and Micro = 0.2 (95% CI: 0.11 ~ 0.28), p < .01, are significant. Whereas the correlation between Macro and Meso is not significant = 0.09 (95% CI: -0.007 ~ 0.18), p > .05. This poses a problem to the overall fit statistics for the second order CFA model in Figure 5 above, and thus contributes to the poor fit indices. The results in this table (Table 7.17 above) show that the correlations between Macro and Meso and the low factor loadings

between Macro and PDSU (Table 7.15 and Table 7.16 above) together contribute to the poor fit indices for the second order CFA model.

7.8 Conclusion

This chapter reported and discussed the demographical results of the study participants as well as the CFA analysis in the form of model fit statistics. I also discussed the convergent validity, discriminant validity and multicollinearity of the items of the SASUCRI. As reported, only those items that had a high factor loading (> 0.4) in the CFA analysis were retained in the latent factor path analysis. The initial CFA model had construct validity concerns, with the factor REP being dropped from the model. After dropping the factor REP, SASUCRI showed acceptable construct validity in the factors. The second order factor analysis showed poor fit indices and therefore is not considered a good fit to the data. However, evidence from the standardised and bootstrap estimates and correlations only identified two areas of concern. These were the non-significant path between Macro second order factor and the first order factor PDSU, as well as the non-significant correlations between the second order factors Macro and Meso. These concerns are considered negligible since there is clear theoretical justification for the specification of second order factors (Byrne, 2016; Hancock & Liu, 2012; Kline, 2023).

This chapter argues that conducting CFA is important for latent path SEM as it ensures that the researcher can be confident in the claims made regarding the nature and relationships between the variables in the study. This chapter also showed that the SASUCRI had sufficient construct validity, ensuring that it measures what it intended to measure.

CHAPTER EIGHT

SEM RESULTS

8.1 Introduction

This chapter presents the main findings of the study, which are the results of the full Latent Path (LP) model.

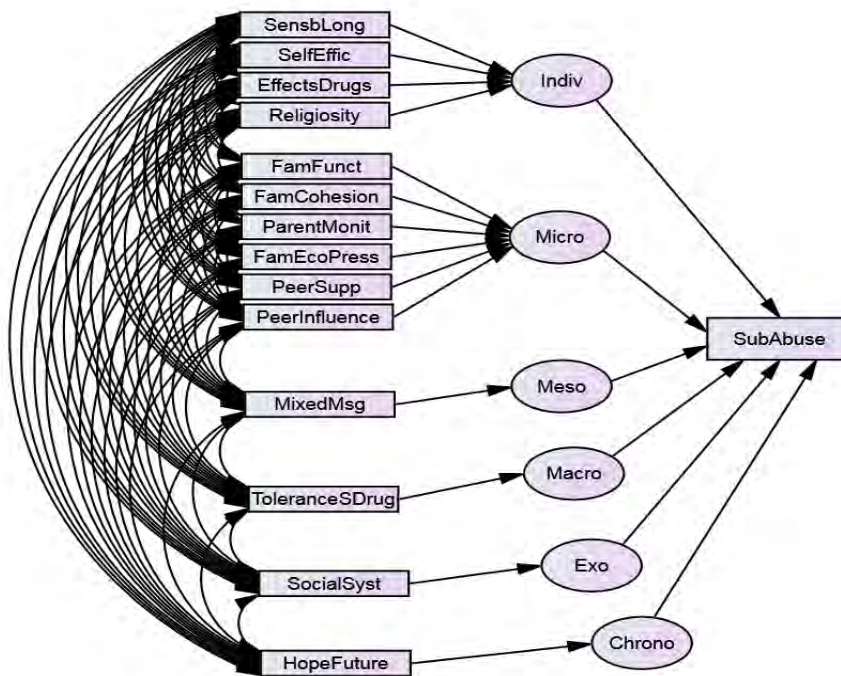
Before I commence with a discussion of the results of the full Latent Path (LP) model, displayed in Figure 7 (see below), it is important to detail the process and steps involved. First, to recap, as stated in Chapter Six, all SEMs start with a theory to be tested. A diagrammatical representation, approximating the theory as accurately as possible, is then generated in a visual model, known as the conceptual model. The purpose of the conceptual model is to approximate the theory being tested and to present it as a visual model as accurately as possible. This model thus becomes the theoretical or conceptual model being tested. It is important to bear in mind that the conceptual model may not always be statistically testable. Figure 6 below is an example of a conceptual model that is not statistically testable. Below I discuss why the model in Figure 6 is not statistically testable and why the model in Figure 7 is statistically testable.

8.2 Conceptual Model (Figure 6)

The conceptual model shown in Figure 6 below displays a path diagram with hypothesised direct, indirect and inter-correlation paths related to individual and contextual factors that have been theorised to influence (predict) substance abuse. The model further displays the underlying exosystemic factors, as emphasised by EST, that are related to the individual and contextual environment of the substance abuser. The hypothesis being tested with this conceptual model (Figure 6) is: Which of the factors best directly predict substance abuse; and which interaction amongst the individual and contextual factors best predict substance abuse.

Figure 6

Conceptual Model



The theoretical model above (Figure 6) can be regarded as a means-construct regression model (Hoyle, 2012) and represents factors that have been identified in the literature as influencing substance abuse. The observed variables (rectangles) in the model represent mean scores of the scales of the SASUCRI and not the observed indicators (items or questions on the questionnaire) themselves. The SASUCRI, as discussed in Chapter Five, was developed to measure factors in an individual's internal and social environment that influence substance abuse (Florence, 2014). Statistically this theoretical model is not properly specified and cannot be tested. This is because SEM does not allow for correlations across factors (scales), and the

arrows from the mean constructs (the rectangles = *X*) to the latent factors (the ellipses = *Y*) are reversed as the estimate (the line with the arrowhead) is a regression line that suggests that Y is comprised of X (that is the latent factor is comprised of the mean construct). The arrows should go the other way (Byrne, 2016; Kline, 2023; SPSS-SA, 2005). The theoretical model shown in Figure 7 below meets all the statistical and theoretical conditions specified in the SEM literature and is therefore deemed theoretically sound and statistically testable. The results for this model follows below.

8.3 Results for the Full Latent Factor SEM

The figure below (Figure 7) is the model being tested and is the primary focus of the study. The model specified in Figure 7 represents an example of a full LP SEM with theoretically informed second order factors that represent the best approximation of the identified individual and contextual factors that influence or predict substance abuse. Specifying and testing this model's fit to the data represents the main purpose of the study. As such, the discussion that follows, related to model specification and testing, comprises the results of the study and is presented following the steps specified by Byrne (2016) and others (Boomsma et al., 2012; Kline, 2023; McDonald & Ho, 2002). These steps include detailing the model specification, model identification, model estimation, model testing and model interpretation.

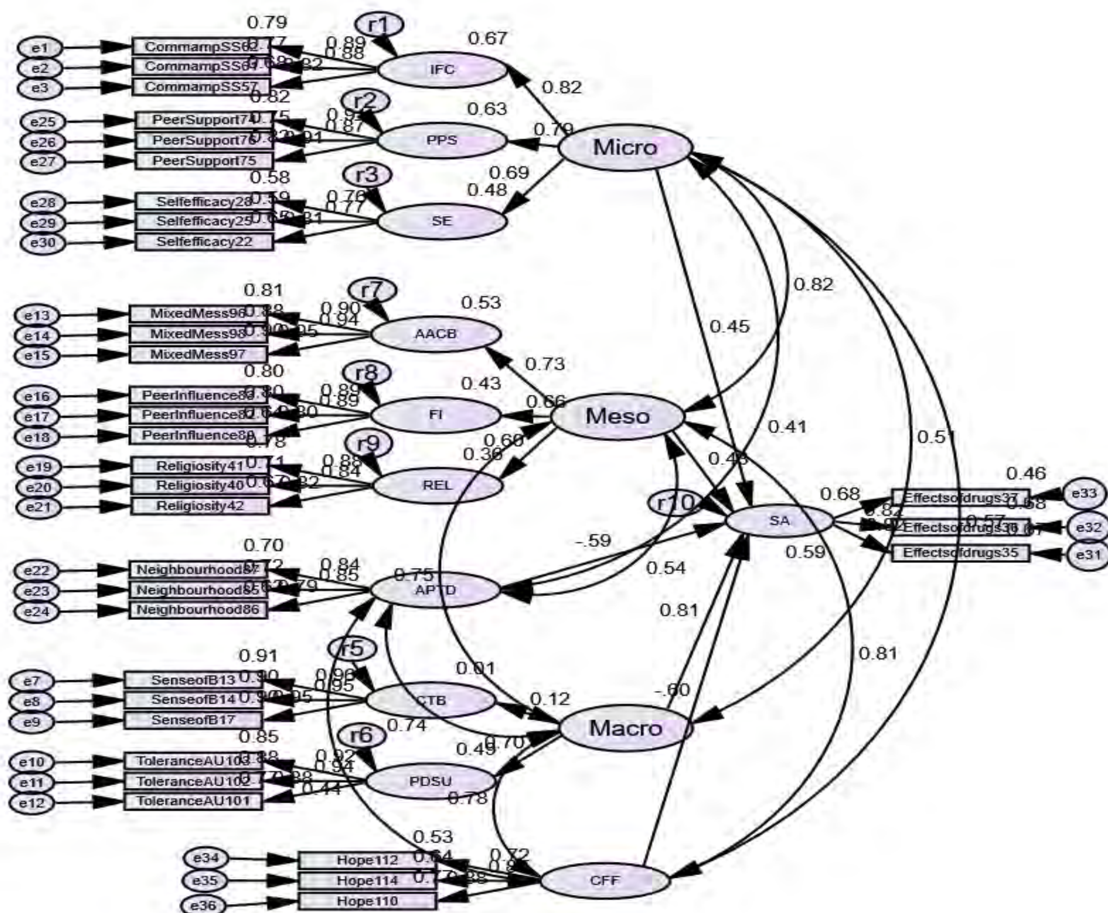
8.3.1 Model specification

Model specification involves drawing a theoretically informed diagram and determining every relationship and parameter in the model to be tested (Arbuckle, 2017; Byrne, 2016; J. McDonald, 2009; Schumacker & Lomax, 2016). If a theoretical model is mis-specified, it could yield biased parameter estimates which would result in estimation error (Arbuckle, 2017; Byrne, 2016; R. P. McDonald, 2004; Schumacker & Lomax, 2016). Estimation error occurs when the parameter estimates differ from what they are in the "true" population (Arbuckle,

2017; Byrne, 2016; J. McDonald, 2009; Schumacker & Lomax, 2016). As we typically do not know the true population model, bias in the parameter estimate is attributed to an error in the model specification (Blunch, 2012; Byrne, 2016). Figure 7 below is the theoretically informed specified model of interest in the current study.

Figure 7

Full SEM with Second Order Factors



Full SEM with second order factors.

The model in Figure 7 above consists of 33 measured indicators with their error variance, 11 LVs and nine disturbance variances, three second order factors, five regression paths and 10 correlations. Firstly, we need to assess if the model fit shows adequate fit to the data, and then we assess all the path and correlation estimates. Logically, I was expecting an interaction between the LVs, but the purpose of the study is to examine the nature, direction and magnitude of the interaction.

8.3.2 Model identification

A model is identified if the degrees of freedom are equal to or greater than 1 (df ≥ 1) (Blunch, 2012; Byrne, 2016; SPSS-SA, 2005). A df = 0 indicates a saturated model, suggesting that all the parameters are being estimated and would be regarded as a just-identified model (Blunch, 2012; Byrne, 2016; SPSS-SA, 2005). Negative degrees of freedom suggest an under-identified model because more parameters are being estimated than are distinct values being measured (Blunch, 2012; Byrne, 2016; SPSS-SA, 2005). The goal is to obtain an over-identified model which specifies fewer paths or variable relations (Blunch, 2012; Byrne, 2016; SPSS-SA, 2005).

8.3.2.1 Model variables

As shown below, there are 89 variables in the model which are comprised of 33 observed variables and 56 unobserved variables. There are also 47 exogenous variables and 42 endogenous variables.

Number of variables in the model: 89

Number of observed variables: 33

Number of unobserved variables: 56

Number of exogenous variables: 47

Number of endogenous variables: 42

8.3.2.2 Model identification produced outputs

Number of distinct sample moments:	561
Number of distinct parameters to be estimated:	88
Degrees of freedom (561 – 88):	473

The model identification produced outputs shows that there are 561 distinct sample moments with 88 distinct parameters to be estimated that results in degrees of freedom of 473 (df = 561 – 88 = 473), the model is recursive.

The model being acyclic or recursive suggests that there are no feedback loops between variables, i.e., the relationship between the variables is not bi-directional. As discussed in Section 6.3.4, a recursive model also implies that if you were to follow every path in the diagram you would not pass through the same variable twice. The model is over-identified, meaning that it is scientifically accurate and statistically testable (Blunch, 2012; Byrne, 2016; SPSS-SA, 2005).

8.3.3 Model estimation

A hypothesised theoretical model can have parameters estimated using several different estimation methods (as discussed in Chapter Six, Section 6.5.3). The method of ML estimation is the default in most SEM computer programmes, and most structural equation models described in the literature are analysed with this method. The use of an estimation method other than ML requires explicit justification (Hoyle, 2000; Kline, 2016). The ML estimation is used when assumption of multivariate normality (acceptable skewness and kurtosis) is met, there are no missing data, no outliers, and continuous variable data (Andreassen et al., 2006; Byrne, 2016; Kline, 2023; SPSS-SA, 2005). Having non-normal data can lead to chi-square values being inflated and thus can lead researchers to start making changes or alterations in a model that are not really needed (Byrne, 2016; Kline, 2023; SPSS-SA, 2005).

In practice it is not always possible to have normally distributed data, and to address the issue of having non-normal data one can look for multivariate outliers, and deleting these might address the issues in a small sample (Byrne, 2016; Gao et al., 2008). However, the best and most frequently used technique to address non-normality is to use the full information maximum likelihood (FIML) estimation along with bootstrapping in the analysis (Hancock & Liu, 2012; Kline, 2023; SPSS-SA, 2005). Bootstrap analysis can be used to estimate the standard errors of a particular model parameter estimate or a fit statistic. It can also be used to calculate confidence intervals for these statistics (Arbuckle, 2017; Byrne, 2016; Hancock & Liu, 2012; Schumacker & Lomax, 2016). Bootstrapping methods are applied in SEM to estimate standard errors for non-normal or categorical data, and when there are missing data (Arbuckle, 2017; Byrne, 2016; Hancock & Liu, 2012; Schumacker & Lomax, 2016; SPSS-SA, 2005). The bootstrap method treats a random sample of data as a substitute for the population (pseudo population), and re-samples from it a specified number of times to generate sample bootstrap estimates and standard errors (Arbuckle, 2017; Byrne, 2016; Hancock & Liu, 2012; Schumacker & Lomax, 2016; SPSS-SA, 2005). This study used the FIML method of estimation and applied bootstrapping to estimate standard errors as the data were not normally distributed. Because the FIML method of estimation was used the GFI, PGFI and CAIC fit indices are not reported. This is because the AMOS program does not produce these when using FIML.

8.3.4 Model testing

In model testing we determine how well our data fit the measurement and structural model (Blunch, 2012; Byrne, 2016; SPSS-SA, 2005). We examine the extent to which the theoretical model is supported by the sample data (Blunch, 2012; Byrne, 2016; SPSS-SA, 2005). To do this we check the model fit indices for the fit of the entire model and examine the specific tests for the statistical significance of the individual parameters in the model (Blunch, 2012; Byrne, 2016; Hooper et al., 2008; Mulaik, 2007; Schermelleh-Engel et al., 2003; SPSS-SA, 2005).

Table 8.1 below shows the fit statistics, which is the model testing results, for the specified model in Figure 7 (see above). Model testing and the different fit-indices were discussed in Chapter Six.

Table 8.1

Latent Path SEM Fit Indices

Measure	Estimate	Threshold	Interpretation
CMIN	1334.08	--	--
DF	473.00	--	--
CMIN/DF	2.82	Btw* 1 and 3	Excellent
CFI	0.97	>0.95	Excellent
SRMR	0.05	<0.08	Excellent
RMSEA	0.04	<0.06	Excellent
PClose	1	>0.05	Excellent

* Between

As can be seen from Table 8.1 above, the model fits the data excellently, with all the fit criteria above or below the recommended cut-off values CMIN/DF = 2.82, NFI = .946, CFI = .97, RMSEA = .04. The model thus shows an excellent fit to the data.

8.3.5 Model modification

As is evident from Figure 7 above, no modifications were implemented. Modification normally involves adding more correlations between the error terms, and between error terms and any of the latent/endogenous variables (Blunch, 2012; Byrne, 2016; SPSS-SA, 2005).

8.3.6 Model interpretation

Model interpretation refers to the process of providing meaningful insights from the various and numerous results of a SEM analysis.

8.3.6.1 Dependent variable

Examining the model in Figure 7 above, we start at the DV substance abuse (SA) located to the right of the diagram. We can observe that SA is measured by the three manifest variables

Effectsofdrugs35, Effectsofdrugs36 and Effectsofdrugs37, with a factor loading of .82, .82 and .68 respectively. In SA, 59% of the variance is explained by the variables in the model with a 95% confidence.

8.3.6.2 Predictor variables

With 561 distinct sample moments and 88 distinct parameters to be estimated, equalling a *df* = 473, the minimum was achieved for fitting the model, and the model is recursive. The chi-square test and significant *p* suggest that the model is a poor fit to the data (χ^2 = 1334.08, p < .001). However, in terms of what has been stated under Section 6.5.4.1.1 above, the chi-square significance test is disregarded under conditions of model complexity and large sample sizes. Examining the different fit criteria CMIN/DF = 2.82, CFI = .97, SRMR = .05, RMSEA = .04 and PClose = 1 suggests that the model is an excellent fit to the data. The model explained 59% of the variance in SA.

Next, we need to evaluate the significance of the different estimates. Table 8.2 below shows the normal theory unstandardised regression estimates.

Table 8.2

Normal Theory Standardised Estimates (Regression Weights)

Parameter			Estimate	S.E.	C.R.	P
SA	<---	Micro	0.45	0.17	3.29	0.00
SA	<---	Meso	0.43	0.29	1.82	0.07
SA	<---	APTD	-0.59	0.06	-10.44	***
SA	<---	Macro	0.81			
SA	<---	CFF	-0.60	0.12	-4.71	***

As is evident in Table 8.2 above, the significance test for the parameter for Macro to SA is not estimated because it needed to be constrained to 1 for the bootstrap analysis to be generated. As can be seen, Meso does not significantly predict SA (0.43, (0.29) p = 0.07). Conversely, Micro (0.45, (0.17), p <.01), APTD (-0.59, (0.06), p <.01), and CFF (-0.57, (0.12), p <.01) all

significantly predict SA ($p < 0.05$). The bootstrap analysis in Table 8.3 below needs to be assessed for the same variables.

Table 8.3

Bootstrapped Standardised Estimates

Parameter			Mean	Bias	SE-Bias	Estimate	Lower CI 95%	Upper CI 95%	P
SA	<---	Micro	0.40	-0.05	0.02	0.45	-0.10	0.80	0.15
SA	<---	Meso	0.53	0.10	0.04	0.43	-0.17	1.59	0.31
SA	<---	APTD	-0.60	-0.01	0.01	-0.59	-0.76	-0.46	0.01
SA	<---	Macro	0.82	0.00	0.00	0.81	0.74	0.90	0.01
SA	<---	CFF	-0.65	-0.05	0.02	-0.60	-1.28	-0.28	0.01

The bootstrap analysis above, still with Macro to SA constrained, now also shows the significance test results for the parameter. The results show that only APTD mean = -0.60, SE = .01, p = .01 (95% CI: -0.76 ~ -0.46), Macro mean = .82, SE = .00, p = .01 (95% CI: -0.74 ~ -0.90), and CFF mean = -0.65, SE = 0.02, p = .01 (95% CI: -1.28 ~ -0.28) significantly predicts SA $p < 0.05$. As can be seen, there is a discrepancy between the normal theory estimation and bootstrap estimation in relation to the Microsystem predicting SA. Normal theory indicates that Micro significantly predicts SA (Micro = 0.45, (0.17), $p < .01$), whereas the bootstrap estimation indicates that it does not significantly predict SA (Micro = 0.45, mean 0.40, SE = 0.02, p = .15, (95% CI: -0.10 ~ 0.80)).

The implications of this result for the hypothesis being tested are discussed below. Table 8.4 below shows the alternative hypothesis statements and the test decision based on the null hypothesis (H_0).

Table 8.4

Hypothesis Test

Alternate Hypothesis statement	β	*p*	Decision based on H_0
H_1: The Microsystem in which an individual interacts significantly predicts substance abuse.	.40	> .05	Fail to reject
H_2: The Mesosystem in which an individual interacts significantly predicts substance abuse.	.53	> .05	Fail to reject
H_3: APTD (Exosystem) significantly predicts substance abuse.	-.60	< .05	Reject
H_4: The Macrosystem in which an individual interacts significantly predicts substance abuse.	.82	< .05	Reject
H_5: CFF (Chronosystem) significantly predicts substance abuse.	-.65	< .05	Reject

In SEM a good fitting model with nonsignificant paths is preferred over a poor fitting model with significant paths. This provides evidence that the model in Figure 7 above is an excellent approximation of factors that predict substance abuse in this sample.

8.4 Residual Examination

Table 8.5 below provides further diagnostic information and is important to examine as even good fitting models can have unacceptable degrees of error between the data and the sample implied matrix.

Table 8.5

Standardised Residual Covariances

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1 Hope110	0.00																																
2 Hope114	-0.05	0.00																															
3 Hope112	-0.57	1.16	0.00																														
4 Effectsofdrugs37	1.56	0.53	1.90	0.00																													
5 Effectsofdrugs36	0.84	-0.24	0.18	-0.48	0.00																												
6 Effectsofdrugs35	-1.10	-1.26	-0.80	-0.45	0.44	0.00																											
7 Selfefficacy22	1.44	0.48	-0.09	0.36	2.87	1.97	0.00																										
8 Selfefficacy25	2.11	0.28	-0.79	0.06	2.50	1.94	-0.18	0.00																									
9 Selfefficacy28	0.83	1.12	-0.80	-1.17	1.48	0.99	0.05	0.16	0.00																								
10 PeerSupport75	-0.73	-1.25	-1.34	2.76	0.73	0.21	-0.94	-1.06	-1.54	0.00																							
11 PeerSupport76	-0.43	0.01	-0.33	1.18	-0.07	-0.21	0.46	-0.44	0.45	-0.17	0.00																						
12 PeerSupport74	-0.42	-0.66	-0.68	1.55	0.04	-0.22	-0.69	-1.35	-1.82	0.09	0.03	0.00																					
13 Neighbourhood86	1.74	1.24	-1.46	0.21	-0.74	-0.49	0.97	1.93	1.07	0.83	0.53	0.72	0.00																				
14 Neighbourhood85	-0.78	-0.17	-0.82	2.07	-1.03	-0.40	-0.48	0.00	-1.01	-0.44	-0.38	0.18	-0.23	0.00																			
15 Neighbourhood87	-0.11	0.09	-0.20	3.23	-0.49	0.16	-0.71	-0.12	-0.65	-0.53	0.17	-0.27	-0.06	0.21	0.00																		
16 Religiosity42	-0.77	-1.68	-0.69	3.24	-0.75	-0.82	3.20	**4.12**	3.13	2.54	3.00	1.90	0.12	-0.38	-0.84	0.00																	
17 Religiosity40	-0.80	-1.96	-1.73	3.34	-0.71	-0.52	**4.49**	3.69	3.89	1.16	2.18	1.90	0.31	-0.35	-1.34	-0.11	0.00																
18 Religiosity41	-1.09	-1.79	-2.09	3.88	-1.21	-1.01	**4.17**	3.86	3.04	2.11	2.66	2.24	0.12	-0.97	-0.94	0.04	0.03	0.00															
19 PeerInfluence80	0.30	-1.36	1.77	**7.40**	2.20	2.39	0.16	-0.39	-0.19	3.36	3.93	3.97	1.16	1.38	1.00	2.09	2.30	1.60	0.00														
20 PeerInfluence82	-2.10	-2.99	0.49	**6.36**	-0.36	0.40	-2.57	-1.45	-2.48	0.33	0.67	1.00	-0.61	1.36	0.37	0.29	0.56	-0.87	-0.32	0.00													
21 PeerInfluence83	-2.89	-3.39	-0.07	**6.14**	0.29	1.21	-2.47	-2.15	-2.45	0.70	0.59	1.13	-0.63	0.56	-0.62	0.31	0.11	-1.08	-0.17	0.23	0.00												
22 MixedMess97	2.89	0.76	1.60	0.83	-2.03	-1.56	-1.45	-0.84	-1.77	-2.64	-2.01	-2.40	1.77	0.44	-0.77	-1.95	-1.75	-2.31	2.86	0.83	1.11	0.00											
23 MixedMess98	2.92	1.15	2.03	1.10	-2.30	-1.96	-1.28	-0.85	-1.43	-2.80	-1.44	-2.26	0.77	-0.52	-0.68	-1.97	-1.51	-2.11	3.01	1.24	0.82	0.00	0.00										
24 MixedMess96	2.48	0.33	1.77	1.23	-2.51	-1.89	-0.49	-0.69	-0.96	-2.84	-1.80	-2.24	1.38	-0.24	-0.80	-1.76	-1.33	-1.90	3.37	1.42	1.07	0.00	0.00	0.00									
25 ToleranceAU101	0.83	-0.48	-0.78	2.07	-0.26	-0.34	-1.67	-1.45	-1.55	1.05	1.09	1.85	0.26	0.55	-0.16	-3.47	-2.53	-3.39	2.61	0.64	-0.91	3.10	1.97	2.40	0.00								
26 ToleranceAU102	0.67	-0.37	-0.62	1.61	-0.80	-0.43	-1.68	-0.75	-1.36	0.97	0.15	1.46	0.34	-0.43	-0.07	-2.93	-3.22	-3.33	1.23	-0.26	-1.62	2.40	1.73	2.10	-0.04	0.00							
27 ToleranceAU103	0.47	-1.15	-1.11	2.00	-0.53	0.01	-1.13	-0.43	-0.99	1.73	1.07	2.37	0.09	-0.35	-0.08	-3.10	-3.04	-2.48	1.76	0.46	-1.76	2.21	1.60	1.83	0.00	0.02	0.00						
28 SenseofB17	1.36	1.10	-0.43	-0.16	0.99	1.06	**5.02**	**4.94**	**5.92**	3.13	2.71	3.34	1.04	1.82	1.08	1.78	1.79	1.91	-0.99	-0.94	-1.86	0.11	0.39	0.08	-0.66	1.02	0.61	0.00					
29 SenseofB14	0.65	0.06	-0.95	-0.34	-0.51	-1.20	2.14	2.63	3.33	1.39	0.57	1.19	0.19	0.62	-0.19	0.94	0.80	1.43	-1.19	-1.40	-2.22	-0.76	-0.67	-0.80	-1.01	0.54	-0.08	-0.01	0.00				
30 SenseofB13	0.15	-0.10	-1.29	-0.62	-0.53	-0.80	2.55	2.57	3.45	1.83	1.28	1.89	-0.29	-0.12	-0.73	0.76	0.65	0.84	-1.30	-1.40	-2.36	-1.46	-1.39	-1.32	-1.23	0.14	-0.53	0.00	0.01	0.00			
31 CommampSS57	0.85	0.63	-0.97	1.69	-0.41	-0.87	0.32	0.06	-0.57	1.94	2.05	1.39	1.47	0.77	0.86	**4.31**	**5.35**	**4.64**	2.21	0.00	-0.49	-0.75	-0.74	-0.73	0.46	0.15	0.54	2.65	0.40	0.62	0.00		
32 CommampSS61	0.96	0.87	-0.68	0.16	-1.63	-2.45	0.18	0.37	0.23	0.72	0.12	-0.68	0.83	-0.94	-0.37	3.27	**4.21**	3.51	0.81	-1.18	-0.98	-1.44	-1.39	-1.37	-1.41	-1.66	-0.98	2.45	0.75	0.87	-0.35	0.00	
33 CommampSS62	-0.52	0.17	-1.30	0.63	-2.36	-1.97	-0.32	-0.20	-0.29	0.37	0.73	-0.71	0.40	-0.72	-0.67	3.60	3.39	3.58	0.91	-1.40	-1.49	-2.90	-2.51	-1.99	-1.59	-2.19	-1.58	2.45	-0.14	0.41	-0.08	0.26	0.00

Bold values are > 4 and suggests unacceptable degree of error

When examining the residuals in the sample, implied matrix values less than 2.5 are acceptable, but more than 4 suggests an unacceptable degree of error; low values are therefore indicative of good fit between the data and the sample implied matrix (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 2016; SPSS-SA, 2005). Indicators that had a correlation of more than 4 were: Religiosity42 + Selfefficacy25 (r = 4,12); Religiosity40 + Selfefficacy22 (r = 4.49); Religiosity41 + Selfefficacy22 (r = 4.17); PeerInfluence80 + Effectsofdrugs37 (r = 7.40); PeerInfluence82 + Effectsofdrugs37 (r = 6.36); PeerInfluence83 + Effectsofdrugs37 (r = 6.14); SenseofB17 + Selfefficacy22 (r = 5.02); SenseofB17 + Selfefficacy25 (r = 4.94); SenseofB17 + Selfefficacy28 (r = 5.92); CommampSS57 + Religiosity42 (r = 4.31); CommampSS57 + Religiosity40 (r = 5.35); CommampSS57 + Religiosity41 (r = 4.64); CommampSS61 + Religiosity40 (r = 4.21). This shows that though the model fits the data well, it would be beneficial to refine these items (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 2016; SPSS-SA, 2005). In the context of this study these 13 problematic correlations of a total of 561 correlations are not a cause for concern since the percentage of problematic correlation is only 2.32% (Blunch, 2012; Byrne, 2016; Schumacker & Lomax, 2016; SPSS-SA, 2005).

8.5 Inter-Correlations

Next, we need to examine the model's normal theorem inter-factor covariances in order to determine the size and strength of the inter-factor covariances. Table 8.6 below contains the results for the model covariances.

Table 8.6

Model Covariances

	Estimate	S.E.	C.R.	P	Label
Meso <--> Micro	0.82	0.02	33.42	***	par_32
Micro <--> Macro	0.52	0.04	11.61	***	par_33
Meso <--> Macro	0.75	0.04	17.73	***	par_34
Meso <--> APTD	0.66	0.05	14.26	***	par_37
APTD <--> CFF	0.69	0.06	10.95	***	par_38
APTD <--> Macro	0.90	0.05	18.14	***	par_39
CFF <--> Micro	0.73	0.05	15.13	***	par_40
APTD <--> Micro	0.50	0.04	11.47	***	par_41
Meso <--> CFF	1.04	0.05	20.00	***	par_43
CFF <--> Macro	1.00	0.06	18.00	***	par_44

The normal theory covariance table above (Table 8.6) shows the outputs for the covariances between the latent predictor variables. The table shows that all the estimates are in good order as none are > 1. Similarly, the S.E. values are in the acceptable range of < .95 and > .001 and C.R. values are > 1.96. All covariances are also significant ($p < .001$). To confirm if these estimates are accurate, we need to again examine the bootstrap outputs in the table (Table 8.7) below.

Table 8.7

Bootstrapped Covariances

Parameter	SE	SE-SE	Mean	Bias	SE-Bias	Lower	Upper	P
Meso <--> Micro	0.06	0.00	0.81	0.00	0.00	0.67	0.89	0.02
Micro <--> Macro	0.08	0.00	0.51	-0.01	0.01	0.39	0.65	0.01
Meso <--> Macro	0.06	0.00	0.75	-0.01	0.00	0.65	0.83	0.01
Meso <--> APTD	0.08	0.00	0.66	0.00	0.01	0.53	0.79	0.01
APTD <--> CFF	0.12	0.01	0.70	0.01	0.01	0.53	0.92	0.01
APTD <--> Macro	0.07	0.00	0.89	-0.01	0.01	0.76	1.00	0.01
CFF <--> Micro	0.08	0.00	0.74	0.00	0.01	0.60	0.86	0.01
APTD <--> Micro	0.09	0.00	0.51	0.01	0.01	0.37	0.65	0.01
Meso <--> CFF	0.08	0.00	1.04	0.00	0.01	0.91	1.17	0.01
CFF <--> Macro	0.09	0.01	0.99	-0.01	0.01	0.85	1.16	0.01

The table above (Table 8.7) shows the outputs for the bootstrap covariances between the latent predictor variables. The table again shows bootstrapped estimates with the associated 95%

bias-corrected confidence intervals. We can therefore have confidence that the covariances (←→) between the LVs are significant. The LVs with the highest covariances are Meso and CFF (mean = 1.04, S.E = .08, p = < .05, CI = 95%) and Macro and CFF (mean = .99, S.E = .09, p = < .05, CI = 95%). The lowest covariance is between Micro and APTD (mean = .51, S.E = .09, p = < .05, CI = 95%) and Macro and Micro (mean = .51, S.E = .08, p = < .05, CI = 95%). The bootstrap covariance estimates do not contradict the normal theory unstandardised covariance estimates.

The normal theory standardised correlation estimates are presented in Table 8.8 below. We can observe that none of the correlation estimates are > .90 or lower than < .30, indicating that they are within the acceptable range.

Table 8.8

Standardised Correlation Estimates (r)

Parameter			Estimate	Lower	Upper	P
Meso	<-->	Micro	0.82	0.67	0.89	0.02
Micro	<-->	Macro	0.52	0.39	0.65	0.01
Meso	<-->	Macro	0.75	0.65	0.83	0.01
Meso	<-->	APTD	0.54	0.46	0.62	0.01
APTD	<-->	CFF	0.44	0.36	0.54	0.01
APTD	<-->	Macro	0.74	0.66	0.80	0.01
CFF	<-->	Micro	0.57	0.49	0.65	0.01
APTD	<-->	Micro	0.41	0.31	0.51	0.01
Meso	<-->	CFF	0.81	0.74	0.87	0.01
CFF	<-->	Macro	0.78	0.72	0.86	0.00

The table above (Table 8.8) shows the correlation estimates, which is the *r* value using standard regression procedure. AMOS only provided the significance levels for these estimates in the (Blunch, 2012; Byrne, 2016; SPSS-SA, 2005) bootstrap procedure. Using the standard Cramer's *V* criteria for the effect size, these values range from moderate effect to large effect. Next we examine the bootstrapped estimates related to these estimates in Table 8.9 below.

Table 8.9

Bootstrapped Correlation Estimates

Parameter			Estimate	SE	SE-SE	Mean	Bias	SE-Bias	Lower	Upper	P
Meso	<-->	Micro	0.82	0.06	0.00	0.81	0.00	0.00	0.67	0.89	0.02
APTD	<-->	Micro	0.41	0.06	0.00	0.42	0.00	0.00	0.31	0.51	0.01
CFF	<-->	Micro	0.57	0.05	0.00	0.57	0.00	0.00	0.49	0.65	0.01
Meso	<-->	APTD	0.54	0.05	0.00	0.54	0.00	0.00	0.46	0.62	0.01
Micro	<-->	Macro	0.52	0.08	0.00	0.51	-0.01	0.01	0.39	0.65	0.01
Meso	<-->	Macro	0.75	0.06	0.00	0.75	-0.01	0.00	0.65	0.83	0.01
APTD	<-->	Macro	0.74	0.04	0.00	0.73	-0.01	0.00	0.66	0.80	0.01
CFF	<-->	Macro	0.78	0.04	0.00	0.77	-0.01	0.00	0.72	0.86	0.00
Meso	<-->	CFF	0.81	0.04	0.00	0.81	0.00	0.00	0.74	0.87	0.01
APTD	<-->	CFF	0.44	0.05	0.00	0.45	0.00	0.00	0.36	0.54	0.01

The table above (Table 8.9) shows the bootstrap correlation estimates, which is the r value using standard regression procedure and the significant levels for the estimates. Looking at the bootstrapped estimate and the bias-corrected significances we see that all the correlations are significant ($p \leq .05$). We note that the highest correlation is between Meso and Micro (mean = .81, SE = .06, $p < .05$, CI = 95%) and Meso and CFF (mean = .81, SE = .04, $p < .05$, CI = 95%) followed by Macro and CFF (mean = .77, SE = .04, $p < .05$, CI = 95%). The smallest correlations are between Micro and APTD (mean = .42, SE = .06, $p < .05$, CI = 95%) and CFF and APTD (mean = .45, SE = .05, $p < .05$, CI = 95%). The bootstrapped standardised correlation estimates again verify the normal theory estimates. Also, important to note is that the correlation between Meso and Macro is now significant as opposed to the non-significant correlation in Table 7.17 and Figure 5 (see Chapter Seven).

8.6 Second Order Factor

In Chapter Seven, Section 7.7, we found no statistical evidence for the presence of second order factors. Since the model is informed by theory and is specified as containing second order factors, it is important to assess if there is evidence for second order factors in the full latent

path SEM. It is also important since we have already shown above that the Macro system significantly predicts substance abuse. Table 8.10 below shows the normal theory unstandardised estimates, standard errors, critical ratios and significance levels (labelled Estimate, S.E., C.R. and P. respectively) for the second order factors for Figure 7 above.

Table 8.10

Standardised Estimates for Second Order Factors

			Estimate	S.E.	C.R.	P.
IFC	<---	Micro	1.09	0.04	26.00	***
PPS	<---	Micro	1.01	0.04	25.68	***
SE	<---	Micro	0.70	0.04	18.61	***
CTB	<---	Macro	0.32	0.09	3.46	***
PDSU	<---	Macro	1.04	0.05	20.45	***
AACB	<---	Meso	1.16	0.05	23.23	***
FI	<---	Meso	0.89	0.04	20.27	***
REL	<---	Meso	0.77	0.04	18.14	***

As is evidenced in this table (Table 8.10), none of the estimates are > 1. Further, though there are no clear acceptable guides for what the S.E. scores should be, the literature suggests that the values should not be too high or too low, which is interpreted as > .95 and < .001. Because C.R. is regarded as a *Z*-score, as such, values ≥ 1.96 are regarded as significant. Thus all the relationships are significant, as indicated by the P. values column ($p < .001$). This strongly suggests the presence of second order factors under normal theory conditions.

As the data do not meet the assumption of a normal distribution of scores, we need to examine the bootstrapped estimates for the second order factors. The first column, labelled *S.E.*, contains bootstrap estimates of standard errors. These estimates may be compared to the approximate standard error estimates obtained by normal theory maximum likelihood estimation in Table 8.11 below. The second column, labelled *S.E.-S.E.*, gives an approximate standard error for the bootstrap standard error estimate itself. The column labelled *Mean* represents the average parameter estimate computed across bootstrap samples. It is important to note that the bootstrap

mean does not necessarily need to be identical to the original estimate. The column labelled *Bias* gives the difference between the original estimate and the mean of estimates across bootstrap samples. If the mean estimate across bootstrapped samples is higher than the original estimate, then *Bias* will be positive. The last column, labelled *S.E.-Bias*, gives an approximate standard error for the bias estimate.

Table 8.11

Second Order Factors Bootstrapped Estimates

Parameter			SE	SE-SE	Mean	Bias	SE-Bias	Estimate	Lower	Upper	P
IFC	<---	Micro	0.07	0.00	1.09	0.00	0.01	1.09	0.99	1.22	0.01
PPS	<---	Micro	0.08	0.00	1.01	0.00	0.01	1.01	0.88	1.14	0.01
SE	<---	Micro	0.09	0.01	0.69	0.00	0.01	0.70	0.53	0.84	0.01
AACB	<---	Meso	0.08	0.00	1.17	0.01	0.01	1.16	1.02	1.28	0.02
FI	<---	Meso	0.09	0.00	0.90	0.00	0.01	0.89	0.74	1.02	0.01
REL	<---	Meso	0.10	0.01	0.76	0.00	0.01	0.77	0.60	0.92	0.01
CTB	<---	Macro	0.10	0.01	0.31	0.00	0.01	0.32	0.15	0.49	0.01
PDSU	<---	Macro	0.07	0.00	1.05	0.01	0.01	1.04	0.90	1.16	0.03

The bootstrap estimates confirm the normal theory estimates showing evidence for the presence of three second order factors. The indicator for Micro to IFC = 1.09 (95% CI: 0.99 ~ 1.22), $p < .05$; Micro to PPS = 1.01 (95% CI: 0.88 ~ 1.14), $p < .05$; Micro to SE = 0.70 (95% CI: 0.53 ~ 0.84), $p < .05$; Macro to CTB = 0.32 (95% CI: 0.15 ~ 0.49), $p < .05$; Macro to PDSU = 1.04 (95% CI: 0.90 ~ 1.16), $p < .05$; Meso to AACB = 1.16 (95% CI: 1.02 ~ 1.28), $p < .05$; Meso to FI = 0.89 (95% CI: 0.74 ~ 1.02), $p < .05$; Meso to REL = 0.77 (95% CI: 0.60 ~ 0.92), $p < .05$. All of these indicators are significant, as can been seen by the fact that none of the lower and upper confidence levels pass zero, and also from all the $p < .01$. This supports the argument that the Micro-, Macro- and Mesosystems are comprised of between two (as with the Macrosystem) and three (as in the case of the Micro- and Mesosystems) first-order constructs. Also, important to note is that, as opposed to the results in Table 7.16 in the previous chapter,

where the results showed a non-significant path, this time the estimate from Macro to PDSU is significant ($p < .05$).

8.7 Mediation Results

Since both the micro system and mesosystem do not significantly predict substance abuse as established and shown in table 8.4 in section 8.3.6.2 above. Parallel mediation analysis was subsequently performed to assess the respective mediating role of the mesosystem, APTD, Macrosystem and CFF on the influence of the microsystem and substance abuse. As well as the mediating role APTD, Macrosystem and CFF on the influence of the mesosystem and substance abuse. Table 8.12 below shows the unstandardized direct effect, the indirect effect, confidence intervals, p-values and the conclusion about the mediation.

Table 8.12

Mediation analysis results

Relationships	Direct Effect	Indirect Effect	Confidence Interval		P-Value	Conclusion
			Low	High		
Micro→Meso→SA	0.55 (1.32)	1.49	0.82	4.75	0.00	Full Mediation
Micro→APTD→SA	0.55 (1.32)	0.17	0.03	0.59	0.03	Full Mediation
Micro→Macro→SA	0.55 (1.32)	0.38	0.03	6.51	0.07	Complimentary Mediation
Micro→CFF→SA	0.55 (1.32)	0.14	0.00	0.48	0.09	Complimentary Mediation
Meso→APTD→SA	0.53 (0.71)	-0.33	-0.83	-0.16	0.01	Full Mediation
Meso→Macro→SA	0.53 (0.71)	-0.58	-7.79	-0.04	0.08	Competitive Mediation
Meso→CFF→SA	0.53 (0.71)	-0.35	-0.84	0.03	0.13	Competitive Mediation

Note: Unstandardized coefficients reported. Values in parenthesis are t-values. Bootstrap sample = 5.000 with replacement.

The results in table 8.12 above displays the sperate paths that were assessed and the overall results for the different mediations. From the results we can see that the influence of the microsystem on substance abuse is mediated by the mesosystem ($\beta = 1.49, t = 1.32, p < .05$) and APTD ($\beta = 0.17, t = 1.32, p < .05$). Since the direct relationship between the microsystem and substance is not significant, the significant indirect effects show that mesosystem and APTD (separately) fully mediates the relationship between the microsystem and substance.

The results in the table further show that the macrosystem ($\beta = 0.38, t = 1.32, p > .05$) and CFF ($\beta = 0.14, t = 1.32, p > .05$) do not significant influence the effect of the microsystem and substance abuse. The nonsignificant direct effect and the nonsignificant indirect effect indicates that the macrosystem and CFF have a complementary mediation effect on the influence of the microsystem on substance abuse.

The results related to the mediating effect that APTD, the macrosystem and CFF have on the relationship between the mesosystem and substance abuse follows a similar trend. The results show that APTD ($\beta = -0.33, t = 0.71, p < .05$) has a significant mediating effect on the relationship between the mesosystem and substance abuse. APTD thus has a full mediation effect on the influence of the mesosystem on substance abuse. This is because the direct effect of the mesosystem on substance abuse was not significant and the indirect effect is significant.

The mediating influence of the macrosystem ($\beta = -0.58, t = 0.71, p > .05$) and CFF ($\beta = -0.35, t = 0.71, p > .05$) on the relationship between the mesosystem and substances abuse are not significant. Since this relationship is negative it demonstrates that a competitive mediation effect exists for the effect of macrosystem and CFF on the influence of the mesosystem on substance abuse. This is because the direct path between the mesosystem and substance abuse and the indirect paths via the macrosystem and CFF respectively, have a negative effect.

8.8 Conclusion

This chapter presented the main results of the SEM analysis. As has been shown, though SEM programmes like AMOS are able to calculate full SEM simultaneously, it is advised that analysis be carried out in two steps. The first step was completed in Chapter Seven and the results of the full latent path SEM were reported in this chapter. The results were presented following the specified steps when conducting SEM (Byrne, 2016; Kline, 2023). These steps included model specification, model identification, model estimation, model testing and model interpretation. The model interpretation involved an analysis of all the relevant estimate tables. In summary, data from 1094 participants who presented with substance abuse problems attending either an inpatient or outpatient treatment centre were analysed. The specified SEM showed adequate fit to the data and, as such, the model is accepted. This suggests that the various factors examined and tested in the SEM are identified factors that influence or make an individual susceptible to substance abuse. The following chapter discusses these findings in greater detail.

CHAPTER NINE

DISCUSSION

9.1 Introduction

This study endeavoured to determine which of the individual and contextual risk factors measured by the SASUCRI best predict substance abuse in a sample of self-identified substance abusers. Additionally, the study sought to determine the magnitude, strength and direction of the effect of the individual and contextual risk factors in predicting substance abuse. The specific aims of the study were: 1) to build a theoretical model that best approximates the identified and measured individual and contextual factors associated with substance abuse, 2) to use SEM to test the adequacy of the model's fit to the data that have been collected, 3) to use SEM to statistically determine which of the perceived individual or contextual factors best predict substance abuse, and 4) to use SEM to statistically determine which combination of perceived individual and contextual factors best predict substance abuse. To achieve these aims, the study applied SEM to data collected from individuals seeking either inpatient or outpatient treatment for substance abuse in the Cape Metropolitan and Gqeberha regions.

As discussed in Chapter Six, the purpose of SEM is to a priori specify a theoretical causal model consisting of a set of predicted covariances between variables, and then test whether it is plausible when compared to the observed data (Blunch, 2012; Byrne, 2010; Reisinger & Mavondo, 2007). The appropriateness of performing SEM was supported by its ability and suitableness in examining the nature and magnitude of postulated dependence relationships, while simultaneously assessing the direct and indirect relations of the variables (Blunch, 2012; Byrne, 2010; Reisinger & Mavondo, 2007). The theoretical causal model that was tested

contained LVs and manifest variables that were identified as risk factors for substance abuse. The prediction model was informed by Bronfenbrenner's (1977b, 1986) EST and was specified (using SEM language, see Section 6.5.1 in Chapter Six) to approximate the different systems of the theory. Data for the study were collected using the relatively newly developed and validated SASUCRI (see Bester, 2017; Carels, 2012; Florence, 2014; Hendricks, 2018; Masiza, 2016; Nkwanyana, 2018; Rawoot, 2015; Rawoot & Florence, 2017) discussed in Section 5.6 in Chapter Five.

The results of the CFA showed that the SASUCRI was a reliable and valid instrument to use with this population, and that the results of the structural model can be interpreted with confidence. The fit statistics for the latent path SEM (see Figure 7, Chapter Eight) and the normal theory and related bootstrap estimates all indicate that the model is an excellent fit to the data CMIN/DF = 2.82, NFI = .946, CFI = .97, RMSEA = .04., thus achieving the study's objective. The normal theory analysis of the paths in the diagram identified the microsystem APTD and CFF as significant predictors of substance abuse, whereas the bootstrap analysis of the paths identified the macrosystem APTD and CFF as significant predictors of substance abuse. During normal theory processes the macrosystem effect on substance abuse was not estimated as the AMOS programme required an additional parameter to be fixed; as such the significance of the path between the macrosystem and substance abuse was not estimated. The normal theory and bootstrap analysis of the correlations and covariances in the model indicate that all the correlations and covariances are significant ($p < .05$). This shows that the individual and contextual factors in the model are related and influence each other in predicting an individual's substance abuse. Overall, 59% of the variance in substance abuse is explained by the variables in the model.

In the discussion that follows, I interpret and discuss the importance and implications of the findings in relation to the literature and theory presented in previous chapters. The discussion

starts by detailing the adequacy of the SASUCRI for this study, followed by a discussion related to the descriptive results. This is then followed by a discussion of the main predictors of substance abuse and the influence of the factors as tested and identified in the specified structural model.

9.2 Adequacy of the Measuring Instrument

As previously stated, the fit statistics for the respecified CFA model (see Figure 4 above) showed an excellent fit to the data (CMIN/DF = 2,17; CFI = 0.98; SRMR = 0.03; and RMSEA = 0.03). Though the graphical analysis of the improved measurement model (Figure 4 in Chapter Seven) suggests the soundness of the measurement instruments, further robust statistical evidence was needed to establish the validity of the constructs. The consensus amongst SEM practitioners (Blunch, 2012; Byrne, 2010; Reisinger & Mavondo, 2007) is that CFA be conducted when using LVs in a model to ensure that the questionnaire used in the study has construct validity, i.e., it measures what it claims to measure. Conducting CFA was thus important as it ensures that the researcher can be confident in the claims made regarding the nature of the relationships between the variables (Aim 1) in the study. Furthermore, the estimated strength of the relationships between the LVs (Aim 2) can only be meaningfully interpreted if construct validity is established (Gaskin et al., 2019; Peter & Churchill, 1986). In CFA SEM, researchers use discriminant validity and convergent validity to evaluate the construct validity of a questionnaire (Sarstedt & Mooi, 2014). This section discusses the reliability, discriminant validity, convergent validity, and multicollinearity of the SASUCRI.

9.2.1 Reliability

As discussed in Section 7.3 of Chapter Seven, reliability is defined as the extent to which a questionnaire consistently produces stable and dependable results (Field, 2013; Pretorius, 2007). Though there are other methods of determining reliability, such as test-retest reliability

and inter-rater reliability (Field, 2013; Pretorius, 2007), I focused on the internal consistency as the measure of reliability for this study. As mentioned before in Section 7.3, internal consistency assesses the consistency of responses across items within the same instrument (Field, 2013; Pretorius, 2007). That is, it measures the extent to which all items in a questionnaire are positively related one to the other, and to the total score (Pretorius, 2007). Cronbach's alpha, which is a reliability coefficient, is the most widely used and reported measure of reliability (Field, 2013; Pretorius, 2007). This coefficient ranges from 0 to 1, where higher values indicate greater internal consistency; as such a Cronbach's alpha value above 0.70 should be considered as very reliable (Anastasi, 1982; Field, 2013; Pretorius, 2007).

The results for the SASUCRI showed that it had good reliability. Except for the construct REP, all the factors had Cronbach's alpha values well above 0.70. The results, therefore, showed good reliability of all the scales involved in this study, as the Cronbach alphas exceed 0.7 (Bagozzi & Yi, 1988; Field, 2013) and the factor loadings of most items are above the recommended threshold of 0.7 (Hair et al., 2014). This demonstrates that, except for REP, the remaining items achieved high internal consistency in measuring their respective constructs. Measurement reliability can therefore be confirmed for the remaining 11 constructs used in the model. The CRs discussed in Section 9.2.3 below are also used as measures and indicators of reliability.

9.2.2 Discriminant validity

The discriminant validity between the latent constructs is also established as shown by all the values on the diagonal being greater than the inter-construct correlations. According to Hair et al. (2014), discriminant validity is the extent to which constructs in a conceptual model are conceptually distinct from each other. Conversely, as show in Section 7.4 in Chapter Seven, Kline (2023) defined discriminant validity as the prediction that scores from two or more tests

claims to measure different constructs should not appreciably covary. Discriminant validity is regarded as one of the key building blocks of model evaluation, and therefore its assessment has become common practice in SEM studies. Establishing discriminant validity ensures that a construct measure is empirically unique and represents phenomena of interest that other measures in a structural equation model do not capture (Hair et al., 2010; Shah & Goldstein, 2006; Shook et al., 2004). Discriminant validity requires that a factor or construct not correlate too highly with other factors or constructs from which it is supposed to differ (Campbell, 1960; Henseler et al., 2015). If discriminant validity is not established, it suggests that the constructs have an influence on the variation of more than just the observed variables to which they are theoretically related. The researcher therefore cannot be certain that the results confirming hypothesised structural paths are real or whether they are a result of statistical discrepancies (Farrell, 2010; Hair et al. 2010). As such, discriminant validity in SEM is assessed by evaluating the AVEs of the correlation matrix and the HTMT, which is a relatively new method for assessing discriminant validity (Gaskin et al., 2019). The HTMT criterion clearly outperforms classic approaches to discriminant validity assessment, such as Fornell-Larcker criterion and (partial) cross-loadings, which are largely unable to detect a lack of discriminant validity (Gaskin et al., 2019).

The first discriminant validity test is statistically demonstrated through the matrix of correlations and AVE square root coefficients (Gaskin et al., 2019; Malhotra et al., 2017). According to Fornell and Larcker (1981), discriminant validity is established if the square root of the AVE used for both discriminant and convergent validity of a construct is greater than its correlation coefficients with other constructs. Inference from the results shows that the square root of the AVE of each construct is greater than the correlation coefficients of that specific construct with other constructs. Therefore, as per the Fornell and Larcker (1981) technique, discriminant validity is confirmed in this study.

The second discriminant validity test, that has recently become popular and is commonly used, is the HTMT analysis. The HTMT test (see Tables 7.9 and 7.10) generates ratios that assess the extent to which any two constructs share a common variance; these ratios are not supposed to exceed 0.9. Any ratio above 0.9 would suggest a discriminant validity concern (Henseler et al., 2015). According to the results, all ratios are below the recommended threshold of 0.9. Therefore, it can be established with confidence that discriminant validity is further supported.

In summary, discriminant validity refers to the extent to which a construct is truly distinct from other constructs. In other words, it assesses whether measures of different constructs are indeed measuring different things. If the square root of the AVE for a construct is greater than the correlations between that construct and others, it suggests good discriminant validity. In this regard the SASUCRI has shown to have discriminant validity.

9.2.3 Convergent validity

Convergent validity assesses the degree to which different measures of the same construct are related (Byrne, 2016; Hair et al., 2014; Kline, 2023). In other words, it checks whether the indicators of a particular construct converge or "come together" as expected. High factor loadings and a high AVE suggest good convergent validity (Byrne, 2016; Kline, 2023). Assessing the convergent validity of the measurement model necessitates the assessment of the model's standardised factor loadings, composite reliability (CR) and the average variance extracted (AVE). The CR coefficient (see Table 7.7 and Table 7.8) is generally preferred as a measure of internal consistency in CFA analysis. The cut-off value for the CR is the same as the cut-off for Cronbach's alpha, viz. 0.7 (Anastasi, 1988; Bagozzi & Yi, 1988; Field, 2013). The results, therefore, showed good reliability of all the scales involved in this study, as both the Cronbach alphas and CR coefficients exceed 0.7 (Bagozzi & Yi, 1988; Field, 2013). Further, the factor loadings of most items are above the recommended threshold of 0.7 (Hair

et al., 2014). This evidence of convergent validity is further supported by the AVEs which are all above the required cut-off value of 0.5 (Chin et al., 1997).

In summary, all the statistical results supplied support the convergent validity of all the scales retained in the improved measurement model. The model was improved by removing the construct REP from the model. This leads to the conclusion that all the items retained in the final measurement model are good measures of their respective constructs (Malhotra et al., 2017). This is also evidenced by all the CRs being > 0.7 and all the AVEs > 0.5 showing very good discriminant validity and convergent validity, respectively (Malhotra et al., 2017).

9.2.4 Multicollinearity

This is another important procedure as the test for multicollinearity allows the researcher to determine if there is inter-correlation between the LVs. Multicollinearity occurs when two or more IVs in a regression model are highly correlated, making it difficult to determine the individual effect of each variable on the DV (Byrne, 2016; Field, 2013; Hair et al., 2014; Kline, 2023). High multicollinearity can lead to instability in parameter estimates and inflated standard errors, making it challenging to interpret the individual contributions of variables (Byrne, 2016; Field, 2013; Hair et al., 2014; Kline, 2023). It is therefore desirable to minimise multicollinearity in SEM models (Byrne, 2016; Hair et al., 2014; Kline, 2023)

To assess multicollinearity, we need to assess the Tolerance values, the VIF values, Eigen values and the conditioned index values. These results are show in Table 7.11 and Table 7.12 in Chapter Seven. In the coefficients table (Table 7.12), Tolerance values of > 0.2 and VIF values of < 5.0 are evidence that there is no multicollinearity between the IVs. In the collinearity table (Table 7.13) we need to examine the Eigenvalue column for values close to zero (e.g., 0.001) and the conditioned index column for values < 15. Altogether, these results support the robustness of the SASUCRI psychometric properties, thus providing evidence that

SASUCRI score comparisons for substance abusers are meaningful. In addition, latent factor mean variance and the strength of relationships among the factors (covariance) did not vary substantially.

In conclusion, the relationships illustrated in the final measurement model (see Figure 7, Chapter Eight) showed an excellent fit to the data. All the constructs measured by the indicators retained in the final measurement model are reliable, and all of them are proven valid in the context of this study. The implication of these results for the study is that is assures us that the results related to the full latent path structural model can be interpreted with confidence.

9.3 Descriptive Results

This section discusses the descriptive results related to the demographic variables in the study and relates them to national and international prevalences for substance abuse. This section is set out according to the age of the substance abuser, their gender, and the province in which they were residing.

9.3.1 Age

As stated in previous chapters, data for this study were obtained from substance abuse treatment centres in the Cape Metropolitan and Gqeberha regions. The age of the participants ranged between 22 years and 38 years, with the oldest participant completing the questionnaire being 66 years old. Cumulatively, 54.8% (599) were aged 30 or younger and 45.2% (495) were aged 31 and older. The overall mean age of the patients in treatment over the data collection period was at 30 years. Myers et al. (2017) state that South Africa has a high prevalence of SUD, with an estimated 13% of the adult population meeting DSM criteria for a lifetime diagnosis of these disorders. The average range being 30 years old suggests that treatment seeking occurs quite late in the natural course of the disorder, given that we know that initiation is often in adolescence or young adulthood. The implications for treatment services are that they are

assisting people who probably have relatively long histories of SU, with accumulative harms. As such, policy makers and service providers could ensure better provision of early intervention.

9.3.2 Gender

Males (73.4%; n = 803) represented the dominant group seeking treatment, while females accounted for 26.6% (291) of treatment seekers. This sex split is consistent with national data from SACENDU that report that male patients across age group and province continue to dominate use of substances (Dada et al., 2022). The SACENDU report goes on to show that the proportion of females decreased slightly (from 22% to 16%) since the last reporting period, and males are still the predominant patients seen in treatment (Dada et al., 2022). Males comprising the bulk of drug users and treatment seekers for substance abuse is also consistent with European data, as seen in the EMCDDA (2021) report that shows that the minimum estimates for drug use prevalence is around 83 million or 28.9% of adults (aged 15 to 64 years) in the European Union, with the experience of drug use being more frequently reported by males (50.6 million) than females (32.8 million). This finding is also consistent with other South African studies that showed that males of any racial group are more at risk of drug use than females (Flisher et al., 2003). Gopal and Collings' (2014) study also identified the modal treatment seeker as an employed, single, adult male. The fact that this study data and national epidemiological data are quite skewed towards men who are generally not as active in help-seeking behaviours as women is a cause for concern and requires possible further investigation. A possible explanation for this skewed data could be that it may be more difficult for woman to access inpatient SU treatment because women still carry the burden of childcare responsibilities. Further, the complex interplay between gender and environmental risk factors needs further exploration as men are more likely to be afforded a life outside of the home and

family. Further research into this skewed gender finding is required since it could possibly have public health policy implications.

9.3.3 Province

Across the provinces, 954 (87%) of the participants were from the Cape Metropolitan region, and 140 (13%) from Gqeberha. Differences in the number of participants between the two regions is consistent with the SACENDU surveillance data that report that 475 patients were treated across SU treatment centres in Gqeberha for the January – June 2019 reporting period, while 3013 patients were treated in Cape Town for the same period (see Figure 1 and 2, Chapter Two) (Dada et al., 2022). While the purpose of this study was not to collect epidemiological survey data, the study does show that there are more SU treatment centres located in the WC than the EC. This difference in the number of SU treatment centres between the two provinces is also shown by SACENDU from their collection of AOD surveillance data from 27 SU treatment centres in the WC and six in the EC (Dada et al., 2022). Possible explanations for the difference in the number of SU treatment centres between the two provinces are geographical and historical factors, such as the WC comprising of South Africa's main winelands region and the historical fact of the dop-system. Another possible explanation could be that Cape Town was seen as the epicentre of a methamphetamine abuse outbreak during the late 90s and early 2000s. This sparked a public health crisis that subsequently influenced the distribution of SU treatment centres.

9.4 Risk Factors that Predict Substance Abuse

As noted by Hawkins et al. (1992), Kraemer et al. (2001) and Stone et al. (2012), risk factors are categorised into those factors that are fixed and those factors that are variable. Variable factors are further classified as interpersonal factors and contextual factors. Common contextual factors that are found in the literature are the peer environment, parental bonding,

neighbourhood characteristics, SES, and culture (Hawkins et al., 1992; Kraemer et al., 2001; Stone et al., 2012).

In this study, the theorised and measured predictors of substance abuse are the second order factor macrosystem that comprises of the latent factors IFC, PPS and SE, and the latent factors APTD and CFF. The analysis shows that both APTD and CFF have a significant negative association with substance abuse. This was expected because of the phrasing of the questions and the fact that they were negatively scored. The implication of this is that lower scores are indicative of higher frequency or occurrence of an event.

The interpretation and discussion of the results is not presented according to the factors that were the largest predictor of substance abuse. Instead, the results are presented by relating them to EST, therefore starting with the domain closest to the substance abuser and moving outward to the chronosystem.

9.4.1 Exosystem (APTD)

The analysis identified "access or proximity to drugs" (APTD) as a significant negative predictor of substance abuse. As shown in Chapter Six, the construct APTD assesses the extent to which participants felt that illicit substances were easy to access in their neighbourhoods because of the proximity of drug dealers and the relatively low cost of drugs. As stated above, this construct was negatively phrased and scored, implying that low scores are indicative of an exceedingly high SU enabling environment. APTD was theorised to represent the exosystemic domain of EST, as it has been shown that the exosystem does not contain the individual, but is a system which can affect the individual's immediate settings (Bronfenbrenner, 1977b; Galvani, 2017). Examples of the exosystem provided by Bronfenbrenner (1977b) include the world of work, the neighbourhood, the mass media, agencies of government (local, state and national), and informal social networks. It was thus rational to have utilised APTD as

representing the exosystem as it represents events occurring in the substance abuser's immediate environment, the neighbourhood in this case. The finding that a substance using enabling environment is a significant predictor of substance abuse is corroborated by most of the literature (Freisthler, Lascala et al., 2005; Mennis et al., 2016). For instance, Mennis et al. (2016) found that relative ready access to substances facilitated SU initiation and potential abuse because the barriers to acquiring, using and abusing substances are low. Freisthler, Lascala et al. (2005) also showed that the interrelation of SU and access are undeniable and that the one partially reflects the other in the complex dynamics of community systems. This, they argued, is primarily because illicit drug markets would not exist without demand, nor would the demand for illicit drugs exist without the drugs supplied by the markets (Freisthler, Lascala et al., 2005). As such, drug sales are often concentrated in neighbourhoods with higher levels of unemployment and economic disadvantage, greater population density, and higher concentrations of historically exploited and oppressed groups (Brooks et al., 2012; Clark et al., 2011; Durand et al., 2013; Freisthler, Gruenewald et al., 2005; Freisthler, Lascala et al., 2005; Hasin et al., 2016; Masiko & Xinwa, 2017), all of which is characteristic of the environments that these centres serve. The current finding shows that in environments where access to illicit substances is easy, and use of substances is widespread and pervasive, the risk of substance abuse will be high.

9.4.2 Macrosystem

The structural analysis shows that the macrosystem is the largest significant predictor of substance abuse. The macrosystem is used as a second order factor and is supported by the CFA analysis that found that there was strong evidence to suggest the existence of a second order factor. Bronfenbrenner (1978) described the macrosystem as comprising of the blueprints of a particular society, such as laws and regulations, as well as undocumented rules and norms. The macrosystem is conceptualised as embracing the institutional systems of a culture or

subculture, such as the economic, social, education, legal and political systems (Bronfenbrenner, 1976, 1978). The fact that the macrosystem is found to be the greatest contributor to substance abuse is therefore not surprising. The theory holds that the majority of macrosystems are informal and subconsciously settled ideologies, which individuals carry and manifest every day through customs and traditions (Bronfenbrenner, 1976, 1978). This finding also corroborates Moshier et al. (2012) who found that illicit drug use frequently occurs in the context of a drug subculture characterised by social ties with other drug users, and feelings of excitement and effectiveness deriving from illicit activities. The macrosystem is reflected by the first order constructs, “community traditions and belonging” (CTB) and “public displays of substance use” (PDSU).

The construct CTB assessed whether the participants felt and considered themselves to be part of the communities in which they reside. Research has shown that identification with and fostering a sense of belonging with peer groups, cultures or communities can serve as either a risk or a protective factor for deviant behaviours (Battistich & Hom, 1997; Duncan et al., 2005; Nasim, Belgrave et al., 2007; Nasim, Corona et al., 2007). This finding is supported by Sibanda and Batisai’s (2021) study that found that a lack of a sense of belonging and the desire to belong should not be underestimated when looking at different determinants of drug use disorder in youth and adults. Similar findings were shown by Moshier et al. (2012) who found that illicit drug use frequently occurs in the context of a drug subculture characterised by social ties with other drug users, feelings of excitement and effectiveness deriving from illicit activities, and alienation from mainstream society. This derived sense of “belongingness”, defined as the extent to which individuals feel personally accepted, respected, included and supported by others in a social environment, has long been considered to be influential in the initiation of drug use (Goodenow, 1993; Sibanda & Batisai, 2021).

The construct PDSU assessed the extent to which the participants felt upset by public displays of SU, especially in the vicinity of children and teens. PDSU is characteristic of the communities in which the participants live, viz. densely populated, low-cost government housing, and high unemployment of youth and young adults. Freisthler, Lascala et al. (2005) have cautioned that the most naïve approach one can take to understanding high incidents of drug use in a specific setting or group is to consider drug use as being directly related to illegal drug access. As mentioned previously, it is undeniable that SU and access are interrelated and that the one partially reflects the other in the complex dynamics of community systems (e.g., including policing activities and norms against use). Public displays are not just about individual use but about how the use of AOD is manifested or exhibited in public spaces. Public displays of AOD can contribute to the creation and reinforcement of social norms. If a certain behaviour related to AOD is commonly observed in public, it can influence the perception of what is acceptable or normal within a community. Social norms have a powerful influence on individual and group behaviour. If the public display of AOD is prevalent and accepted, it can impact individual choices regarding SU. Further possible consequences of public displays of AOD use are that it has the potential of stirring urges and temptations to use for potential first time users and those in recovery. Another possible consequence is that it might appeal to the motive of having a pleasant time with others.

9.4.3 Chronosystem (CFF)

The construct CFF was also found to be a significant negative predictor of substance abuse. This suggests that a lack of concern for future life events strongly predicted substance abuse. CFF measured the extent to which the participants had hope for the future of their communities and for themselves. As shown in Section 5.8.10 (see Chapter Five), CFF is argued to be associated with purpose in life (PIL). Kim et al. (2020) defined PIL as the extent to which individuals see their lives as having meaning, a sense of direction, and broader goals to live

for. Chen et al. (2019) defined purpose as a self-sustaining source of motivation and meaning that creates and sustains health and well-being, and suggests that purpose may be a promising target for intervention strategies aimed at improving health and well-being among young adults.

In the model that was tested, CFF was conceptualised as representing the chronosystem in EST. In the formulation of EST, Bronfenbrenner (1977b) highlighted the significance of time to various environmental systems. He noted that the influence of proximal processes on an individual's development and his or her environment changes as an individual ages (Bronfenbrenner, 1977b). The chronosystem was further described as future events that are either normative or non-normative. Normative events occurred within the culturally or sub-culturally settled range of expected events through time in the developing person's life, such as entering school, leaving home for university, entering into casual or committed relationships, getting married and/or having children, etc. Non-normative transitions involved culturally or sub-culturally unexpected disruptions affecting the developmental progress of the individual through time, such as the sudden death of a love one, divorce, moving home or city, major changes in income or unexpected pregnancy (Bronfenbrenner, 1977b; Rus et al., 2010). As such, CFF evaluated participants' concern about these potential future normative and/or non-normative events. The results showed that a lack of concern for the future strongly predicted substance abuse.

Lack of CFF (as with lack of PIL) can be argued to be a casualty of deprived economic opportunities associated with the context in which the majority of the SU treatment centres are located. This implies that public health interventions cannot be separated from other developmental and economic initiatives that are needed to give people a future worth being concerned about and a purpose to live out. If sense of purpose can be increased, as shown by Kim et al. (2020), then concern for future endeavours can also be increased. As with sense of

PIL, that has been shown by Kim et al. (2020) to promote positive development and is associated with decreased SU, and which also emerged as a novel drug misuse prevention and intervention strategy, as shown by Abramoski et al. (2018), the formation of CFF in SU intervention and prevention work may provide a novel strategy for promoting multiple facets of psychological well-being, prosocial character, and possibly overall mental health among young adults.

9.5 Influence of Risk Factors on Substance Abuse

The results of the inter-factor correlations clearly confirm the basic tenets of EST and this study's hypothesis that the different ecological systems interact in exerting influence on individuals' susceptibility to abusing substances. As such, an aim of this study was to determine the strength and size of the influence that each system contributes to the life of the individual. The diagram presented in Figure 7 (see Chapter Eight) is a configuration of the correlations shown in Table 8.2 to Table 8.3 in Chapter Eight, and shows all the inter-factor correlations in the model being tested in Figure 7

The results showed that all the systems (chronosystem, represented by CFF; macrosystem; exosystem, represented by APTD; and mesosystem) significantly correlated with the microsystem to exert influence on the individual's substance abusing behaviour. The influences within the microsystem consist of individuals and groups of individuals with whom the individual has interactions in the immediate environment (e.g., home), which constantly impact the individual. The mesosystem showed the strongest correlation with the microsystem; this could be attributed to the fact that the mesosystem is the environment that is located immediately outside of the microsystem, and it was theorised by Bronfenbrenner (1979b, 1993) to comprise of interrelations between two or more microsystems. The physical, social and symbolic features of the setting encourage or inhibit engagement in sustained, progressively

more complex interactions with the immediate environment (Bronfenbrenner, 1979, 1993). This finding suggests that the different domains of factors as proposed by EST, and as tested in the SEM, should not be treated in isolation, but rather they should be seen for the way they interact, amplify and mediate risks of SU.

9.5.1 Microsystem influences

The microsystem significantly correlates with the exosystem, macrosystem and chronosystem to predict substance abuse. Though the microsystem also significantly correlates with the mesosystem, neither the microsystem nor the mesosystem independently significantly predict substance abuse. The fact that the microsystem significantly correlates with the other systems in predicting substance abuse validates EST and is validated by the theory. This therefore suggests that micro-level factors such as self-efficacy (SE), intra-family communication (IFC) and positive peer support (PPS) significantly interact with exo-level factors, such as the variable access or proximity to drugs (APTD), macro-level factors such as the variables community traditions and belonging (CTB), public displays of SU (PDSU), and chrono-level factors such as concern for the future (CFF) to predict substance abuse. This implies that individuals with low SE, who perceive their family as lacking or having low intra-family communication, who lack positive peer support, who have easy access to drugs, who feel that they lack a sense of community traditions and belonging (CTB), who saw public displays of SU (PDSU) as common, and who had a lack of concern for the future (CFF), are at greater risk of substance abuse.

The fact that this study found that the microsystem interacts with exo-, macro- and chronosystems in increasing an individual’s susceptibility to substance abuse is not a novel finding. Similar relationships have been reported by other South African studies. For instance, Rich (2017) identified compromised parent-child relationships, association with drug-using

peers and easy access to drugs within the neighbourhood/community as risk factors for substance abuse. Similarly, Brook et al. (2006) found that parental factors, association with deviant peers and environmental stressors such as violence and discrimination, significantly contributed to the explained variance of adolescent substance abuse. These findings are also consistent with international studies, specifically Collins et al. (2008) who found that family conflict, friends' drug use and perceived availability of drugs strongly predicted substance abuse, while low parental bonding and monitoring was implicated in predicting substance abuse by Durand et al. (2013). These findings are also supported by Smirnov et al. (2013) who found that social environmental risk factors rather than individual risk factors greatly contribute to substance abuse vulnerability.

9.5.2 Mesosystem influences

The mesosystem also significantly correlated with the three other systems outside of it, that is the exosystem, macrosystem, and chronosystem, in predicting substance abuse. The chronosystem and macrosystem had the strongest correlation with the mesosystem. A mesosystem consists of interrelationships between two or more microsystems in which the individual is situated (e.g., the relationship between school and home) (Bronfenbrenner, 1977b; Rus et al., 2010). Experiences in one micro-level system, or experiences involving a direct interaction, such as with peers, may influence another micro-level system interaction such as family (Eamon, 2001). What this reveals is that individuals who perceived criminal behaviours as normal (AACB), who felt a strong need to fit in (FI), who were less religious (Rel), who had easy access to drugs (APTD), who felt that they lacked a sense of community traditions and belonging (CTB), who saw public displays of SU (PDSU) as common, and who had a lack of concern for the future, are also at greater risk of substance abuse than those who do not. These findings are corroborated by Muchiri and Dos Santos (2018) and Brook et al. (2001) who found the risk for substance abuse to be high in contexts in which interpersonal violence was

relatively high, where illicit substances are readily available, where men conform to masculine ideas of machismo, where family drug use is rampant and distant parent-child relationships are prevalent. These findings are supported by Badr et al. (2014) who found that attachment to God and family was negatively associated with substance abuse These results, among others, facilitate a better understanding of the influence of social environments along with religion, family and personal factors on substance abuse.

9.5.3 Exosystem influences

The exosystem significantly correlated with the macro- and chronosystem in exerting influence on the individual's substance abuse behaviour. To reiterate, the exosystem does not contain the individual, but is a system which can affect the individual's immediate settings (Bronfenbrenner, 1977b; Rus et al., 2010). The exosystem level consists of interactions between two or more settings or interactions, one of which does not directly affect the individual. However, the interaction indirectly influences processes within the immediate setting or interaction in which the individual is embedded (Bronfenbrenner, 1993). The macrosystem had a strong influence on the exosystem, while the chronosystem had a moderate influence on the exosystem. This means that individuals who had easy access to drugs and who felt that they lacked a sense of community traditions and belonging (CTB), who saw public displays of SU (PDSU) as common, and who had a lack of concern for the future (CFF), were at higher risk of substance abuse than others who did not share a similar environment.

These findings are substantiated by Brooks et al. (2012) and Clark et al. (2011) who found that access to drugs and neighbourhood disorganisation, which is characteristic of disadvantaged communities, are influential contextual factors that promote substance abuse. These findings are substantiated by Durand et al. (2013) who showed that approximately half of adolescents consider alcohol and marijuana easy to obtain in their neighbourhoods and communities, and

Kogan et al. (2017) who found that residing in disadvantaged neighbourhoods amplifies the risk of substance abuse. The studies by Wagner and Anthony (2002) and Patrick et al. (2009) both showed that substance abuse does not solely arise because of drug users' seeking out opportunities to use drugs. Instead, substance abusers tried either cigarettes or alcohol, followed by both marijuana and inhalants (Patrick et al., 2009; Wagner & Anthony, 2002). This study's findings, showing that individuals' susceptibility and vulnerability to substance abuse increases in social environments where experimentation with cigarettes, alcohol and marijuana is high, and the recreational use of these substances is prevalent and normalised, are thus clearly supported by national and international literature.

9.5.4 Macrosystem influences

The macrosystem and chronosystem also showed a significant, strong correlation in exerting influence on the individual's substance abuse behaviour. The macrosystem includes organisational, social, cultural and political contexts, which can potentially determine the interactions within other systems, whereas the chronosystem introduced the aspect of time and its effect on developmental processes. Bronfenbrenner (1977b) highlighted the significance of time within various environmental systems. This means that individuals who believed that they lack a sense of community traditions and belonging (CTB), who saw public displays of SU (PDSU) as common, and who had a lack of concern for the future, are at greater risk of substance abuse.

These findings are affirmed by Durand et al. (2013) who found that societal norms, favourable attitudes towards drugs, and SU characteristics of neighbourhood disorganisation, such as population density, physical deterioration, low attachment and high crime, do appear related to higher rates of substance abuse. Likewise, these results are substantiated by Smirnov et al. (2013) who found that MDMA/ecstasy initiation in early adulthood is associated

predominantly with social environmental factors. Hasin et al.'s (2016) assertion that drug use progression and its consequences are increasingly being viewed as responses to exposure to stressful environments is also corroborated by this study's findings.

9.6 Conclusion

In interpreting the results of SEM analysis, it is important to bear in mind the fact that the proposed theoretical model that was tested fits the data well. As discussed in Chapter Six and Chapter Eight, in SEM it is better to have a good fitting model with no significant paths than to have a poor fitting model with significant paths. As such, the fact that two of the five regression paths (micro level factors (low SE, lack of or low intra-family communication, and a lack of positive peer support) and meso-level factors (normalisation of criminal activity, a strong need to fit in, and being less religious)) are not significant is of little consequence in the overall scheme. These findings, therefore, show that the contextual factors in the model are better predictors of substance abuse amongst the sample. Further, 59% of the variance in substance abuse is explained by the factors in the model. The theoretical model thus confirms the hypothesis that individual and contextual factors influence each other in predicting substance abuse.

It is important to mention that, despite a neighbourhood lacking barriers, the majority of people do not use illicit substances. Also, some individuals may experiment with illicit substances, but experimentation alone does not necessarily progress to regular or harmful use. Instead, as Bronfenbrenner (1993) and Hong et al. (2011) have shown, it is the occurrence of the interaction of the different risk factors in an ecological system that indirectly influences processes within the immediate setting in which the individual is embedded. Lastly, the requirement for ecological research is to include at least two different ecological systems in the

analysis to understand a particular developmental outcome (Bronfenbrenner 1975; Eriksson et al., 2018; Hong et al., 2011). As such, this study included all the systems identified by Bronfenbrenner (1975, 1977b, 1993).

CHAPTER TEN

CONCLUSION

10.1 Introduction

Substance abuse levels in South Africa have continued to rise, with the age of first experimentation with drugs reported as being 10 years (Dada et al., 2016; Herman et al., 2009; Magidson et al., 2019; Myers et al., 2022; Pasché & Myers, 2012; Pengpid et al., 2021). Several studies have shown that substance abuse has an adverse impact on users, their families and their communities, resulting in a number of social, psychological and economic struggles (Hawkins et al., 1992; Kraemer et al., 2001; Masiko & Xinwa 2017; Stone et al., 2012). Moreover, substance abuse places an increased psychological, social and financial burden on the individual and the family, as it has been related to the destabilisation of the nuclear and extended family units, permeating every area of life and affecting the very fabric of society. This study therefore, firstly, strived to determine whether individual or contextual risk factors are better predictors of substance abuse. This study then further sought to examine and determine the nature and magnitude of the possible direct and indirect effect of the individual and contextual risk factors in their influence and prediction of substance abuse.

This chapter will conclude the study by summarising the key research findings in relation to the research aims and research questions, as well as the value and contribution thereof. It will also review the limitations of the study and propose opportunities for further research.

10.2 Overall Findings

This study aimed to build a structural model in order to test and establish which of the individual and contextual risk factors predict substance abuse, and to determine the nature and magnitude of the direct and indirect effect of the individual and contextual risk factors. The

results indicate that the structural model is a good fit to the data and that contextual level risk factors (exosystem, macrosystem and chronosystem) are better predictors of substance abuse. Further findings show that the risk of substance abuse is greatly increased when individual level risk factors interact and combine with contextual level risk factors. Though individual level risk factors increase vulnerability to substance abuse, they do not independently predict substance abusing behaviour. Though these findings are not new, they provide valuable insight from self-identified substance abusers about local contextual/environmental conditions that increase the risk of substance abuse.

Several studies (Brooks et al., 2012; Clark et al., 2011; Durand et al., 2013; Kogan et al., 2017; Hasin et al., 2016; Masiko & Xinwa, 2017) have shown that living in an environment in which drug use is commonplace contributes to substance abuse. This might be due to individual exposure to others in their neighbourhoods or communities buying drugs in the street, or to others' public use of substances. In addition, the normalisation of drug use in a community might give the impression that abuse is both common and harmless (Durand et al., 2013; Kogan et al., 2017; Hasin et al., 2016). Further, peer pressure plays a significant role in alcohol and substance abuse, allowing young people to fit in with their peers and find social acceptance. The adult social context is also susceptible to a bidirectional influence in that spouses or domestic partners, for example, might entice drug use, as when one spouse or domestic partner uses drugs, the other might join in, curious to understand the allure. The once-sober spouse or domestic partner might also use drugs in a peace-making effort. Instead of fighting about the drugs, the two might use drugs together. While it might initially seem harmonious, this act can enable and create an environment for substance abuse, with subsequent conflict and socioeconomic hardship.

10.3 Main Contribution of the Study

Ultimately, this study identified 10 risk profiles that interact in the prediction of substance abuse; these are: individuals with low SE who perceive their family as lacking or having low intra-family communication, who lack positive peer support, who perceive criminal behaviours as normal, who feel a strong need to fit in, who are less religious, who have easy access to drugs, who lack a sense of community traditions and belonging, who see public displays of SU as normal, and who lack concern for the future, are at 59% greater risk of substance abuse. It is important to emphasise that though micro level factors (low SE, lack of or low intra-family communication, and a lack of positive peer support) and meso-level factors (normalisation of criminal activity, a strong need to fit in, and being less religious) does not significantly predict abuse, they significantly interact with external factors in predicting substance abuse. Thus, it is only when they are influenced or interact with factors located in the other systems (exosystem, macrosystem and chronosystem) that they become significant predictors of substance abuse. Conversely, exosystem (easy access to drugs), macrosystem (lack of a sense of community traditions and belonging, commonplace public displays of SU), and chronosystem factors (lack of concern for the future), independently are significant predictors of substance abuse.

This finding contributes to the body of literature that has emphasised the importance of environmental determinants of substance abuse in young adults and adolescence. For instance, Ismail et al. (2017) argued that individual, family and social environments were significant variables in understanding the involvement of adolescents in substance abuse. Durand et al. (2013) also showed that societal risk factors of adolescent SU consist of contextual community influences that promote the use of illicit substances. Moss et al. (2014) further showed that the context of use patterns, early onset and elevated polysubstance use behaviour are better indicators of young adult SU behaviours and SUDs than single drug exposure. The interplay

between intrapersonal factors and socialisation agents, such as parents, peers, compromised parent-child relationships. association with drug-using peers, and easy access to drugs within the neighbourhood/community have been shown to increase the risk of SU (Conn & Marks, 2017; Goulet et al., 2020; Rich, 2017). Meier et al. (2016) has also observed that an increasing interest exists in community-based, universal risk assessment to identify youth and young adults who either have a SUD or who will develop one in the future. This they argue is important, as the identification of universal risk assessment, followed by appropriate intervention, could potentially reduce the population burden of disease associated with SUDs (Meier et al., 2016). This finding contributes to the body of literature by echoing the need for SU intervention programmes to focus on minimising environmental level factors that increase susceptibility and risk of substance experimentation and use. This finding has important implications for public health policy in relation to intervention and prevention of SU. The mainstay of intervention is treatment centres that remove people temporarily from their environments and focus on their individual risk factors, then return them to the same contexts, resulting in the limited efficacy of the interventions (though still important). Interventions need to be upstream and designed to impact all the systems that create risk. Until this is successfully designed and implemented, the battle against SU is unfortunately a lost battle.

10.4 Limitations of the Study

Though great care was taken to ensure that this study had a high degree of scientific rigor in the various stages of the research process, it is inevitable that this study, and every other social research study, will have certain limitations. The limitations of this study are discussed below, focusing on general limitations related to the study design used and the sample, and then more specific limitations related to the questionnaire used and the DV/endogenous variable.

10.4.1 Study design

This study used a cross-sectional design in combination with a self-completion questionnaire to collect data. Though explanatory cross-sectional designs and self-completion questionnaires methodology are widely used in the social sciences, they have inherent limitations. One such limitation is related to the fact that cross-sectional designs typically aim to understand causal processes that occur over time, but their conclusion is based on observations made at only one point in time. Another limitation is that cross-sectional designs and self-completion questionnaires require carefully selected probability samples combined with standardised questionnaires and large sample sizes. A further limitation related to the use of standardised questionnaires are that items in the questionnaire often represent the least common denominator in assessing attitudes, orientations, circumstances and experiences. Therefore, they are criticised for being superficial in coverage of complex topics and can seldom adequately assess the context and complexity of social life. In some regards, they are artificial and cannot measure the complexity of social action, merely self-reporting recalled past action. Finally, self-completion questionnaires prevent the researcher's ability to prompt or probe, and some questions might not be salient. Fortunately, through the use of sophisticated analyses such as SEM, most of the limitations associated with cross-sectional designs and self-completion questionnaires can be resolved.

Suggested criteria for evaluating quantitative designs are reliability, validity and replicability. In general, cross-sectional designs and self-completion questionnaires are weak in validity but strong in reliability. This study's internal validity is considered to be weak because co-relations are much more likely to be found than causality, whereas this study's external validity is considered to be strong as a probability multi-stage cluster sampling strategy was used. For a study to have high replicability, the researcher is required to specify all the procedures

followed. Details pertaining to the procedures followed to recruit participants and to collect data are provided in Chapter Five.

10.4.2 Sample/participants

Because this study was interested in predictors of substance abuse, participants for this study were exclusively recruited from substance abuse treatment centres, both inpatient and outpatient centres. A multi-stage cluster sampling strategy was therefore deemed to be the most appropriate probability sampling strategy to use. As cluster sampling is employed when a population of interest is dispersed over a wide geographic region, it is then reasonable to divide the population into "clusters" (usually along geographic boundaries), randomly sample a few clusters, and measure all units within that cluster. However, depending on between-cluster differences, the variability of sample estimates in a cluster sample will generally be higher than that of a simple random sample, and hence the results are less generalisable to the population than those obtained from simple random samples.

Cluster sampling is also prone to bias in instances where the clusters representing the entire population were formed based on a biased opinion, thus the inferences about the entire population would be biased as well. Sampling bias limits the generalisability of findings because it is a threat to external validity. Another concern with cluster sampling is that it is prone to higher sampling error than the samples formed using other sampling methods. Sampling errors occur due to a disparity in the representativeness of the respondents. To a moderately reasonable extent, these sampling errors have been controlled and eliminated by having a large enough sample to reflect the entire population. This study overcame the limitation associated with the sampling strategy as the sample was relatively large. In fact, this study's sample equalled 31% of the total 10-year average for treatment seekers recorded by SACENDU for the EC (542) and WC (2962).

10.4.3 Measuring instrument

Despite the SASUCRI being developed in response to an identified need for an instrument that considers and mirrors the uniqueness and complexity of the South African social context, the phrasing of some of the items, the ambiguity in meaning of some of the questions and the negative phrasing of some questions renders the meaning of the subsequent scales somewhat unclear. For instance, the questions that load onto the construct PPS, namely, "I felt that my friends were there for when I need them", "I felt comfortable when I was amongst my friends", and "My friends were good listeners", do not seem to discern between friends who were using substances with them and those who were not. The respondent could have felt comfortable with either of the two sets of friends. Providing clarity within these questions could draw a distinction between those friends who the respondent tried substances with and those friends who did not encourage substance experimentation.

The same holds true for the questions related to the construct CTB. These questions, namely, "I enjoyed spending time with others in my community who practiced the same traditions I did", and "Being part of my community traditions made me feel like I belong", do not distinguish whether the traditions were rooted in virtuous or reprehensible values. This criticism can be applied to the construct PDSU, for which the questions were, "I was upset to see children playing near to people using alcohol and/or *dagga*", "I was upset to see children and/or teens smoking cigarettes and/or *dagga* in public", and "I was upset to see children and/or teens drinking alcohol in public". It is difficult to decern from these questions what specifically about these behaviours is upsetting, especially when the respondents are substance abusers themselves.

10.4.4 Outcome variable

The dependent/endogenous variable in this study does not measure substance abuse in the traditional sense, such as evaluating a respondent's frequency and quantity of use over a determined period. Though SASUCRI does have scales that measure type of SU and the frequency and quantity of SU, these were not included in the questionnaire used to collect data for this study. The purpose of including the type of substance used and frequency of SU in SASUCRI is to identify individuals with problematic use in the general population and distinguish them from those who do not have problematic use. As such, it was not deemed necessary to include these measures in this study as the participants were self-identified substance abusers seeking treatment for their substance abuse. Thus the latent construct that is used to indicate substance abuse really measures whether any, or a sense of, pleasure was derived from using substances. The study is also limited in that the predictor variables (exogenous variables in SEM language) used as predictors are not an exhaustive list of predictor variables identified in the literature. Instead, they are the individual and contextual risk variables identified in the development of the SASUCRI.

10.5 Strengths of the Study

Considering the study limitations mentioned above, this study has substantial strengths. This research on individual and contextual factors that predict substance abuse has significant implications for public health policies and interventions. That is because, by employing an ecological systems approach, this study demonstrates an understanding of the complexity of factors that influence SU. This was achieved using SEM within this framework, allowing for a nuanced analysis that goes beyond simplistic description and identification of relationships, considering both individual and environmental factors. In addition, the application of Bronfenbrenner's (1977b, 1986) EST highlights the interconnectedness of various systems and

how they collectively contribute to the complexity of SU phenomena. This approach showcases the practical utility of Bronfenbrenner's (1977b, 1986) ideas in understanding substance abuse and emphasises the importance of examining the multiple layers of influence on an individual's development and behaviour.

Furthermore, the validation and refinement of a locally developed measure of SU, the SASUCRI, demonstrates a commitment to the context specificity and accuracy of data collection. This enhances the credibility of the study and contributes to the broader field of SU research by providing a tool tailored to the unique characteristics of the local population.

The complex SEM statistical analysis delves into the intricate ways that systems interact, providing a comprehensive understanding that would be unattainable with simpler statistical approaches. This analysis offers insights into the dynamic nature of the factors that influence substance abuse, acknowledging that it is not solely determined by isolated factors but rather by the complex interplay among these various systems.

The findings therefore carry significant public health implications by challenging the prevailing focus on individual-based interventions. Recognising that the drivers of substance abuse extend beyond individual factors, this study therefore advocates for interventions that address the broader systems contributing to the issue. This has the potential to inform more effective and holistic public health strategies. Finally, this study emphasises the need for comprehensive strategies that span different systems, acknowledging the role of family, community and societal factors. This call for complex interventions aligns with the ecological systems perspective, advocating for a paradigm shift in how we address SU by considering the broader environmental influences that contribute to the problem. In summary, this study not only contributes to the academic understanding of SU but also has practical implications for public health policies and interventions.

10.6 Recommendations for Future Research

Future research aimed at establishing whether individual or contextual risk factors best predict substance abuse with a similar population could include individual and contextual risk factors not included in this study. Further, such studies could include questions related to the context of SU initiation, i.e., the context in which first-time use or experimentation occurred. Psychopathologies such as conduct disorder and/or oppositional defiant disorder and its comorbidity with substance abuse can also be measured or examined. Future research could use SEM to build a theoretical model of protective factors for SU.

These findings add to the body of literature that emphasises the need for more social context focused substance abuse interventions. Specifically, community-based interventions that focus on decreasing the visibility of SU in marginalised and disadvantaged communities. Programmes could also focus on promoting positive values that instil a sense of hope for people in these communities.

10.7 Conclusion

SU and SUDs are developmental phenomena which increase from adolescence to young adulthood, with few and inconsistent gender differences. Adolescents and young adults are not specialised users, but rather tend to use or abuse multiple substances increasingly with age. The current finding shows that the risk of substance abuse is increased in environments where access to illicit substances is relatively easy and the use of substances is perceived to be widespread and pervasive. These results, among others, facilitate a better understanding of the influence of social environments, along with religion, family and personal factors, on substance abuse. This study's findings contribute to the body of literature, showing that individuals' susceptibility and vulnerability to substance abuse increases in social environments where experimentation with cigarettes, alcohol and marijuana is high, and the recreational use of these

substances is prevalent and normalised. As contextual level factors are the main predictors of substance abuse in this sample, community-based interventions as an approach to addressing the issue of substance abuse would be better suited in decreasing the risk of SU.

REFERENCES

Abramoski, K., Pierce, J., Hauck, C., & Stoddard, S. (2018). Variations in adolescent purpose in life and their association with lifetime substance use. *The Journal of School Nursing: The Official Publication of the National Association of School Nurses, 34*(2), 114–120. https://doi.org/10.1177/1059840517696964

Ackard, D. M., Neumark-Sztainer, D., Story, M., & Perry, C. (2006). Parent–child connectedness and behavioral and emotional health among adolescents. *American Journal of Preventive Medicine, 30*(1), 59–66. https://doi.org/10.1016/j.amepre.2005.09.013

Albright, J. J., & Park, H. M. (2009). *Confirmatory factor analysis using Amos, LISREL, Mplus, SAS/STAT CALIS*. The University Information Technology Services (UITS) Center for Statistical and Mathematical Computing, Indiana University. Microsoft Word - cfa_calis.doc (iu.edu)

Allen, T. M., & Lo, C. C. (2010). Religiosity, spirituality, and substance abuse. *Journal of Drug Issues, 40*(2), 433–459. https://doi.org/10.1177/002204261004000208

American Psychiatric Association. (1952). *Diagnostic and Statistical Manual of Mental Disorders (DSM-I)*. American Psychiatric Association.

American Psychiatric Association. (1968). *Diagnostic and Statistical Manual of Mental Disorders* (2nd ed. (DSM-II). American Psychiatric Association.

American Psychiatric Association. (1980). *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed. (DSM-III)). American Psychiatric Association.

American Psychiatric Association. (1987). *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., Revised (DSM-III-R)). American Psychiatric Association.

American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. (DSM-IV)). American Psychiatric Association.

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., Text Revision (DSM-IV-TR)). American Psychiatric Association.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed. (DSM-5)). American Psychiatric Association. https://doi.org/10.1176/appi.books.9780890425596

American Psychiatric Association. (2022). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed., Text Revision (DSM-5-TR)). American Psychiatric Association. https://doi.org/10.1176/appi.books.9780890425787.

Anastasi, A. (1982). *Psychological testing* (5th ed.). Macmillan.

Anastasi, A. (1988). *Psychological testing* (6th ed.). Macmillan.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411–423. https://doi.org/10.1037/0033-2909.103.3.411

Andreassen, T. W., Lorentzen, B. G., & Olsson, U. H. (2006). The impact of non-normality and estimation methods in SEM on satisfaction research in marketing. *Quality and Quantity, 40*(1), 39–58. https://doi.org/10.1007/s11135-005-4510-y.

Arbuckle, J. (2017). *Amos user's guide: Version 25*. SmallWaters Corporation.

Antonakis, J., Bendahan, S., Jacquart, P., & Lalive, R. (2010). On making causal claims: A review and recommendations. *The Leadership Quarterly, 21*(6), 1086–1120. https://doi.org/10.1016/j.leaqua.2010.10.010

Aytur, S. A., Carlino, S., Bernard, F., West, K., Dobrzycki, V., & Malik, R. (2022). Social-ecological theory, substance misuse, adverse childhood experiences, and adolescent suicidal ideation: Applications for community–academic partnerships. *Journal of Community Psychology, 50*(1), 265–284. https://doi.org/10.1002/jcop.22560

Babbie, E., & Mouton, J. (2001). *The practice of social research: South African edition*. Oxford University Press Southern Africa.

Babbie, E., Mouton, J., Payze, C., Vorster, J. H., Boshoff, N., & Prozesky, H. E. (2017). *The practice of social research*. Oxford University Press.

Badr, L. K., Taha, A., & Dee, V. (2014). Substance abuse in Middle Eastern adolescents living in two different countries: Spiritual, cultural, family and personal factors. *Journal of Religion and Health, 53*(4), 1060–1074. https://doi.org/10.1007/s10943-013-9694-1.

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, *16*, 74–94. https://doi.org/10.1007/s11747-011-0278-x

Bagozzi, R. P., & Yi, Y. (2012). Specification, evaluation, and interpretation of structural equation models. *Journal of the Academy of Marketing Science, 40*(1), 8–34. https://doi.org/10.1007/s11747-011-0278-x

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A., & Cervone, D. (1986). Differential engagement of self-reactive influences in cognitive motivation. *Organizational Behavior and Human Decision Processes, 38*(1), 92–113. https://doi.org/10.1016/0749-5978(86)90028-2

Battistich, V., & Hom, A. (1997). The relationship between students' sense of their school as a community and their involvement in problem behaviours. *American Journal of Public Health, 87*(12), 1997–2001. https://doi.org/10.2105/AJPH.87.12.1997.

Beckson, M., & Tucker, D. (2014). Commentary: Craving diagnostic validity in DSM-5 substance use disorders. *Journal of the American Academy of Psychiatry and the Law Online, 42*(4), 453–458.

Berkel, L. A., Armstrong, T. D., & Cokley, K. O. (2004). Similarities and differences between religiosity and spirituality in African American college students: A preliminary investigation. *Counseling and Values, 49*(1), 2–26. https://doi.org/10.1002/j.2161-007X.2004.tb00248.x

Bester, K. J. (2017). *The external validity of South African substance use contextual risk instrument: Predictive validity* [Master's thesis, University of the Western Cape]. https://etd.uwc.ac.za/xmlui/bitstream/handle/11394/5774/Bester_MPsych_2017.pdf?sequence=1&isAllowed=y

Black, R. A., Yang, Y., Beitra, D., & McCaffrey, S. (2015). Comparing fit and reliability estimates of a psychological instrument using second-order CFA, bifactor, and essentially tau-equivalent (coefficient alpha) models via AMOS 22. *Journal of Psychoeducational Assessment, 33*(5), 451–472. https://doi.org/10.1177/0734282914553551

Bless, C., Higson-Smith, C., & Kagee, A. (2006). *Fundamentals of social research methods: An African perspective* (5th ed.). Juta and Company Ltd.

Blunch, N. J. (2012). *Introduction to structural equation modeling using IBM SPSS statistics and AMOS* (2nd ed.). IBM.

Bollen, K. A. (1989b). *Structural equations with latent variables* (Vol. 210). John Wiley & Sons.

Bollen, K. A. (2011). Evaluating effect, composite, and causal indicators in structural equation models. *MIS Quarterly, 35*(2), 359–372.

Bollen, K. A., & Long, J. S. (Eds.). (1993). *Testing structural equation models* (Vol. 154). Sage.

Boomsma, A., Hoyle, R. H., & Panter, A. T. (2012). The structural equation modeling research report. In R. H. Hoyle (Ed.), *Handbook of structural equation modeling* (pp. 341–358). The Guilford Press.

Boys, A., Marsden, J., & Strang, J. (2001). Understanding reasons for drug use amongst young people: A functional perspective. *Health Education Research, 16*(4), 457–469. https://doi.org/10.1093/her/16.4.457

Bozdogan, H. (1987). Model selection and Akaike's information criterion (AIC): The general theory and its analytical extensions. *Psychometrika, 52*(3), 345-370. https://doi.org/10.1007/BF02294361

Breakwell, G. M., Smith, J. A., & Wright, D. B. (Eds.) (2012). *Research methods in psychology* (4th ed.). Sage Publications.

Bronfenbrenner, U. (1975). Reality and research in the ecology of human development. *Proceedings of the American Philosophical Society, 119*(6), 439–469. https://www.jstor.org/stable/986378

Bronfenbrenner, U. (1974). Developmental research, public policy, and the ecology of childhood. *Child Development, 45*(1), 1–5. https://doi.org/10.2307/1127743

Bronfenbrenner, U. (1976). The experimental ecology of education. *Teachers College Record, 78*(2), 157–204.

Bronfenbrenner, U. (1977a). Lewinian space and ecological substance. *Journal of Social Issues, 33*(4), 199–212. https://doi.org/10.1111/j.1540-4560.1977.tb02533.x

Bronfenbrenner, U. (1977b). Toward an experimental ecology of human development. *American Psychologist, 32*(7), 513–531. https://doi.org/10.1037/0003-066X.32.7.513

Bronfenbrenner, U. (1978). The social role of the child in ecological perspective. *Zeitschrift fur Soziologie, 7*(1), 4–20. https://doi.org/10.1515/zfsoz-1978-0101

Bronfenbrenner, U. (1979a). Contexts of child rearing: Problems and prospects. *American Psychologist, 34*(10), 844–850. https://doi.org/10.1037/0003-066X.34.10.844

Bronfenbrenner, U. (1979b). *The ecology of human development: Experiments by nature and design*. Harvard University Press.

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology, 22*(6), 723–742. https://doi.org/10.1037/0012-1649.22.6.723

Bronfenbrenner, U. (1989). Ecological systems theory. In R. Vasta (Ed.), *Annals of child development: A research annual* (pp. 187–249). JAI Press.

Bronfenbrenner, U. (1993). Ecological models of human development. In M. Gauvain & M. Cole (Eds.), *Readings on the development of children* (2nd ed., pp. 37–43). Freeman.

Bronfenbrenner, U. (2005). *Making human beings human: Bioecological perspectives on human development*. Sage.

Brook, J. S., Brook, D. W., Arencibia-Mireles, O., Richter, L., & Whiteman, M. (2001). Risk factors for adolescent marijuana use across cultures and across time. *The Journal of Genetic Psychology, 162*(3), 357–374. https://doi.org/10.1080/00221320109597489

Brook, J. S., Lee, J. Y., Finch, S. J., Koppel, J., & Brook, D. W. (2011). Psychosocial factors related to cannabis use disorders. *Substance Abuse, 32*(4), 242–251. https://doi.org/10.1080/08897077.2011.605696

Brook, J. S., Saar, N. S., Zhang, C., & Brook, D. W. (2009). Psychosocial antecedents and adverse health consequences related to substance use. *American Journal of Public Health, 99*(3), 563–568. https://doi.org/10.2105/AJPH.2007.127225

Brook, J. S., Morojele, N. K., Pahl, K., & Brook, D. W. (2006). Predictors of drug use among South African adolescents. *Journal of Adolescent Health, 38*(1), 26–34. https://doi.org/10.1016/j.jadohealth.2004.08.004.

Brooks, F. M., Magnusson, J., Spencer, N., & Morgan, A. (2012). Adolescent multiple risk behaviour: An asset approach to the role of family, school and community. *Journal of Public Health, 34*(suppl_1), i48–i56. https://doi.org/10.1093/pubmed/fds001

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. The Guilford Press.

Bryant, A. L., Schulenberg, J. E., O'Malley, P. M., Bachman, J. G., & Johnston, L. D. (2003). How academic achievement, attitudes, and behaviors relate to the course of substance use during adolescence: A 6-year, multiwave national longitudinal study. *Journal of Research on Adolescence, 13*(3), 361–397. https://doi.org/10.1111/1532-7795.1303005

Burnhams, N. H., Bharat, C., Williams, D. R., Stein, D. J., & Myers, B. (2019). Transitions between lifetime alcohol use, regular use and remission: Results from the 2004 South African stress and health survey. *South African Medical Journal, 109*(1), 40–46. https://doi.org/10.7196/SAMJ.2019.v109i1.13061

Burnhams, N. H., Dada, S., & Myers, B. (2012). Social service offices as a point of entry into substance abuse treatment for poor South Africans. *Substance Abuse Treatment, Prevention, and Policy, 7*(1), 22. https://doi.org10.1186/1747-597X-7-22

Byrne, B. M. (2001). Structural equation modeling with AMOS, EQS, and LISREL: Comparative approaches to testing for the factorial validity of a measuring instrument. *International Journal of Testing, 1*(1), 55–86. https://doi.org/10.1207/S15327574IJT0101_4

Byrne, B. M. (2010). Structural Equation Modeling with Amos: Basic concepts, applications, and programming (2nd ed.). Taylor and Francis Group.

Byrne, B. M. (2016). *Structural Equation Modeling with AMOS: Basic concepts, applications, and programming* (3rd ed.). Routledge. https://doi.org/10.4324/9781315757421

Campbell, D. T. (1960). Recommendations for APA test standards regarding construct, trait, or discriminant validity. *American Psychologist, 15*(8), 546–553. https://doi.org/10.1037/h0048255

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*(2), 81–105. https://doi.org/10.1037/h0046016

Carels, C. Z. (2012). *Evaluating the content validity of the dimensions of a questionnaire measuring factors associated with substance use in adolescents in low socio-economic status communities* [Master's thesis, University of Western Cape]. http://hdl.handle.net/11394/3305

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 14*(3), 464–504. https://doi.org/10.1080/10705510701301834

Chen, Y., Kim, E. S., Koh, H. K., Frazier, A. L., & VanderWeele, T. J. (2019). Sense of mission and subsequent health and well-being among young adults: An outcome-wide analysis. *American Journal of Epidemiology, 188*(4), 664–673. https://doi.org/10.1093/aje/kwz009

Cheung, G. W., & Lau, R. S. (2008). Testing mediation and suppression effects of latent variables: Bootstrapping with structural equation models. *Organizational Research Methods, 11*(2), 296–325. https://doi.org/10.1177/1094428107300343

Chin, W. W., Gopal, A., & Salisbury, W. D. (1997). Advancing the theory of adaptive structuration: The development of a scale to measure faithfulness of appropriation. *Information Systems Research*, *8*(4), 342–367. https://doi.org/10.1287/isre.8.4.342

Chitwood, D. D., Weiss, M. L., & Leukefeld, C. G. (2008). A systematic review of recent literature on religiosity and substance use. *Journal of Drug Issues, 38*(3), 653–688. https://doi.org/10.1177/002204260803800302

Clark, T. T., Nguyen, A. B., & Belgrave, F. Z. (2011). Risk and protective factors for alcohol and marijuana use among African-American rural and urban adolescents. *Journal of Child & Adolescent Substance Abuse, 20*(3), 205–220. https://doi.org/10.1080/1067828X.2011.581898

Collier, J. E. (2020). Applied structural equation modeling using AMOS: Basic to advanced techniques.

Collins, D., Zhenfeng, P. A. N., Johnson, K., Courser, M., & Shamblen, S. (2008). Individual and contextual predictors of inhalant use among 8th graders: A multilevel analysis. *Journal of Drug Education, 38*(3), 193–210. https://doi.org/10.2190/DE.38.3.a

Conn, B. M., & Marks, A. K. (2014). Ethnic/racial differences in peer and parent influence on adolescent prescription drug misuse. *Journal of Developmental & Behavioral Pediatrics, 35*(4), 257–265. https://doi.org/10.1097/DBP.0000000000000058

Conn, B. M., & Marks, A. K. (2017). An ecological approach to understanding adolescent prescription drug misuse. *Journal of Adolescent Research, 32*(2), 183–204. https://doi.org/10.1177/0743558415589369

Conway, K. P., Swendsen, J., Husky, M. M., He, J. P., & Merikangas, K. R. (2016). Association of lifetime mental disorders and subsequent alcohol and illicit drug use: Results from the National Comorbidity Survey–Adolescent Supplement. *Journal of the American Academy of Child & Adolescent Psychiatry, 55*(4), 280–288. https://doi.org/10.1016/j.jaac.2016.01.006

Cosden, M. (2001). Risk and resilience for substance abuse among adolescents and adults with LD. *Journal of Learning Disabilities, 34*(4), 352–358. https://doi.org/10.1177/002221940103400410

Dada, S., Burnhams, N. H., Erasmus, J., Parry, C., Bhana, A., Timol, F., Nel, E., Kitshoff, D., & Weimann, R. (2016). M*onitoring alcohol, tobacco and other drug abuse treatment admissions in South Africa (Phase 38).* South African Community Epidemiology Network on Drug Use (SACENDU). http://196.21.144.194/adarg/sacendu/SACENDUFullReportPhase38.pdf

Dada, S., Burnhams, N. H., Erasmus, J., Lucas, W., Parry, C., Pretorius, S., Weimann, R., & Associated Organisations. (2022). *Monitoring alcohol, tobacco and other drug use trends in South Africa (July 1996 – December 2020) (Phase 49)*. South African Community Epidemiology Network on Drug Use (SACENDU). SACENDUBriefPhase49.pdf (host-h.net)

Daly, M. (2003). Methodology. In R. Miller & J. Brewer (Eds.), *The A-Z of social research* (pp. 192–194). Sage Publications.

Danielson, C. K., Amstadter, A. B., Dangelmaier, R. E., Resnick, H. S., Saunders, B. E., & Kilpatrick, D. G. (2009). Trauma-related risk factors for substance abuse among male versus female young adults. *Addictive Behaviors, 34*(4), 395–399. https://doi.org/10.1016/j.addbeh.2008.11.009

Dastgeer, G., Rehman, A. U., & Rahman, W. (2012). Examining data and measurement model specification in SEM: An illustration from management development. *Journal of Business & Economics, 4*(1), 62–88.

Deckman, T., DeWall, C. N., Way, B., Gilman, R., & Richman, S. (2014). Can marijuana reduce social pain? *Social Psychological and Personality Science, 5*(2), 131–139. https://doi.org/10.1177/1948550613488949

Denzin, N. K., & Lincoln, Y. S. (1994). *Handbook of qualitative research*. SAGE publications.

Devlieger, I., & Rosseel, Y. (2017). Factor score path analysis. An alternative for SEM? *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences, 13*(Suppl 1), 31–38. https://doi.org/10.1027/1614-2241/a000130

Dhawan, A., & Mandal, P. (2017). Preventive strategies for substance use. *Indian Journal of Social Psychiatry, 33*(2), 108–111. https://doi.org/10.4103/ijsp.ijsp_42_17

Ding, L., Velicer, W. F., & Harlow, L. L. (1995). Effects of estimation methods, number of indicators per factor, and improper solutions on structural equation modeling fit indices. *Structural Equation Modeling: A Multidisciplinary Journal, 2*(2), 119–143. https://doi.org/10.1080/10705519509540000

Duncan, S. C., Duncan, T. E., & Strycker, L. A. (2005). Sources and types of social support in youth physical activity. *Health Psychology, 24*(1), 3–10.https://doi.org/10.1037/0278-6133.24.1.3

Durand, V., Hennessey, J., Wells, D. S., Crothers, L. M., Kolbert, J. B., Lipinski, J., & Hughes, T. L. (2013). Bullying and substance use in children and adolescents. *Journal of Addiction Research & Therapy*, *4*(158), 2. https://doi.org/10.4172/2155-6105.1000158

Eamon, M. K. (2001). The effects of poverty on children's socioemotional development: An ecological systems analysis. *Social Work*, *46*(3), 256–266. https://doi.org/10.1093/sw/46.3.256

Ellickson, P. L., Tucker, J. S., & Klein, D. J. (2003). Ten-year prospective study of public health problems associated with early drinking. *Pediatrics, 111*(5), 949–956. https://doi.org/10.1542/peds.111.5.949

Ensminger, M. E., Juon, H. S., & Fothergill, K. E. (2002). Childhood and adolescent antecedents of substance use in adulthood. *Addiction, 97*(7), 833–844. https://doi.org/10.1046/j.1360-0443.2002.00138.x

Eriksson, M., Ghazinour, M., & Hammarström, A. (2018). Different uses of Bronfenbrenner's ecological theory in public mental health research: What is their value for guiding public mental health policy and practice?. *Social Theory & Health, 16*(4), 414–433. https://doi.org/10.1057/s41285-018-0065-6

European Monitoring Centre for Drugs and Drug Addiction. (2021). *European drug report: Trends and development*. https://www.emcdda.europa.eu/publications/edr/trends-developments/2021_en

Fan, X., Thompson, B., & Wang, L. (1999). Effects of sample size, estimation methods, and model specification on structural equation modeling fit indexes. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 56–83. https://doi.org/10.1080/10705519909540119

Farrell, A. M. (2010). Insufficient discriminant validity: A comment on Bove, Pervan, Beatty, and Shiu (2009). *Journal of Business Research, 63*(3), 324–327. https://doi.org/10.1016/j.jbusres.2009.05.003

Ferdinand, R. F., Blüm, M., & Verhulst, F. C. (2001). Psychopathology in adolescence predicts substance use in young adulthood. *Addiction, 96*(6), 861–870. https://doi.org/10.1046/j.1360-0443.2001.9668617.x

Fetzer Institute. (2003). *Multidimensional measurement of religiousness/spirituality for use in health research: A report of the Fetzer Institute/National Institute on Aging Working Group*. John E. Fetzer Institute. https://fetzer.org/sites/default/files/resources/attachment/%5Bcurrent-date%3Atiny%5D/Multidimensional_Measurement_of_Religousness_Spirituality.pdf

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage.

Fischer, B. A. (2012). A review of American psychiatry through its diagnoses: The history and development of the Diagnostic and Statistical Manual of Mental Disorders. *The Journal*

of Nervous and Mental Disease, 200(12), 1022–1030. https://doi.org/10.1097/NMD.0b013e318275cf19

Fisher, G., & Strantz, I. (1972). An ecosystems approach to the study of dangerous drug use and abuse with special reference to the marijuana issue. *American Journal of Public Health, 62*(10), 1407–1414. https://doi.org/10.2105/ajph.62.10.1407

Flisher, A. J., Parry, C. D., Evans, J., Muller, M., & Lombard, C. (2003). Substance use by adolescents in Cape Town: Prevalence and correlates. *Journal of Adolescent Health, 32*(1), 58–65. https://doi.org/10.1016/s1054-139x(02)00445-7

Florence, M. A. (2014). *Adolescent substance use: The development and validation of a measure of perceived individual and contextual factors* [Doctoral dissertation, University of the Western Cape]. http://hdl.handle.net/11394/3941

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.2307/3151312

Freisthler, B., Gruenewald, P. J., Johnson, F. W., Treno, A. J., & Lascala, E. A. (2005). An exploratory study examining the spatial dynamics of illicit drug availability and rates of drug use. *Journal of Drug Education, 35*(1), 15–27.

Freisthler, B., Lascala, E. A., Gruenewald, P. J., & Treno, A. J. (2005). An examination of drug activity: Effects of neighborhood social organization on the development of drug distribution systems. *Substance Use & Misuse, 40*(5), 671–686.

Galea, S., Nandi, A., & Vlahov, D. (2004). The social epidemiology of substance use. *Epidemiologic Reviews, 26*(1), 36–52. https://doi.org/10.1093/epirev/mxh007

Galvani, S. (2017). Social work and substance use: Ecological perspectives on workforce development. *Drugs: Education, Prevention and Policy, 24*(6), 469–476. https://doi.org/10.1080/09687637.2017.1282421

Gao, S., Mokhtarian, P. L., & Johnston, R. A. (2008). Exploring the connections among job accessibility, employment, income, and auto ownership using structural equation modeling. *The Annals of Regional Science, 42*, 341–356. https://doi.org/10.1007/s00168-007-0154-2

Gaskin, J., & Lim, J. (2019). Master Validity Tool. *AMOS Plugin. In: Gaskination's StatWiki.*

Gelo, O., Braakmann, D., & Benetka, G. (2008). Quantitative and qualitative research: Beyond the debate. *Integrative Psychological and Behavioral Science, 42*(3), 266–290. https://doi.org/10.1007/s12124-008-9078-3

Gerbing, D. W., & Anderson, J. C. (1992). Monte Carlo evaluations of goodness of fit indices for structural equation models. *Sociological Methods & Research, 21*(2), 132–160. https://doi.org/10.1177/0049124192021002002

Godley, M. D., Kahn, J. H., Dennis, M. L., Godley, S. H., & Funk, R. R. (2005). The stability and impact of environmental factors on substance use and problems after adolescent outpatient treatment for cannabis abuse or dependence. *Psychology of Addictive Behaviors, 19*(1), 62–70. https://doi.org/10.1037/0893-164X.19.1.62

Golden, S. D., & Earp, J. A. L. (2012). Social ecological approaches to individuals and their contexts: Twenty years of *Health Education & Behavior* health promotion interventions. *Health Education & Behavior, 39*(3), 364–372. https://doi.org/10.1177/1090198111418634

Goodenow, C. (1993). Classroom belonging among early adolescent students: Relationships to motivation and achievement. *The Journal of Early Adolescence, 13*(1), 21–43. https://doi.org/10.1177/0272431693013001002

Gopal, N. D., & Collings, S. J. (2014). The incidence of polysubstance abuse among treatment seeking youth in Durban, South Africa. *The Oriental Anthropologist: A Bi-Annual*

International Journal of the Science of Man, 14(2), 333–341. https://doi.org/10.1177/0976343020140211

Goulet, M., Clément, M. E., Helie, S., & Villatte, A. (2020). Longitudinal association between risk profiles, school dropout risk, and substance abuse in adolescence. *Child & Youth Care Forum, 49*(5), 687–706. https://doi.org/10.1007/s10566-020-09550-9

Gravetter, F. J., & Forzano, L. A. B. (2009). *Research methods for psychology*. Cengage Learning Australia.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Prentice Hall.

Hair, J. F., Gabriel, M., & Patel, V. (2014). AMOS covariance-based structural equation modeling (CB-SEM): Guidelines on its application as a marketing research tool. *Brazilian Journal of Marketing, 13*(2), 44–55. https://doi.org/10.5585/remark.v13i2.2718

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modelling (PLS-SEM)* (3rd ed.). Sage.

Hair Jr, J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: Updated guidelines on which method to use. *International Journal of Multivariate Data Analysis, 1*(2), 107–123. https://doi.org/10.1504/IJMDA.2017.087624

Hales, A. H., Williams, K. D., & Eckhardt, C. I. (2015). A participant walks into a bar…: Subjective intoxication buffers ostracism's negative effects. *Social Psychology, 46*(3), 157–166. https://doi.org/10.1027/1864-9335/a000235

Hancock, G. R., & Liu, M. (2012). Bootstrapping standard errors and data-model fit statistics in structural equation modeling. In R. H. Hoyle (Ed.), *Handbook of structural equation modeling* (pp. 296–306). The Guilford Press.

Hartwell, K. J., Back, S. E., McRae-Clark, A. L., Shaftman, S. R., & Brady, K. T. (2012). Motives for using: A comparison of prescription opioid, marijuana and cocaine dependent individuals. *Addictive Behaviors*, *37*(4), 373–378. https://doi.org/10.1016/j.addbeh.2011.11.014

Hasin, D. S., & Grant, B. F. (2015). The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) Waves 1 and 2: Review and summary of findings. *Social Psychiatry and Psychiatric Epidemiology, 50*(11), 1609–1640. https://doi.org/10.1007/s00127-015-1088-0

Hasin, D. S., Kerridge, B. T., Saha, T. D., Huang, B., Pickering, R., Smith, S. M., Jung, J., Zhang, H., & Grant, B. F. (2016). Prevalence and correlates of DSM-5 cannabis use disorder, 2012-2013: Findings from the national epidemiologic survey on alcohol and related conditions-III. *American Journal of Psychiatry, 173*(6), 588–599. https://doi.org/10.1176/appi.ajp.2015.15070907

Hasin, D. S., O'Brien, C. P., Auriacombe, M., Borges, G., Bucholz, K., Budney, A., & Grant, B. F. (2013). DSM-5 criteria for substance use disorders: Recommendations and rationale. *American Journal of Psychiatry, 170*(8), 834–851. https://doi.org/10.1176/appi.ajp.2013.12060782

Haslam, S. A., & McGarty, C. (2019). *Research methods and statistics in psychology* (3rd ed.). Sage Publications.

Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin, 112*(1), 64–105. https://doi.org/10.1037//0033-2909.112.1.64.

Hayduk, L. (2014a). Seeing perfectly fitting factor models that are causally misspecified: Understanding that close-fitting models can be worse. *Educational and Psychological Measurement, 74*(6), 905–926. https://doi.org/10.1177/0013164414527449

Hayduk, L. A. (2014b). Shame for disrespecting evidence: The personal consequences of insufficient respect for structural equation model testing. *BMC Medical Research Methodology, 14*, 124. https://doi.org/10.1186/1471-2288-14-124

Hayduk, L., Cummings, G., Boadu, K., Pazderka-Robinson, H., & Boulianne, S. (2007). Testing! testing! one, two, three-Testing the theory in structural equation models!. *Personality and Individual Differences, 42*(5), 841–850. https://doi.org/10.1016/j.paid.2006.10.001

Hendricks, S. (2018). *Pretesting the revised version of the South African Substance Use Contextual Risk Instrument (SASUCRI)* [Master's thesis, University of the Western Cape]. http://hdl.handle.net/11394/6568

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*, 115–135. https://doi.org/10.1007/s11747-014-0403-8

Herman, A. A., Stein, D. J., Seedat, S., Heeringa, S. G., Moomal, H., & Williams, D. R. (2009). The South African Stress and Health (SASH) study: 12-month and lifetime prevalence of common mental disorders. *South African Medical Journal = Suid-Afrikaanse Tydskrif vir Geneeskunde, 99*(5 Pt 2), 339–344.

Hershberger, S. L. (2003). The growth of structural equation modeling: 1994-2001. *Structural Equation Modeling, 10*(1), 35–46. https://doi.org/10.1207/S15328007SEM1001_2

Hong, J. S., Huang, H., Sabri, B., & Kim, J. S. (2011). Substance abuse among Asian American youth: An ecological review of the literature. *Children and Youth Services Review, 33*(5), 669–677. https://doi.org/10.1016/j.childyouth.2010.11.015

Hooper, D., Coughlan, J., & Mullen, M. (2008). Evaluating model fit: A synthesis of the structural equation modelling literature. In *7th European Conference on research methodology for business and management studies* (Vol. 2008, pp. 195–200).

Horner, M. S., Tarter, R., Kirisci, L., & Clark, D. B. (2013). Modeling the association between sexual maturation, transmissible risk, and peer relationships during childhood and adolescence on development of substance use disorder in young adulthood. *The American Journal on Addictions, 22*(5), 474–480. https://doi.org/10.1111/j.1521-0391.2013.12046.x

Hoyle, R. H. (2000). Confirmatory factor analysis. In H. E. A. Tinsley & S. D. Brown (Eds.), *Handbook of applied multivariate statistics and mathematical modeling* (pp. 465–497). Academic Press. https://doi.org/10.1016/B978-012691360-6/50017-3

Hoyle, R. H. (Ed.). (2012). *Handbook of structural equation modeling*. Guilford press.

Hoyle, R. H., & Isherwood, J. C. (2013). Reporting results from structural equation modeling analyses in Archives of Scientific Psychology. *Archives of Scientific Psychology, 1*(1), 14–22. https://doi.org/10.1037/arc0000004

Hu, L. T., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle (Ed.), *Structural equation modelling: Concepts, issues, and applications* (pp. 76–99). Sage Publications.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

IBM. (2008). *IBM SPSS software.* https://www.ibm.com/spss

Isaac, R. (2019). *Factors associated with illegal drug use in South Africa: A qualitative literature review* [Master’s thesis, Malmö University]. urn:nbn:se:mau:diva-24891

Ismail, R., Ahmad, N. A., Ibrahim, F., & Nen, S. (2017). The influence of individual, familial and social environmental factors towards substance abuse behavior among adolescents. *Akademika*, *87*(1), 7–16.

Johnson, N., Frenn, M., Feetham, S. & Simpson, P. (2011). Autism Spectrum Disorder: Parenting stress, family functioning and health-related quality of life. *Families, Systems & Health, 29*(3), 232–252. https://doi.org/10.1037/a0025341

Kafka, R. R., & London, P. (1991). Communication in relationships and adolescent substance use: The influence of parents and friends. *Adolescence, 26*(103), 587–598.

Kalsoom, U., & Malik, J. (2019). Suggestibility and substance abuse among adolescents: Examining the association through structural equation modeling. *Journal of Postgraduate Medical Institute*, *33*(4), 310–314. https://jpmi.org.pk/index.php/jpmi/article/view/2555

Kenny, D. A. (2019). Enhancing validity in psychological research. *American Psychologist, 74*(9), 1018–1028. https://doi.org/10.1037/amp0000531

Keyes, K. M., Hatzenbuehler, M. L., & Hasin, D. S. (2011). Stressful life experiences, alcohol consumption, and alcohol use disorders: The epidemiologic evidence for four main types of stressors. *Psychopharmacology, 218*(1), 1–17. https://doi.org/10.1007/s00213-011-2236-1

Kilpatrick, D. G., Acierno, R., Saunders, B., Resnick, H. S., Best, C. L., & Schnurr, P. P. (2000). Risk factors for adolescent substance abuse and dependence: Data from a national sample. *Journal of Consulting and Clinical Psychology, 68*(1), 19–30. https://doi.org/10.1037/0022-006X.68.1.19

Kim, E. S., Ryff, C., Hassett, A., Brummett, C., Yeh, C., & Strecher, V. (2020). Sense of purpose in life and likelihood of future illicit drug use or prescription medication

misuse. *Psychosomatic Medicine, 82*(7), 715–721. https://doi.org/10.1097/PSY.0000000000000842

Kline, R. B. (2011). Convergence of structural equation modeling and multilevel modeling. In M. Williams & W. Paul Vogt (Ed.), *The SAGE handbook of innovation in social research methods* (pp. 562–589). SAGE.

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford Publications.

Kogan, S. M., Cho, J., Brody, G. H., & Beach, S. R. (2017). Pathways linking marijuana use to substance use problems among emerging adults: A prospective analysis of young Black men. *Addictive Behaviors, 72*, 86–92. https://doi.org/10.1016/j.addbeh.2017.03.027

Kosterman, R., Graham, J. W., Hawkins, J. D., Catalano, R. F., & Herrenkohl, T. I. (2001). Childhood risk factors for persistence of violence in the transition to adulthood: A social development perspective. *Violence and Victims, 16*(4), 355–369. https://doi.org/10.1891/0886-6708.16.4.355

Kraemer, H. C., Stice, E., Kazdin, A., Offord, D., & Kupfer, D. (2001). How do risk factors work together? Mediators, moderators, and independent, overlapping, and proxy risk factors. *American Journal of Psychiatry, 158*(6), 848–856. https://doi.org/10.1176/appi.ajp.158.6.848

Kroneman, L. M., Hipwell, A. E., Loeber, R., Koot, H. M., & Pardini, D. A. (2011). Contextual risk factors as predictors of disruptive behavior disorder trajectories in girls: The moderating effect of callous-unemotional features. *Journal of Child Psychology and*

Psychiatry, and Allied Disciplines, 52(2), 167–175. https://doi.org/10.1111/j.1469-7610.2010.02300.

Lai, H. M. X., Cleary, M., Sitharthan, T., & Hunt, G. E. (2015). Prevalence of comorbid substance use, anxiety and mood disorders in epidemiological surveys, 1990–2014: A systematic review and meta-analysis. *Drug and Alcohol Dependence*, *154*, 1–13. https://doi.org/10.1016/j.drugalcdep.2015.05.031

Laudet, A. B., Magura, S., Vogel, H. S., & Knight, E. L. (2004). Perceived reasons for substance misuse among persons with a psychiatric disorder. *The American Journal of Orthopsychiatry, 74*(3), 365–375. https://doi.org/10.1037/0002-9432.74.3.365.

Le Bon, O., Basiaux, P., Streel, E., Tecco, J., Hanak, C., Hansenne, M., & Dupont, S. (2004). Personality profile and drug of choice; A multivariate analysis using Cloninger's TCI on heroin addicts, alcoholics, and a random population group. *Drug and Alcohol Dependence, 73*(2), 175–182. https://doi.org/10.1016/j.drugalcdep.2003.10.006

Levitas, R., Pantazis, C., Fahmy, E., Gordon, D., Lloyd-Reichling, E., & Patsios, D. (2007). *The multi-dimensional analysis of social exclusion*. University of Bristol.

Lezin, N., Rolleri, L., Bean, S., & Taylor, M. J. (2004). *Parent-child connectedness: Implications for research, interventions, and positive impacts on adolescent health*. ETR Associates. https://www.handinhandparenting.org/wp-content/uploads/2013/08/Parent-Child-Connectedness-Bridge-Project.pdf

Loehlin, J. C. (2004). *Latent variable models: An introduction to factor, path, and structural equation analysis* (4th ed.). Erlbaum.

Luk, J. W., Wang, J., & Simons-Morton, B. G. (2010). Bullying victimization and substance use among US adolescents: Mediation by depression. *Prevention Science, 11*(4), 355–359. https://doi.org/10.1007/s11121-010-0179-0

Madu, S. N., & Matla, M. Q. P. (2003). Illicit drug use, cigarette smoking and alcohol drinking behaviour among a sample of high school adolescents in the Pietersburg area of the Northern Province, South Africa. *Journal of Adolescence, 26*(1), 121–136. https://doi.org/10.1016/S0140-1971(02)00120-3

Magidson, J. F., Dietrich, J., Otwombe, K. N., Sikkema, K. J., Katz, I. T., & Gray, G. E. (2017). Psychosocial correlates of alcohol and other substance use among low-income adolescents in peri-urban Johannesburg, South Africa: A focus on gender differences. *Journal of Health Psychology, 22*(11), 1415–1425. https://doi.org/10.1177/1359105316628739

Malhotra, N. K., Schaller, T. K., & Patil, A. (2017). Common method variance in advertising research: When to be concerned and how to control for it. *Journal of Advertising, 46*(1), 193–212. https://doi.org/10.1080/00913367.2016.1252287

Manu, E., Douglas, M., & Ayanore, M. A. (2020). Socio-ecological influences of adolescence marijuana use initiation: Qualitative evidence from two illicit marijuana-growing communities in South Africa. *South African Journal of Psychiatry, 26*(1). https://doi.org/10.4102/sajpsychiatry.v26i0.1477

Martínez-Mesa, J., González-Chica, D. A., Duquia, R. P., Bonamigo, R. R., & Bastos, J. L. (2016). Sampling: How to select participants in my research study?. *Anais Brasileiros de Dermatologia, 91*(3), 326–330. https://doi.org/10.1590/abd1806-4841.20165254

Masiko, N., & Xinwa, S. (2017). *Substance abuse in South Africa, its linkages with gender based violence and urban violence.* Centre for the Study of Violence and Reconciliation (CSVR). https://www.saferspaces.org.za/uploads/files/Substance_Abuse_in_SA_-_Linkages_with_GBV__Urban_Violence.pdf

Masiza, M. (2016). *Investigating the scalar equivalence of the English version of the South African Substance Use Contextual Risk Instrument across the English and isiXhosa*

mother tongue speakers. [Master's thesis, University of the Western Cape]. http://hdl.handle.net/11394/5627

Mason, M. J., Light, J. M., Mennis, J., Rusby, J. C., Westling, E., Crewe, S., & Flay, B. R. (2017). Neighborhood disorder, peer network health, and substance use among young urban adolescents. *Drug and Alcohol Dependence, 178*, 208–214. https://doi.org/10.1016/j.drugalcdep.2017.05.005

McDonald, J. (2009). Using least squares and tobit in second stage DEA efficiency analyses. *European Journal of Operational Research, 197*(2), 792–798. https://doi.org/10.1016/j.ejor.2008.07.039

McDonald, R. P. (2004). Respecifying improper structures. *Structural Equation Modeling, 11*(2), 194–209. https://doi.org/10.1207/s15328007sem1102_3

McDonald, R. P., & Ho, M. H. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods*, *7*(1), 64–82. https://doi.org/10.1037/1082-989x.7.1.64

McLellan A. T. (2017). Substance misuse and substance use disorders: Why do they matter in healthcare?. *Transactions of the American Clinical and Climatological Association, 128*, 112–130.

McQueen, R. A., & Knussen, C. (1999). *Research methods in psychology: A practical introduction*. Prentice Hall.

Meader, N., King, K., Moe-Byrne, T., Wright, K., Graham, H., Petticrew, M., & Sowden, A. J. (2016). A systematic review on the clustering and co-occurrence of multiple risk behaviours. *BMC Public Health, 16*(1), 1–9. https://doi.org/10.1186/s12889-016-3373-6

Meier, M. H., Hall, W., Caspi, A., Belsky, D. W., Cerdá, M., Harrington, H., & Moffitt, T. E. (2016). Which adolescents develop persistent substance dependence in adulthood?

Using population-representative longitudinal data to inform universal risk assessment. *Psychological Medicine, 46*(4), 877–889. 10.1017/S0033291715002482

Mennis, J., Stahler, G. J., & Mason, M. J. (2016). Risky substance use environments and addiction: A new frontier for environmental justice research. *International Journal of Environmental Research and Public Health, 13*(6), 607. https://doi.org/10.3390/ijerph13060607

Messick, S. (1989). Meaning and values in test validation: The science and ethics of assessment. *Educational Researcher, 18*(2), 5–11. https://doi.org/10.3102/0013189X018002005

Miles, J., & Shevlin, M. (2007). A time and a place for incremental fit indices. *Personality and Individual Differences, 42*(5), 869–874. https://doi.org/10.1016/j.paid.2006.09.022

Miller, A. S. (1998). Why Japanese religions look different: The social role of religious organizations in Japan. *Review of Religious Research, 39*(4), 360–370. https://doi.org/10.2307/3512444

Morojele, N. K., Brook, J. S., & Kachieng'a, M. A. (2006). Perceptions of sexual risk behaviours and substance abuse among adolescents in South Africa: A qualitative investigation. *AIDS Care, 18*(3), 215–219. https://doi.org/10.1080/09540120500456243

Moshier, S. J., McHugh, R. K., Calkins, A. W., Hearon, B. A., Rosellini, A. J., Weitzman, M. L., & Otto, M. W. (2012). The role of perceived belongingness to a drug subculture among opioid-dependent patients. *Psychology of Addictive Behaviors, 26*(4), 812–820. https://doi.org/10.1037/a0029107

Moss, H. B., Chen, C. M., & Yi, H. Y. (2014). Early adolescent patterns of alcohol, cigarettes, and marijuana polysubstance use and young adult substance use outcomes

in a nationally representative sample. *Drug and Alcohol Dependence, 136*, 51–62. https://doi.org/10.1016/j.drugalcdep.2013.12.011

Mouton, J., & Marais, H. C. (1991). *Basic concepts in the methodology of social sciences* (2nd rev.). Human Sciences Research Council.

Muchiri, B. W., & Dos Santos, M. M. (2018). Family management risk and protective factors for adolescent substance use in South Africa. *Substance Abuse Treatment, Prevention, and Policy, 13*(24). https://doi.org/10.1186/s13011-018-0163-4

Mudavanhu, N., & Schenck, R. (2014). Substance abuse amongst the youth in Grabouw Western Cape: Voices from the community. *Social Work, 50*(3), 370–392. https://doi.org/10.15270/50-2-405

Mulaik, S. (2007). There is a place for approximate fit in structural equation modelling. *Personality and Individual Differences, 42*(5), 883–891. https://doi.org/10.1016/j.paid.2006.10.024

Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of goodness-of-fit indices for structural equation models. *Psychological Bulletin, 105*(3), 430–445. https://doi.org/10.1037/0033-2909.105.3.430

Myers, B., Koch, J. R., Johnson, K., & Harker, N. (2022). Factors associated with patient-reported experiences and outcomes of substance use disorder treatment in Cape Town, South Africa. *Addiction Science & Clinical Practice, 17*(8). https://doi.org/10.1186/s13722-022-00289-3

Myers, B., Williams, P. P., Johnson, K., Govender, R., Manderscheid, R., & Koch, J. R. (2017). Readiness to adopt a performance measurement system for substance abuse treatment: Findings from the Service Quality Measures initiative. *South African Medical Journal, 107*(2), 160–164. https://doi.org/10.7196/SAMJ.2017.v107i2.11331

Nachmias, C., & Nachmias, D. (1996). *Research methods in the social sciences*. Edward Arnold.

Naidoo, P., Mangoma-Chaurura, J., Khan, G., Canham, B., Malope-Rwodzi, N., Subklew-Sehume, F., & Mashigo, R. (2016). *Using sport as an intervention for substance abuse reduction among adolescents and young adults in three selected communities in South Africa: An exploratory study*. Human Sciences Research Council and loveLife.

Nasim, A., Belgrave, F. Z., Jagers, R. J., Wilson, K. D., & Owens, K. (2007). The moderating effects of culture on peer deviance and alcohol use among high-risk African-American adolescents. *Journal of drug education, 37*(3), 335–363.

Nasim, A., Corona, R., Belgrave, F., Utsey, S. O., & Fallah, N. (2007). Cultural orientation as a protective factor against tobacco and marijuana smoking for African American young women. *Journal of Youth and Adolescence, 36*, 503-516.

Neff, J. A. (2006). Exploring the dimensionality of "religiosity" and "spirituality" in the Fetzer multidimensional measure. *Journal for the Scientific Study of Religion*, *45*(3), 449–459. https://doi.org/10.1111/j.1468-5906.2006.00318.x

Neiderhiser, J. M., Marceau, K., & Reiss, D. (2013). Four factors for the initiation of substance use by young adulthood: A 10-year follow-up twin and sibling study of marital conflict, monitoring, siblings, and peers. *Development and Psychopathology, 25*(1), 133–149. https://doi.org/10.1017/S0954579412000958

Nkwanyana, A. (2018). *Investigating item bias in some of the scales of the English version of the South African Substance Use Contextual Risk Instrument (SASUCRI) across a sample of English and isiXhosa mother-tongue learners*. [Master's thesis, University of the Western Cape]. http://hdl.handle.net/11394/6178

O'Brien, K. H. M., Salas-Wright, C. P., Vaughn, M. G., & LeCloux, M. (2015). Childhood exposure to a parental suicide attempt and risk for substance use disorders. *Addictive Behaviors, 46*, 70–76. https://doi.org/10.1016/j.addbeh.2015.03.008

Ozerkmen, N. (2005). A study of fifty drug users in Ankara, Turkey. *Addiction Research & Theory, 13*(2), 171–178. https://doi.org/10.1080/16066350512331328104

Pasché, S., & Myers, B. (2012). Substance misuse trends in South Africa. *Human Psychopharmacology: Clinical and Experimental, 27*(3), 338–341.

Patrick, M. E., Collins, L. M., Smith, E., Caldwell, L., Flisher, A., & Wegner, L. (2009). A prospective longitudinal model of substance use onset among South African adolescents. *Substance Use & Misuse, 44*(5), 647–662. https://doi.org/10.1080/10826080902810244

Peck, S. C., Vida, M., & Eccles, J. S. (2008). Adolescent pathways to adulthood drinking: Sport activity involvement is not necessarily risky or protective. *Addiction, 103*(Suppl 1), 69–83. https://doi.org/10.1111/j.1360-0443.2008.02177.x

Peltzer, K. (2010). Leisure time physical activity and sedentary behavior and substance use among in-school adolescents in eight African countries. *International Journal of Behavioral Medicine, 17*(4), 271–278. https://doi.org/10.1007/s12529-009-9073-1

Peltzer, K., & Phaswana-Mafuya, N. (2018). Drug use among youth and adults in a population-based survey in South Africa. *South African Journal of Psychiatry, 24*(1), a1139. https://doi.org/10.4102/sajpsychiatry.v24i0.1139.

Peltzer, K., & Ramlagan, S. (2010). Illicit drug use in South Africa: Findings from a 2008 national population-based survey. *South African Journal of Psychiatry, 16*(1), 8–15. https://doi.org/10.4102/sajpsychiatry.v16i1.230

Pengpid, S., Peltzer, K., & Ramlagan, S. (2021). Prevalence and correlates of hazardous, harmful or dependent alcohol use and drug use amongs persons 15 years and older in

South Africa: Results of a national survey in 2017. *African Journal of Primary Health Care and Family Medicine, 13*(1), 1–8. https://doi.org/10.4102/PHCFM.V13I1.2847.

Peter, J. P., & Churchill, G. A. (1986). Relationships among research design choices and psychometric properties of rating scales: A meta-analysis. *Journal of Marketing Research, 23*(1), 1–10.

Piko, B. (2000). Perceived social support from parents and peers: Which is the stronger predictor of adolescent substance use?. *Substance Use & Misuse, 35*(4), 617–630. https://doi.org/0.3109/10826080009147475

Plüddemann, A., Dada, S., Parry, C., Bhana, A., Perreira, T., Nel, E., Mncwabe, T., Gerber W., & Aboagye, L. (2010). Monitoring alcohol and drug abuse trends in South Africa (July 1996-December 2009). *South African Community Epidemiology Network on Drug Abuse (SACENDU), Research Brief, 13*(1), 1–11. http://hdl.handle.net/20.500.11910/3905

Plüddemann, A., Flisher, A. J., McKetin, R., Parry C., & Lombard, C. (2010). Methamphetamine use, aggressive behaviour, and other mental health issues among high school students in Cape Town, South Africa. *Drug and Alcohol Dependence, 109*(1–3), 14–19. https://doi.org/10.1016/j.drugalcdep.2009.11.021

Preller, K. H., Pokorny, T., Hock, A., Kraehenmann, R., Stämpfli, P., Seifritz, E., & Vollenweider, F. X. (2016). Effects of serotonin 2A/1A receptor stimulation on social exclusion processing. *Proceedings of the National Academy of Sciences, 113*(18), 5119–5124. https://doi.org/10.1073/pnas.1524187113

Pretorius, T. B. (2007). *Inferential Data Analysis: Hypothesis testing and decision-making*. Reach Publishers.

Rabinowitz, V. C., & Weseen, S. (2001). Power, politics, and the qualitative/quantitative debates in psychology. In D. L. Tolman & M. Brydon-Miller (Eds.), *From subjects to*

subjectivities: A handbook of interpretive and participatory methods. New York University Press.

Rawoot, I. (2015). *Investigating item bias in some of the scales of the South African Substance Use Contextual Risk Instrument (SASUCRI) for use with adolescents in low socio-economic status communities in the Western Cape* [Master's thesis]. University of the Western Cape, Cape Town.

Rawoot, I., & Florence, M. A. (2017). Equivalence and bias in the South African substance use contextual risk instrument. *Psychological Reports, 120*(1), 158–178. https://doi.org/10.1177/0033294116685865

Reddy, S. P., James, S., Sewpaul, R., Sifunda, S., Ellahebokus, A., Kambaran, N. S., & Omardien, R. G. (2013). *Umthente uhlaba usamila: The 3rd South African national youth risk behaviour survey 2011*. Cape Town: South African Medical Research Council.

Redonnet, B., Chollet, A., Fombonne, E., Bowes, L., & Melchior, M. (2012). Tobacco, alcohol, cannabis and other illegal drug use among young adults: The socioeconomic context. *Drug and Alcohol Dependence, 121*(3), 231–239. https://doi.org/10.1016/j.drugalcdep.2011.09.002

Reisinger, Y., & Mavondo, F. (2007). Structural equation modeling: Critical issues and new developments. *Journal of Travel & Tourism Marketing, 21*(4), 41–71. https://doi.org/10.1300/J073v21n04_05

Rich, E. G. (2017). *Exploring perceived reasons and risk factors for illicit drug use among youth in the Western Cape: Implications for primary prevention*. [Doctoral dissertation, University of the Western Cape]. http://hdl.handle.net/11394/6081

Ringle, C. M., Wende, S., & Becker, J. (2022). *SmartPLS 4*. Oststeinbek: SmartPLS. https://www.smartpls.com

Robinson, S. M., & Adinoff, B. (2016). The classification of substance use disorders: Historical, contextual, and conceptual considerations. *Behavioral Sciences, 6*(3), 18. https://doi.org/10.3390/bs6030018

Rosa, E. M., & Tudge, J. (2013). Urie Bronfenbrenner's theory of human development: Its evolution from ecology to bioecology. *Journal of Family Theory & Review, 5*(4), 243–258. https://doi.org/10.1111/jftr.12022

Rounsaville, B. J., Spitzer, R. L., & Williams, J. B. (1986). Proposed changes in DSM-III substance use disorders: Description and rationale. *The American Journal of Psychiatry, 143*(4), 463–468. https://doi.org/10.1176/ajp.143.4.463

Rus, A. V., Parris, S., Cross, D., & Purvis, K., (2010). Romanian institutionalized children's privation and Bronfenbrenner's Ecological System Theory. *Research, Education and Development: Symposium Proceedings*. Cluj-Napoca, Romania: Risoprint Publishing House. https://doi.org/10.13140/2.1.5000.8004

Saban, A., Flisher, A. J., Grimsrud, A., Morojele, N., London, L., Williams, D. R., & Stein, D. J. (2014). The association between substance use and common mental disorders in young adults: Results from the South African Stress and Health (SASH) Survey. *The Pan African Medical Journal*, *17*(Suppl 1). https://doi.org/10.11694/pamj.supp.2014.17.1.3328

Saladino, V., Mosca, O., Petruccelli, F., Hoelzlhammer, L., Lauriola, M., Verrastro, V., & Cabras, C. (2021). The vicious cycle: Problematic family relations, substance abuse, and crime in adolescence: A narrative review. *Frontiers in Psychology, 12*, 673954. https://doi.org/10.3389/fpsyg.2021.673954

Sánchez-Queija, I., Oliva, A., Parra, Á., & Camacho, C. (2016). Longitudinal analysis of the role of family functioning in substance use. *Journal of Child and Family Studies, 25*(1), 232–240. https://doi.org/10.1007/s10826-015-0212-9

Sarstedt, M., & Mooi, E. (Eds.). (2014). Hypothesis testing & ANOVA. In *A concise guide to market research: The process, data, and methods using IBM SPSS statistics* (3rd ed., pp. 141–192). Springer.

Savalei, V. (2012). The relationship between root mean square error of approximation and model misspecification in confirmatory factor analysis models. *Educational and Psychological Measurement, 72*(6), 910–932. https://doi.org/10.1177/0013164412452564

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online, 8*(8), 23–74.

Schuckit, M. A., Nathan, P. E., Helzer, J. E., Woody, G. E., & Crowley, T. J. (1991). Evolution of the DSM diagnostic criteria for alcoholism. *Alcohol Research and Health, 15*(4), 278–283.

Schumacker, R. E., & Lomax, R. G. (1996). *A beginner's guide to structural equation modeling*. Lawrence Erlbaum Associates.

Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling*. Psychology Press.

Schumacker, R. E., & Lomax, R. G. (2016). *A beginner's guide to structural equation modeling* (4th ed.). Routledge.

Shah, R., & Goldstein, S. M. (2006). Use of structural equation modeling in operations management research: Looking back and forward. *Journal of Operations Management, 24*(2), 148–169. https://doi.org/10.1016/j.jom.2005.05.001

Shook, C. L., Ketchen Jr, D. J., Hult, G. T. M., & Kacmar, K. M. (2004). An assessment of the use of structural equation modeling in strategic management research. *Strategic Management Journal, 25*(4), 397–404. https://doi.org/10.1002/smj.385

Shumba, A., & Makura, A. H. (2014). Drug abuse by learners in South Africa: A replication and extension study. *Journal of Psychology in Africa, 24*(2), 197–199. https://doi.org/10.1080/14330237.2014.903066

Sibanda, A., & Batisai, K. (2021). The intersections of identity, belonging and drug use disorder: Struggles of male youth in post-apartheid South Africa. *International Journal of Adolescence and Youth, 26*(1), 143–157. https://doi.org/10.1080/02673843.2021.1899945

Sireci, S. G. (1998). Gathering and analyzing content validity data. *Educational Assessment, 5*(4), 299–321. https://doi.org/10.1207/s15326977ea0504_2

Smirnov, A., Najman, J. M., Hayatbakhsh, R., Plotnikova, M., Wells, H., Legosz, M., & Kemp, R. (2013). Young adults' trajectories of Ecstasy use: A population based study. *Addictive Behaviors, 38*(11), 2667–2674. https://doi.org/10.1016/j.addbeh.2013.06.018

Social Exclusion Unit. (2004). *Breaking the cycle*. Office of the Deputy Prime Minister. http://webarchive.nationalarchives.gov.uk/+/http:/www.cabinetoffice.gov.uk/media/cabinetoffice/social_exclusion_task_force/assets/publications_1997_to_2006/breaking_report.pdf

Solomon, P. (2004). Peer support/peer provided services underlying processes, benefits, and critical ingredients. *Psychiatric Rehabilitation Journal, 27*(4), 392–401. https://doi.org/10.2975/27.2004.392.401

SPSS-SA. (2005). *Structural Equation Modeling with AMOS: Training course handbook*. SPSS-SA, Silvermine House, Cape Town.

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. *Personality and Individual Differences*, *42*(5), 893–898. https://doi.org/10.1016/j.paid.2006.09.017

Stoker, A., & Swadi, H. (1990). Perceived family relationships in drug abusing adolescents. *Drug and Alcohol Dependence, 25*(3), 293–297. https://doi.org/10.1016/0376-8716(90)90154-7

Stone, A. L., Becker, L. G., Huber, A. M., & Catalano, R. F. (2012). Review of risk and protective factors of substance use and problem use in emerging adulthood. *Addictive Behaviors, 37*(7), 747–775. https://doi.org/10.1016/j.addbeh.2012.02.014

Surís, A., Holliday, R., & North, C. S. (2016). The evolution of the classification of psychiatric disorders. *Behavioral Sciences, 6*(1), 5. https://doi.org/10.3390/bs6010005

Svensson, R. (2000). Risk factors for different dimensions of adolescent drug use. *Journal of Child & Adolescent Substance Abuse, 9*(3), 67–90. https://doi.org/10.1300/J029v09n03_05

Teesson, M., Slade, T., Swift, W., Mills, K., Memedovic, S., Mewton, L., & Hall, W. (2012). Prevalence, correlates and comorbidity of DSM-IV cannabis use and cannabis use disorders in Australia. *Australian & New Zealand Journal of Psychiatry, 46*(12), 1182–1192. https://doi.org/10.1177/0004867412460591

Terre Blanche, M., Durrheim, K., & Painter, D. (Eds.). (2006). *Research in practice: Applied methods for the social sciences*. Juta and Company.

Thomas, N. S., Salvatore, J. E., Gillespie, N. A., Aliev, F., Ksinan, A. J., Dick, D. M., & Spit for Science Working Group. (2021). Cannabis use in college: Genetic predispositions, peers, and activity participation. *Drug and Alcohol Dependence, 219*, 108489. https://doi.org/10.1016/j.drugalcdep.2020.108489

Tucker, J. S., Pollard, M. S., de la Haye, K., Kennedy, D. P., & Green Jr, H. D. (2013). Neighborhood characteristics and the initiation of marijuana use and binge drinking. *Drug and Alcohol Dependence, 128*(1–2), 83–89. https://doi.org/10.1016/j.drugalcdep.2012.08.006

Tudge, J. R., Mokrova, I., Hatfield, B. E., & Karnik, R. B. (2009). Uses and misuses of Bronfenbrenner's bioecological theory of human development. *Journal of Family Theory & Review, 1*(4), 198–210. https://doi.org/10.1111/j.1756-2589.2009.00026.x

Ullman, J. B. (2001). Structural equation modeling. In B. G. Tabachnick & L. S. Fidell (Eds.), *Using multivariate statistics* (4th ed.). Allyn & Bacon.

Ungar, M., Liebenberg, L., Dudding, P., Armstrong, M., & Van de Vijver, F. J. (2013). Patterns of service use, individual and contextual risk factors, and resilience among adolescents using multiple psychosocial services. *Child Abuse & Neglect, 37*(2–3), 150–159. https://doi.org/10.1016/j.chiabu.2012.05.007

United Nations Office on Drugs and Crime. (2014). *World Drug Report 2014*. https://www.unodc.org/wdr2014/

United Nations Office on Drugs and Crime. (2018). *World Drug Report 2018.* https://www.unodc.org/wdr2018/

United Nations Office on Drugs and Crime. (2019). *World Drug Report 2019.* https://wdr.unodc.org/wdr2019/

United Nations Office on Drugs and Crime. (2021). *World Drug Report 2021*. https://www.unodc.org/unodc/en/data-and-analysis/wdr2021.html

VandenBos, G. R. (Ed.). (2015). *APA dictionary of psychology* (2nd ed.). American Psychological Association. https://doi.org/10.1037/14646-000

Van Heerden, M. S., Grimsrud, A. T., Seedat, S., Myer, L., Williams, D. R., & Stein, D. J. (2009). Patterns of substance use in South Africa: Results from the South African Stress and Health study. *South African Medical Journal*, *99*(5 Pt 2), 358–366.

Van Hoeven, L. R., Janssen, M. P., Roes, K. C., & Koffijberg, H. (2015). Aiming for a representative sample: Simulating random versus purposive strategies for hospital

selection. *BMC Medical Research Methodology, 15*(1), 90. https://doi.org/10.1186/s12874-015-0089-8

Volkow, N. D., Han, B., Einstein, E. B., & Compton, W. M. (2021). Prevalence of substance use disorders by time since first substance use among young people in the US. *JAMA Pediatrics, 175*(4), 640–643. https://doi.org/10.1001/jamapediatrics.2020.6981

Wagner, F. A., & Anthony, J. C. (2002). Into the world of illegal drug use: Exposure opportunity and other mechanisms linking the use of alcohol, tobacco, marijuana, and cocaine. *American Journal of Epidemiology, 155*(10), 918–925. https://doi.org/10.1093/aje/155.10.918

Walsh, K., Resnick, H. S., Danielson, C. K., McCauley, J. L., Saunders, B. E., & Kilpatrick, D. G. (2014). Patterns of drug and alcohol use associated with lifetime sexual revictimization and current posttraumatic stress disorder among three national samples of adolescent, college, and household-residing women. *Addictive Behaviors, 39*(3), 684–689. https://doi.org/10.1016/j.addbeh.2013.12.006

Weich, S., Blanchard, M., Prince, M., Burton, E., Erens, B. O. B., & Sproston, K. (2002). Mental health and the built environment: Cross-sectional survey of individual and contextual risk factors for depression. *The British Journal of Psychiatry, 180*(5), 428–433. https://doi.org/10.1192/bjp.180.5.428

Weinberg, N. Z. (2001). Risk factors for adolescent substance abuse. *Journal of Learning Disabilities, 34*(4), 343–351. https://doi.org/10.1177/002221940103400409

Wesselmann, E. D., & Parris, L. (2021). Exploring the links between social exclusion and substance use, misuse, and addiction. *Frontiers in Psychology, 12*, 674743. https://doi.org/10.3389/fpsyg.2021.674743

West, S. G., Taylor, A. B., & Wu, W. (2012). Model fit and model selection in structural equation modeling. In R. H. Hoyle (Ed.), *Handbook of structural equation modeling* (pp. 209–231). The Guilford Press.

Wilson, S., & MacLean, R. (2011). *Research methods and data analysis for psychology*. McGraw-Hill Education.

Winek, J. L., Dome, L. J., Gardner, J. R., Sackett, C. R., Zimmerman, M. J., & Davis, M. K. (2010). Support network intervention team: A key component of a comprehensive approach to family-based substance abuse treatment. *Journal of Groups in Addiction & Recovery, 5*(1), 45–69.

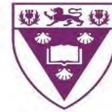
World Health Organization (WHO). (2017, May 26). *World health statistics 2017: Monitoring health for the SDGs, sustainable development goals.* World Health Organization. https://iris.who.int/bitstream/handle/10665/255336/9789241565486-eng.pdf?sequence=1

World Health Organization (WHO). (2021). *Global health observatory metadata: Age group codelist.* GHO | Metadata | Age Group - Codelist (who.int)

Zou, Z., Wang, H., d'Oleire Uquillas, F., Wang, X., Ding, J., & Chen, H. (2017). Definition of substance and non-substance addiction. In J. Shi, R. Tao, & X. Zhang (Eds.), *Substance and non-substance addiction* (pp. 21–41). Springer.

APPENDICES

Appendix A: Rhodes University Ethics Clearance



RHODES UNIVERSITY
Where leaders learn

Rhodes University Ethical Standards Committee, Rhodes University, P O Box 94, Grahamstown, 6140
Tel: +27 46 603 7366 • Fax: +27 46 603 8934 • Email: ethics-committee@ru.ac.za

28-Aug-2015

Dear Elron Fouten

Ethics Clearance: Examining the direct and indirect effect that individual and contextual factors have on substance abuse in low socio-economic communities in the Western and Eastern Cape.

Principal Investigator: Elron Fouten

This letter confirms that a research proposal with tracking number: RU-HSD-14-08-0005 and title: **Examining the direct and indirect effect that individual and contextual factors have on substance abuse in low socio-economic communities in the Western and Eastern Cape.** was given ethics clearance by the Rhodes University Ethical Standards Committee.

1. With regard to containing participants' discomfort, should any such discomfort arise: 'While on-site counsellors will be able to contain any such discomfort', please make sure that the counseling service undertaken is free of charge.

2. The researchers should please take steps to ensure that people receiving treatment are fully able to give informed consent (e.g. through discussing the matter with the Department of Social Development case workers).

Please ensure that the ethical standards committee is notified should any substantive change(s) be made, for whatever reason, during the research process. This includes changes in investigators. Please also ensure that a brief report is submitted to the ethics committee on completion of the research. The purpose of this report is to indicate whether or not the research was conducted successfully, if any aspects could not be completed, or if any problems arose that the ethical standards committee should be aware of. If a thesis or dissertation arising from this research is submitted to the library's electronic theses and dissertations (ETD) repository, please notify the committee of the date of submission and/or any reference or cataloguing number allocated.

Yours Sincerely,

Professor M. Goebel: Chairperson RUESC.

Note:
1. This clearance is valid from the date on this letter to the time of completion of data collection.
2. The ethics committee cannot grant retrospective ethics clearance.
3. Progress reports should be submitted annually unless otherwise specified.

Appendix B: Request for Permission to Collect Data

RHODES UNIVERSITY
Grahamstown • 6140 • South Africa

PSYCHOLOGY DEPARTMENT □□Tel: (046) 603 8500 / 8003 □ Fax: (046) 622 4032 □ e-mail: e.fouten@ru.ac.za

October 2016

Dear Sir or Madame

REQUEST FOR PERMISSION TO COLLECT DATA

I am a lecturer and registered PhD student at Rhodes University and I am writing to request permission to collect data from people currently receiving substance abuse intervention at Substance Abuse Treatment Centres. The study focuses on **the effects that individual and social factors have on substance abuse**.

Over the last few years a number of media reports have suggested that the misuse of the drug methamphetamine is becoming a growing problem for youth particularly in poverty-stricken areas. The overall purpose of this study is to conduct an investigation into the abuse of substances particularly methamphetamine in low socio- economic status communities of the larger Cape Town and Port Elizabeth metropolitans. The particular interest of this study is in the factors that impact on the abuse of substances in these communities. These factors range from the individual to the family to the broader social and political context of the community. The literature suggest that there is a need to explore the problem of substance abuse in the South African context, in

terms of the eco-systemic framework, in that there could be factors at the different levels (i.e. personal, family, community, cultural, societal, political and historical) that impact on the prevalence of substance abuse in low socio-economic areas. This study therefore proposes to frame the research in the eco-systemic theoretical framework developed by Bronfenbrenner (1986). A better understanding of substance abuse in communities such these could contribute to the formulation of effective strategies to counteract the effects of this problem in this and similar communities. This model will help to identify and explain the risk factors associated with substance abuse.

Data for this study will be collected through the administration of a self-completion questionnaire. The South African Substance Use Contextual Risk Index (SASUCRI) will be used and has been piloted in the Western Cape. The estimated amount of time required to complete the questionnaire varies between 40 to 50 minutes.

Information regarding the study will be provided in writing to the Treatment Centre and the participants. Only clients who sign consent forms to participate in the study will be permitted to complete the questionnaire. I have attached examples of these for your inspection. Extreme care will be taken to ensure the anonymity of the participants and the Treatment Centre and neither will be identifiable in research reports. I will also provide written feedback to the Department and, if the need or opportunity arises, I would be more than willing to do a formal presentation of the study and its findings.

Potential risks of the study could involve emotional discomfort or embarrassment related to participants own or a family member's substance abuse. Though there is no direct benefit to the participants at this stage, besides that they are able to reflect on themselves and their family and community functioning, findings of this study will inform intervention modules for participants of similar demographics.

Sincerely,

Elron Fouten

E.S. Fouten
Lecturer Psychology

Course Coordinator Psychology 3

Psychology Department

Tel (W): 046-603 8003

Tel (C): 072-576 2540

E-mail: e.fouten@ru.ac.za

Appendix C: City of Cape Town Research Request

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

CITY HEALTH

Dr Hélène Visser
Manager: Specialised Health

T: 021 400 3981 F: 021 421 4894 M: 083 298 8718
E: Helene.Visser@capetown.gov.za

2016-02-12

Re: Research Request: Examining the direct and indirect effect that individual and contextual factors have on adolescent substance abuse in low socio-economic communities in the Western and Eastern Cape (6596) (ID No: 10545)

Dear Dr Fouten,

Your research request has been approved for the following City Health Clinics:

Southern Sub District: Contact People	Parkwood Clinic Dr M Osman (Sub District Manager) Tel: (021) 444-3258/ 083 556 9838 Mrs K Shuping (Head: PHC & Programmes) Tel: (021) 444-3260 / 082 728 4531
Klipfontein Sub District: Contact People	Manenberg Clinic Mr K Nkoko (Sub District Manager) Tel: (021) 630-1667/ 082 433 1332 Mrs T Nojaholo (Head: PHC & Programmes) Tel: (021) 630-1626/ 084 220 0133
Mitchells Plain Sub District: Contact People	Tafelsig Clinic Mrs S Elloker (Sub District Manager) Tel: (021) 391-5012/ 084 222 1478 Mrs N Nqana (Head: PHC & Programmes) Tel: (021) 391-0175/ 084 2221489
Tygerberg Sub District: Contact People:	Delft South Clinic Mrs M Alexander (Sub District Manager) Tel: (021) 938-8279 / 084 222 1471 Mrs D Titus (Head: PHC & Programmes) Tel: (021) 938-8281 / 084 308 0596

Please note the following:

1. All individual patient information obtained must be kept confidential.
2. Access to the clinics and its patients must be arranged with the relevant Managers such that normal activities are not disrupted. Interviews will take place offsite.
3. A copy of the final report must be sent to the City Health Head Office, P O Box 2815 Cape Town 8001, within 6 months of its completion and feedback must also be given to the clinics involved.
4. Your project has been given an ID Number (10545). Please use this in any future correspondence with us.
5. No monetary incentives to be paid to clients on the City Health premises.

CIVIC CENTRE IZIKO LOLUNTU BURGERSENTRUM
HERTZOG BOULEVARD CAPE TOWN 8001 P O BOX 2815 CAPE TOWN 8000
www.capetown.gov.za

Making progress possible. Together.

Appendix D: Province of the Eastern Cape Social Development – Permission Letter

Beacon Hill Office Park - Corner of Hargreaves Road and Hockley Close – Private Bag X0039 – Bhisho – 5605 – REPUBLIC OF SOUTH AFRICA
Tel: +27 (0)43 605 5234 - Email address: dolores.tatchell@ecdsd.gov.za - Website: www.ecdsd.gov.za

11 September 2015

Mr Elron Fouten
Rhodes University
Psychology Department
GRAHAMSTOWN

Dear Mr Fouten

RESEARCH: Examining the direct and indirect effect that individual and contextual factors have on substance abuse in low socio-economic communities in Western and Eastern Cape

The Department acknowledges receipt of your application to conduct a study with persons currently receiving substance abuse intervention at state funded substance abuse treatment centre's. Please be aware that the Eastern Cape currently does not have a state funded substance abuse treatment centre, but is subsidizing non-profit organizations that provide this service. The Ernest Malgas State Treatment Centre in Port Elizabeth will, once operational, admit children up to age of 18 years.

Your application is approved with the following conditions:

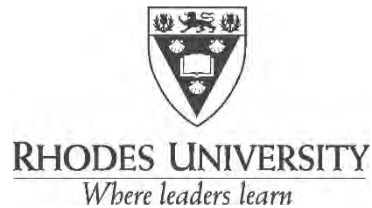
1. You will contact Mrs Sarita Beer, Manager: NPO Management, at the Port Elizabeth district office to coordinate with the relevant subsidized centres and to provide further information. Her contact numbers are: 041-4065700/0721991496
2. After completion of your research, you are expected to provide the Department with a written report and recommendations based on your research findings. The report will be used to inform and strengthen our substance abuse intervention programmes.
3. The Department is afforded a fair opportunity to respond to any issues that might arise from the research.
4. You avail yourself, should the need arise, to present the findings and recommendations to the Department.
5. Strictly adhere to ethical standards to make sure no harm comes to the participants in the study.

I wish you well with your research and look forward to the findings and recommendations.

PERMISSION RESEARCH FOUTEN RHODES UNIVERSITY-SEPT 15

Building a Caring Society Together

Appendix E: Participant Information Sheet



DEPARTMENT OF PSYCHOLOGY

Tel: +27(0)46 603 8500 Fax: +27(0)46 622 4032 Website:

http://www.rhodes.ac.za/academic/department/psychology

INFORMATION SHEET- Participants

Title of Research Project: *Examining the direct and indirect effect that individual and contextual factors have on adolescent substance abuse in low socio-economic communities in the Western and Eastern Cape.*

What is this study about?

This research project is being conducted by the Mr E. Fouten, a lecturer and PhD candidate and Rhodes University. I am inviting you to participate in this research project because you are between the ages of 18 and 24 years. The purpose of this research project is to get a sense of whether substance abuse is a problem in the community you live in and to find out what factors in the community and beyond could lead to substance abuse. This research will contribute to a better understanding of the problem in this area and could lead to better preventive and treatment programmes being implemented.

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

You will be asked to answer questions on a questionnaire to which you must please respond to the best of your ability. The kind of question that will be asked is, for example, Have you felt loved by your parents, have you felt satisfied with your life etc. As well as some demographic information such as age, gender, family make-up, etc. You will be handed the questionnaire and will be assisted by the researcher or a trained assistant to complete the questionnaire before handing it back. Participation in the research is completely voluntary and you are under no obligation to take part. The information that your will provide will not be disclosed to any member of staff at the treatment facility or any other person.

Would my participation in this study be kept confidential?

I will do my best to keep your personal information confidential. I will need to record information like your age, gender and socio-economic status, but your name will not appear on the questionnaire or the record that will be kept of the information. A number that will be assigned to the questionnaire and recorded on a computer will be the only way of linking your responses to a specific questionnaire, but it will be completely anonymous. The researchers will be the only people who will have access to the results. If we write a report or article about this research project, your identity will be protected to the maximum extent possible.

What are the risks of this research?

There are no known risks associated with participating in this research project. We are not doing research on you as a person or to affect you in any way. You are only being questioned so that we could collect information about substance abuse in general in the area.

What are the benefits of this research?

This research is not designed to help you personally, but the results may help the researchers learn more about the factors in your community that influence substance abuse. We hope that, in the future, other people might benefit from this study through improved understanding of this problem.

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

Your participation in this research is completely voluntary. You may choose not take part at all. If you decide to participate in this research, you may stop at any time. If you decide not to participate in this study or if you stop participating at any time, there will be no consequences.

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

Should you be negatively affected by this research, you can contact me personally and I will do everything possible to refer you for support and assistance.

What if I have questions?

This research is being conducted by, Mr Elron Fouten if you have any questions about the research study itself, please contact me at:

E.S. Fouten

Lecturer

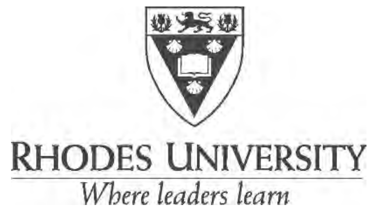
Psychology Department

Tel (W): 046-603 8003

Tel (C): 072-576 2540

E-mail: e.fouten@ru.ac.za

Appendix F: Participant Consent Form



DEPARTMENT OF PSYCHOLOGY

Tel: +27(0)46 603 8500 Fax: +27(0)46 622 4032 Website:

http://www.rhodes.ac.za/academic/department/psychology

CONSENT FORM

Title of Research Project: *Examining the direct and indirect effect that individual and contextual factors have on substance abuse in low socio-economic communities in the Western and Eastern Cape.*

The study has been described to me in language that I understand and I freely and voluntarily agree to participate. My questions about the study have been answered. I understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time 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 study or wish to report any problems you have experienced related to the study, please contact the study coordinator:

E.S. Fouten

Lecturer

Psychology Department

Tel (W): 046-603 8003

Tel (C): 072-576 2540

E-mail: e.fouten@ru.ac.za

Appendix G: South African Substance Use Contextual Risk Instrument (SASUCRI)

					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 this 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 anytime, 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.

T**ick (√)** 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**	AE

Please provide us with the following background information. Either **tick (√) one** of the options **OR fill in your answer** in the space provided.

Are you female or male?	Female		Male			AF
How old are you?						AG
What is your home language?	English	Afrikaan s	Eng. & Afr.	Xhosa	Other: specify	AH
What grade are you in?	8	9	10	11	12	AI
What area do you live in?						AJ
What is your religion?						AK

To answer the rest of the questions, **think about the past 30 days**, then use the following key to **tick (√) the option** that matches your answer:

Always	**Often**	**Seldom**	**Never**	**Not applicable (N/A)**
(100% of the time)	(More than 50% of the time)	(Up to 50% of the time)	(0% of the time)	Not relevant for you (only for questions 37-41, 103 & 104)

Appendix H: SASUCRI – English Version (Revised)

					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 this 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 don't 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 anytime, 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.

To answer the rest of the questions, **think about the time before you started using**, then use the following key to **tick (√) the option** that matches your answer:

Always	**Often**	**Seldom**	**Never**	**Not applicable (N/A)**
(100% of the time)	(More than 50% of the time)	(Up to 50% of the time)	(0% of the time)	Not relevant for you (only for questions 37-41, 103 & 104)

	Identity **Before I started using**	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
1	I found it hard to know how to act when I could not tell what others expected.	1	2	3	4	
2	I felt I have been negatively impacted by living in a community that has been affected by apartheid.	1	2	3	4	
3	I found belonging to my community affected my chances of success in life.	1	2	3	4	
4	I felt discriminated against.	1	2	3	4	
5	I felt left out of things that others in my community were doing.	1	2	3	4	
6	I felt like I had to do what my friends wanted to do, even though I did not want to do it.	1	2	3	4	
7	When bad things happened, I got so upset I felt like I could not control my feelings.	1	2	3	4	
8	When bad things happened, I got so upset I felt like I couldn't do anything about it.	1	2	3	4	
9	I made use of the drugs available in my community to help me cope with my problems. I turned to drugs and/or alcohol to help me cope with my problems.	1	2	3	4	

	Sense of belonging **Before I started using**	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
10	I felt certain about who I really am.	4	3	2	1	
11	I was proud of the traditions that my community practices i.e. practices that are common for my social group	4	3	2	1	
12	I was comfortable with the traditions that my community practiced	4	3	2	1	
13	I enjoyed spending time with others in my community who practiced the same traditions as I did.	4	3	2	1	
14	I was proud to be a South African citizen.	4	3	2	1	
15	I felt the need to operate within South African law	4	3	2	1	
16	It was easy for me to tell the difference between right and wrong based on South African laws.	4	3	2	1	
17	Being part of my community's traditions made me feel like I belong.	4	3	2	1	
18	I preferred spending time with the people in my community than anywhere else.	4	3	2	1	

19	I felt that I had a lot of interests in common with the other people in my community	4	3	2	1	
20	I found I could relate well to other South Africans who come from different types of communities.	4	3	2	1	
21	I was willing to work with others in my neighbourhood to improve our neighbourhood	4	3	2	1	

	Self-efficacy **Before I started using**	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
22	I was able to make my own decisions about things that impacted on my life.	4	3	2	1	
23	I was in control of all of my actions.	4	3	2	1	
24	I could think of different ways to solve my problems.	4	3	2	1	
25	I was determined to solve my problems, even when faced with difficulties.	4	3	2	1	
26	I was able to resist things that were bad for me, like drugs.	4	3	2	1	
27	I felt that, no matter what happens in my life, things would be okay.	4	3	2	1	
28	I was capable of solving the problems that came up in my life.	4	3	2	1	
29	I was able to access support from people in my life to help me solve problems.	4	3	2	1	
30	I felt that I could deal with the conflict in my family.	4	3	2	1	
31	I could deal with problems that arose between me and my friends.	4	3	2	1	
32	I could deal with relationship problems i.e. with a girlfriend or boyfriend.	4	3	2	1	
33	There were people in my life that could help me solve problems.					

	Effects of drugs **Growing up**	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	**N/A**	
34	I considered using drugs to improve my functioning.	4	2	1	1		
35	I was calmer than usual after using drugs.	4	3	2	1	N/A 0	
36	I had more energy than usual after using drugs.	4	3	2	1	N/A 0	
37	I was able to cope better than usual after using drugs.	4	3	2	1	N/A 0	

38	I felt more confident than usual after using drugs.	4	3	2	1	N/A 0	
39	I felt that I can do **anything** after using drugs.	4	3	2	1	N/A 0	

	Religiosity Before I started using	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
40	I prayed daily.	4	3	2	1	
41	My faith provided meaning and purpose in my life.	4	3	2	1	
42	I was active in my faith or church.	4	3	2	1	
43	I enjoyed being around those who shared my faith.	4	3	2	1	
44	My faith impacted my decisions.	4	3	2	1	

	Family functioning Before I started using	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
45	I felt accepted by my family.	4	3	2	1	
46	It was worth making personal sacrifices if it helped my family.	4	3	2	1	
47	Everyone in my family understood the family rules.	4	3	2	1	
48	In my family, I felt that our relationships would last no matter what happens	4	3	2	1	
49	I got along with the people I lived with.	4	3	2	1	
50	My family enjoyed time together (even if it was just doing household chores).	4	3	2	1	
51	We had time to do things together as a family.	4	3	2	1	

	Parental monitoring Before I started using	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
52	My parent(s)/guardian(s) were concerned **about me.**	4	3	2	1	
53	My parent(s)/guardian(s) cared who I spent time with.	4	3	2	1	
54	My parent(s)/guardian(s) cared what I was doing when I was with my friends.	4	3	2	1	
55	My parent(s)/guardian(s) would be concerned if they found out I was doing something wrong.	4	3	2	1	

56	My parent(s)/guardian(s) were concerned about future educational options for me such as college, etc.	4	3	2	1	

	Communication and social support Before I started using	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
57	My parent(s)/guardian(s) were concerned **with how I was feeling.**	4	3	2	1	
58	My parent(s)/guardian(s) were thinking about and planning for future jobs for me.	4	3	2	1	
59	My family could talk to each other about how we feel.	4	3	2	1	
60	The people in my family could turn to each other for support in times of crisis.	4	3	2	1	
61	We were able to share our concerns and feelings in healthy ways in my family.	4	3	2	1	
62	We talked about the different ways we as a family could deal with problems or concerns.	4	3	2	1	
63	I had someone in my family to talk to about things that worried me.	4	3	2	1	
64	I had someone who I could depend on in my family.	4	3	2	1	

	Economic pressure in the family Before I started using	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
65	My family had enough money to pay bills.	4	3	2	1	
66	My family had enough food for at least three meals a day.	4	3	2	1	
67	My family had enough money to buy items for the house when we needed them.	4	3	2	1	
68	My family could easily provide clothes that I want to wear.	4	3	2	1	
69	The adults in my family could easily find jobs if needed.	4	3	2	1	
70	My family could easily provide a home for us.	4	3	2	1	
71	My family could afford the electronics that I want like cell phones, etc.	4	3	2	1	
72	My family could spend money on or give me money for entertainment.	4	3	2	1	

	Peer support Before I started using	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
73	I felt that it is good for me to spend time with my friends.	4	3	2	1	
74	I felt that my friends are “there for me” when I need them.	4	3	2	1	

75	I felt comfortable when I was amongst my friends.	4	3	2	1	
76	My friends were good listeners.	4	3	2	1	
77	I had or would have had the confidence to confront a friend when I felt that he/she was doing something wrong.	4	3	2	1	
78	My friends at school supported me.	4	3	2	1	

	Peer Influence Growing up	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
79	I felt the need to **go along** with what my friends were doing in order to "fit in".	4	3	2	1	
80	I **changed my behaviour** when I was with my friends in order to "fit in".	4	3	2	1	
81	I have changed my mind about something because of how my friends responded to it.	4	3	2	1	
82	I felt the need to hide my true opinion about something from my friends.	4	3	2	1	
83	I pretended that I agree with my friends just to avoid being teased.	4	3	2	1	

	Neighbourhood Growing up	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	**N/A**	
84	When there was nothing for me to do, I wanted to use drugs.	1	2	3	4		
85	It would have been easy to buy drugs in my neighbourhood/community.	1	2	3	4	n/a 0	
86	I found that drugs were a cheaper option than any other activity I wanted to do.	1	2	3	4	n/a 0	
87	It was common for people to sell drugs in my neighbourhood/community.	1	2	3	4		
88	No one did anything about the drug use in my neighbourhood/community.	1	2	3	4		
89	I felt that drugs are used too openly in my neighbourhood/community	1	2	3	4		

	Contradictions Before I started using	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
90	The people in my community sent the wrong message to young people by **selling** drugs.	4	3	2	1	

91	The people in my community sent the wrong message to young people by **using** drugs.	4	3	2	1	

	Mixed messages **Before I started using**	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
92	I felt confused because the people in my community **use** drugs which I have been taught is wrong.	4	3	2	1	
93	I felt confused because the people in my community **sell** drugs which I have been taught is wrong.	4	3	2	1	
94	It didn't matter what attempts were made to stop drug use, drugs would still have been used in my community.	4	3	2	1	
95	I felt that it would be dangerous to get involved with drug prevention efforts in my community.	4	3	2	1	
96	I felt confused about the people in my community who tolerated **gang** activity.	4	3	2	1	
97	I felt confused about the people in my community who tolerated **criminal** activity.	4	3	2	1	
98	I felt confused about the people in my community who tolerated **drug trade**.	4	3	2	1	

	Tolerance for drug use amongst children and teenagers **Before I started using**	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
99	It bothered me that it was common to see people in my community **drinking alcohol** in public.	1	2	3	4	
100	It bothered me that it was common to see people in my community **smoking dagga** in public.	1	2	3	4	
101	I was upset to see children playing near to people using alcohol and/or dagga.	1	2	3	4	
102	I was upset to see children and/or teens smoking cigarettes or dagga in public.	1	2	3	4	
103	I was upset to see children or teens drinking alcohol in public.	1	2	3	4	

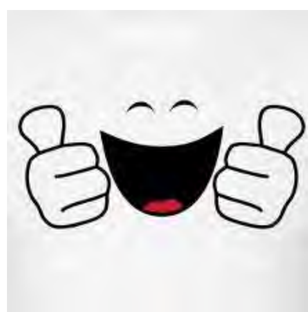
	Tolerance of soft drugs **Before I started using**	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
104	I felt it wasn't right for the people in my community to talk about **alcohol abuse** as if it is a normal and everyday thing.	1	2	3	4	
105	I felt that it wasn't right for the people in my community to talk about **dagga use** as if it is a normal and everyday thing.	1	2	3	4	

106	I felt that people in my community think that some drugs are more acceptable than others (e.g. dagga is okay, but not "tik").	1	2	3	4	

	Hope for the future **Before I started using**	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
107	I felt hopeful about the future for myself.	4	3	2	1	
108	I felt that I am able to improve my own situation.	4	3	2	1	
109	I felt that I am going to be able to get out of my circumstances.	4	3	2	1	
110	I was clear about my plans for my future.	4	3	2	1	
111	I felt that it's no use to think about the future.	4	3	2	1	
112	I had nobody to talk to about my future.	4	3	2	1	
113	I was happy with my future career opportunities.	4	3	2	1	
114	I felt positive about the future of my community.	4	3	2	1	

	Individual hope **Before I started using**	**Always** (100% of the time)	**Often** (More than 50% of the time)	**Seldom** (Up to 50% of the time)	**Never** (0% of the time)	
115	I felt that people in my community who are addicted to drugs could not help becoming addicted.	1	2	3	4	
116	I felt that it's no use to think about the future.	1	2	3	4	
117	I felt that I am too young to think about the future.	1	2	3	4	

Thank you for completing this questionnaire.



Appendix I: Initial CFA Standardised Regression Weights and Correlations

Standardised Regression Weights:

			Estimate
CommampSS62	<---	IFC	0.886
CommampSS61	<---	IFC	0.879
CommampSS57	<---	IFC	0.824
SenseofB13	<---	CTB	0.955
SenseofB14	<---	CTB	0.947
SenseofB17	<---	CTB	0.947
ToleranceAU103	<---	PDSU	0.922
ToleranceAU102	<---	PDSU	0.937
ToleranceAU101	<---	PDSU	0.881
MixedMess96	<---	AACB	0.9
MixedMess98	<---	AACB	0.938
MixedMess97	<---	AACB	0.948
PeerInfluence83	<---	FI	0.894
PeerInfluence82	<---	FI	0.89
PeerInfluence80	<---	FI	0.8
Religiosity41	<---	REL	0.883
Religiosity40	<---	REL	0.844
Religiosity42	<---	REL	0.819
Neighbourhood87	<---	APTD	0.84
Neighbourhood85	<---	APTD	0.843
Neighbourhood86	<---	APTD	0.792
PeerSupport74	<---	PPS	0.906
PeerSupport76	<---	PPS	0.865
PeerSupport75	<---	PPS	0.907
Selfefficacy28	<---	SE	0.761
Selfefficacy25	<---	SE	0.765
Selfefficacy22	<---	SE	0.808
Effectsofdrugs35	<---	SA	0.818
Effectsofdrugs36	<---	SA	0.827
Effectsofdrugs37	<---	SA	0.677
Hope112	<---	CFF	0.716
Hope114	<---	CFF	0.794
Hope110	<---	CFF	0.886
Identity5	<---	REP	0.721
Identity4	<---	REP	0.643
Identity6	<---	REP	0.566

Appendix J: Respecified CFA

Standardised Regression Weights:

			Estimate
CommampSS62	<---	IFC	0.886
CommampSS61	<---	IFC	0.879
CommampSS57	<---	IFC	0.824
SenseofB13	<---	CTB	0.955
SenseofB14	<---	CTB	0.947
SenseofB17	<---	CTB	0.947
ToleranceAU103	<---	PDSU	0.923
ToleranceAU102	<---	PDSU	0.936
ToleranceAU101	<---	PDSU	0.881
MixedMess96	<---	AACB	0.9
MixedMess98	<---	AACB	0.938
MixedMess97	<---	AACB	0.948
PeerInfluence83	<---	FI	0.895
PeerInfluence82	<---	FI	0.889
PeerInfluence80	<---	FI	0.799
Religiosity41	<---	REL	0.882
Religiosity40	<---	REL	0.844
Religiosity42	<---	REL	0.819
Neighbourhood87	<---	APTD	0.838
Neighbourhood85	<---	APTD	0.847
Neighbourhood86	<---	APTD	0.791
PeerSupport74	<---	PPS	0.906
PeerSupport76	<---	PPS	0.865
PeerSupport75	<---	PPS	0.907
Selfefficacy28	<---	SE	0.76
Selfefficacy25	<---	SE	0.766
Selfefficacy22	<---	SE	0.808
Effectsofdrugs35	<---	SA	0.818
Effectsofdrugs36	<---	SA	0.826
Effectsofdrugs37	<---	SA	0.677
Hope112	<---	CFF	0.716
Hope114	<---	CFF	0.794
Hope110	<---	CFF	0.886

Appendix K: Second Order CFA

Standardised Regression Weights:

			Estimate
SE	<---	M_I_C_R_O	0.576
IFC	<---	M_I_C_R_O	0.726
PPS	<---	M_I_C_R_O	0.695
AACB	<---	M_E_S_O	0.74
FI	<---	M_E_S_O	0.684
REL	<---	M_E_S_O	0.634
CTB	<---	M_A_C_R_O	0.926
PDSU	<---	M_A_C_R_O	0.106
IFC	<---	er2	0.688
PPS	<---	er3	0.719
AACB	<---	er5	0.672
FI	<---	er6	0.729
REL	<---	er7	0.774
CTB	<---	er8	0.377
PDSU	<---	er9	0.994
SE	<---	er1	0.818
CommampSS62	<---	IFC	0.91
CommampSS61	<---	IFC	0.887
CommampSS57	<---	IFC	0.826
SenseofB13	<---	CTB	0.955
SenseofB14	<---	CTB	0.947
SenseofB17	<---	CTB	0.947
ToleranceAU103	<---	PDSU	0.805
ToleranceAU102	<---	PDSU	0.933
ToleranceAU101	<---	PDSU	0.827
MixedMess96	<---	AACB	0.884
MixedMess98	<---	AACB	0.935
MixedMess97	<---	AACB	0.944
PeerInfluence83	<---	FI	0.896
PeerInfluence82	<---	FI	0.892
PeerInfluence80	<---	FI	0.797
Religiosity41	<---	REL	0.886
Religiosity40	<---	REL	0.844
Religiosity42	<---	REL	0.819
PeerSupport74	<---	PPS	0.925
PeerSupport76	<---	PPS	0.874
PeerSupport75	<---	PPS	0.909
Selfefficacy28	<---	SE	0.836
Selfefficacy25	<---	SE	0.78
Selfefficacy22	<---	SE	0.813