FACTORS ASSOCIATED WITH SUBSTANCE USE IN ADOLESCENTS ADMITTED TO TARA HOSPITAL ADOLESCENT UNIT

Dr Vuyani W. Nxumalo

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Medicine in the discipline of Psychiatry, in 2020.

DECLARATION

I, Vuyani Wiseman Nxumalo, declare that this Research Report is my own, unaided work. It is being submitted for the Degree of Master of Medicine in Psychiatry discipline at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

_____ _____

Vuyani Wiseman Nxumalo Date

_____ _____

Yvette Nel Date

(Supervisor)

PLAGIARISM DECLARATION FOR WRITTEN WORK

I, Dr Vuyani Nxumalo, as a postgraduate student registered for a MMed at the University of the Witwatersrand declare the following:

- I am aware that plagiarism is the use of someone else's work without their permission and or without acknowledging the original source.
- I am aware plagiarism is wrong.
- I confirm that this written work is my own work except where I have stated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or if I have failed to acknowledge the ideas or writing of others.

…… June 2020

Signature **Date**

PRESENTATION ARISING FROM THIS STUDY

Oral presentation- University of the Witwatersrand, Department of Psychiatry, Annual Research Day, 2019.

ACKNOWLEDGEMENTS

Thank you to Dr Yvette Nel, my supervisor, for your immense input and support.

Thank you to Tara Hospital for allowing access to the patient records for this research.

Thank you to Dr Petra Gaylard for all the help with the statistical analysis.

Thank you to Dr Thuli Mdaka and Kholofelo for extra support.

Thank you to Dr Noleen Loubser for editing this work.

ABSTRACT

Background

Substance use among the adolescent population has been described as serious public health concern with long-term health, financial and psychosocial consequences. Previous studies have described risk factors associated with the onset of substance use in adolescents. The aim of the study was to determine the prevalence of substance use and to describe and compare the socio-demographic and clinical profile of adolescent substance users and adolescent substance non-users admitted to the adolescent ward at Tara H. Moross Centre Hospital (Tara).

Methods

This was a retrospective comparative record review of all the adolescent patients admitted to Tara Hospital's adolescent unit over a period of four years from 1 January 2012 to 31 December 2015. Records from adolescents between ages of 13 and 18 were included in the study.

Results

Overall the total sample consisted of 118 patient records. The prevalence of substance use in this population was 44.1% (n=52), 53.4% (n=63) of the total sample were female and the median age of the total sample was 16 years (IQR=15-16). Cannabis was the predominant choice of substance (n=36, 69.2%) and the majority of the patients reported being introduced to substances by their peers (n=39, 86.4%). When comparing the substance use group and substance non-user group it was found that there was a significant difference between the groups with regards to main caregiver patterns (p=0.012). There was also a significant difference with regards to

psychosocial stressors, where the stressor of “conflict with parents” was more common in the substance use group (61.5%, n=32) compared to the substance non-user group (25.8%, n=17, p<0.001).

Conclusion

This study results are in keeping with the international literature with respect to factors associated with adolescent substance use and substance use patterns. The high prevalence of substance use in this study highlights the important potential role of dual diagnosis programmes for adolescent mental health care users. Family caregiver patterns should be noted in the history, and conflict within the family unit can be viewed as a potential therapeutic target. This study suggests that there is still a need for continuous psychoeducation about substances in families and the community at large.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ADHD	Attention deficit hyperactivity disorder
ART	Antiretroviral treatment
DSM- IV- TR	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision
DSM- 5	Diagnostic and Statistical Manual of Mental Disorders Fifth Edition
HIV	Human immunodeficiency virus
ICD-9	International Classification of Diseases, Ninth Revision
IQR	Interquartile range
MHCU	Mental health care user
SA	South Africa
SACENDU	South African Community Epidemiology Network on Drug Use
SAS	Statistical Analysis System
SD	Standard deviation
SNU	Substance non-user
STI	Sexually transmitted infection
STD	Sexually transmitted disease
SU	Substance user
Tara	Tara H. Moross Centre Hospital
UNODC	United Nation Office on Drugs and Crime
USA	United States of America
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Background

Substance use, which may refer to both legal and illicit drugs, continues to be a global concern with multiple health and socioeconomic consequences.[1] Studies have shown that there has been a rapid rise in substance use globally over the past decade.[1,2] This is a serious public health concern with significant negative impact on public health and socioeconomic outcomes.[1] According to the United Nations Office on Drugs and Crime (UNODC) World Drug Report, approximately 5.6% of the global population between the ages of 15 and 64 years used substances at least once during the year 2016.[3] A further 16.7% of this population suffered from substance use disorders and related disorders.[3]

The onset of substance use during the adolescent years poses a danger to the vulnerable adolescent brain that is still developing.[4] The World Health Organization (WHO) regards adolescence as the age period from 10 years to 19 years.[5] The adolescence stage of development has been described as a critical stage of human development characterized by a transition from childhood to adulthood where there is rapid physical, cognitive, emotional and biological growth.[5] The introduction of substance use in this stage of development would therefore have a negative impact on the overall development of the individual.[5] Substance use at an early age plays an important role in an adult developing a substance use disorder.[6] Research has shown that most patients who have a substance use disorder in adulthood started using substances before the age of 18 and had developed their disorder by the age of 20 years.[6] The likelihood of developing a substance use disorder has been shown to be highest in individuals with onset of use in their early adolescent years.[7] In one

study, it was shown that 15% of people who started using alcohol by the age of 14 years developed alcohol dependence, compared with two percent of those who commenced use at the age of 21 years or older.[7] The common addictive substances with which the majority of people begin with are tobacco, alcohol, and cannabis or marijuana.[7] Early substance use has also been associated with the development of psychiatric illnesses other than substance use disorders later in life.[8]

There are several factors associated with the onset of substance use during adolescence that have been described in the literature. These factors include individual, familial and environmental factors.[1,9] Factors such as the genetic predisposition, the availability of drugs, the family environment, exposure to violence, physical or emotional abuse, the presence of mental illness, and peer pressure, all increase the likelihood of an adolescent using substances.[9,10] Analysing these factors is vital for the development of preventative and treatment programmes for adolescents who use substances or have substance use disorders.

When teenagers struggle with emotional problems, they may turn to substance use to help them manage difficult feelings.[9] Because adolescent brains are still developing, the results of teenage 'self-medication' can be more immediately problematic.[9] In the short term, this behaviour can help alleviate unwanted mental health symptoms such as anxiety and depression. In the longer term it exacerbates them, and often ends in abuse or dependence.[9] This progression is more likely to happen in adolescents with pre-existing mental health conditions. The chosen location for the current study has a unit specifically targeted at adolescents with mental health issues.

The Tara H. Moross Centre Hospital (Tara Hospital) is situated in Johannesburg in the Gauteng province of South Africa (SA). The hospital has 140 in-patient beds and offers

specialised psychiatric inpatient and outpatient services to children and adults with mental illness. Tara Hospital is one of three hospitals in Gauteng that has an adolescent in-patient unit.[11] This study aimed to determine the factors associated with substance use in adolescents admitted to Tara Hospital.

1.2 Aim

The aim of this study was to describe the sociodemographic and clinical profiles of adolescent substance users (SU) admitted to Tara Hospital in the period from 1 January 2012 to 31 December 2015, and to compare these profiles to those of adolescent substance non-users (SNU).

1.3 Objectives

The objectives of this study were:

- To determine the percentage of adolescent in-patients presenting with a substance use history;
- To describe and compare the socio-demographic and clinical profiles of the patients with a substance use history and those without; and
- To determine which factors, if any, could be associated with a substance use history.

1.4 Hypothesis

It was hypothesised that in adolescent patients admitted to Tara Hospital there would be a difference in the sociodemographic and clinical profiles of substance users compared to non-users.

CHAPTER TWO: LITERATURE REVIEW

2.1 Substance Use

Substance use may include experimenting by using a substance as a once-off incident, persistent or even dependent use.[12] The term 'substances' refers to drugs that activate the brain's reward pathway, and the classification of these drugs is not based on whether a substance is legal or not.[9,12] The classes of drugs include alcohol, cannabis, nicotine, caffeine, stimulants, hallucinogens, inhalants, opioids, sedatives, hypnotics, anxiolytics, stimulants, and other substances like anabolic steroids.[12] From the listed drugs, alcohol, caffeine and nicotine are not regarded as 'illicit drugs'. The term 'illicit drugs' refers to substances that are addictive and illegal.[12] Each class has a separate mechanism by which reward is produced, but all substances produce the associated intoxication experience through the activation or inhibition of the central nervous system.[13]

According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth edition (DSM 5), substance use disorder is defined as '…a cluster of cognitive, behavioural and physiological symptoms indicating that the individual continues to use substances despite significant substance-related problems'.[14] Substance use disorders involve pathological patterns of behaviours such as aggression, as well as neglect of social and occupational responsibilities.[14]

2.2 Neurobiology of Substance Use in Adolescents

Research suggests that there are rapid changes in the emotional and regulatory controls of the adolescent's brain. As a result, adolescents are driven to seek new experiences and immediate rewards which may lead to substance use.[15] An increase

in dopaminergic connections feeding into the underdeveloped prefrontal cortex, the development of limbic system, increase in white matter and decrease in grey matter are all characteristics of brain development during adolescent period.[9] The region of the brain that is concerned with decision-making and processing is called the prefrontal cortex. Memory and incentive assessment are elements that this region utilizes to make decisions and it reacts to stimulation by dopamine.[9] Dopamine is a neurotransmitter that plays a central role in emotional responsiveness, desire and incentives.[9] The bulk of addictive substances promote the extreme release of the neurotransmitter, dopamine. As a result, this can lead to addiction through excess stimulation of the reward pathway. The underdeveloped prefrontal cortex of adolescents is sensitive to reward and has a decreased ability to inhibit stimulus which then limits decision-making.[9] This further contributes to an incapability to make decisions and control behaviour, leading to risk-seeking behaviours such as substance use.[8]

2.3 Psychosocial Determinants of Substance Use

Identity formation is the central developmental task of adolescence, according to the 'Theory of Psychosocial Development'.[16] Adolescents start developing their identity through the exploration of new things which may lead to substance use, thus experimenting with substances may be considered to be normal behaviour.[8,17] Another theory, the 'Social Development Model' also postulates that children learn behavioural patterns from their social environment including family, school, peers and surrounding community.[17]

2.4 The Prevalence of Substance Use, Illicit and Legal, in Adolescents in other Countries and South Africa

Substance use includes both legal and illicit substances. The use of illicit substances is a growing public health problem. Globally the prevalence of substance use in 2014 was 5.3%.[2] A national USA survey of 2018 among grade 8-10 students showed that the lifetime prevalence use for any illicit substance was between 19% and 45%, and the 12 month prevalence use for any illicit substance was between 19% and 40%.[18]

A study by Göbel *et al.* among European adolescents in 2016 showed that the overall prevalence of alcohol use was 11.2% and polysubstance use was 4.7%.[19] It reported further that alcohol use was more prevalent in Denmark (26.4%) and Hungary (23.8%), with higher prevalence rates for polysubstance use in Ireland (10%) and Estonia (9.1%).[19] An Ethiopian study done in 2012 used a self-report questionnaire to assess the prevalence of substance use and associated factors among high school adolescents in Woreta Town in Ethiopia. It was found that the prevalence of current substance use among 651 students in the study was 47.9%. Furthermore, the study found that the lifetime prevalence was 65.4% and the three most commonly used substances were alcohol, nicotine and methcathinone (also known as mephedrone, with street name ‘Kat’ or ‘khat’) respectively.[20]

Olumide *et al.* used a self-report questionnaire to conduct a comparative study on the lifetime prevalence of substance use among adolescents in five major cities, namely, Baltimore, Shanghai, Delhi, Ibadan, and Johannesburg.[21] Of all the cities listed, Johannesburg had the highest prevalence of substance use of 77.4%, followed by Baltimore (73.2%), Shanghai (71.9%), Ibadan (53.8%) and Delhi (33%).[21] The most

commonly used substances in all the cities was alcohol, with a prevalence of 44.6%, followed by nicotine (26.2%) and cannabis (17.9%).[21]

In a South African study conducted among high school students by Moodley *et al*. in the Pretoria township of Atteridgeville, a self-report questionnaire indicated that the lifetime prevalence rates for the three most commonly used substances were 51.4% for alcohol, 25.2% for cigarettes and 13.2% for cannabis.[22] In this study alcohol was also found to have the lowest mean age of initiation compared to the other substances.[22] Taukoor *et al.* carried out a retrospective chart review and reported a lifetime prevalence of substance use of 38.3% among adolescents in Durban and alcohol was the most commonly used substance at 29.6% followed by cannabis use at 19.8%.[23] A South African population-based survey conducted in 2012 by Peltzer and Phaswana-Mafuya used a screening test to examine substance use in 26453 individuals, individuals aged 15 years and older , for the previous three-month period.[2] This study found that the most commonly used substance during the three month period was cannabis, followed by sedatives and amphetamine-type stimulants.[2] Peltzer and Phaswana-Mafuya also found that of all the SA provinces, Western Cape had the highest drug use during the study period (7.1%) followed by Free State (6.3%) and Northern Cape (5.2%).[2] It also seemed as if each province had a preferred substance. Western Cape was found to have higher rates of methamphetamine use whereas residents of Gauteng and Mpumalanga preferred to use alcohol and cannabis.[24] From all of the studies mentioned above it appears that alcohol and cannabis are the most commonly used substances by South African adolescents.

2.5 Substance Use and Mental Illness

The relationship between substance use and mental illness is often described as complex and bidirectional in that the two disorders can be reciprocal.[25,26] The presence of mental illness may lead to an increase in drug-seeking behaviour to alleviate psychiatric symptoms such as depression and anxiety, while mental illness may be induced by substance abuse.[26]

The prevalence of substance use is also higher among adolescents with mental illness than in the general adolescent population.[27-29] Niethammer and Frank studied psychiatric inpatient adolescents in Germany and found that alcohol was the most common substance with 44% regular use and illegal substances had a 40% use.[30] Another study done by Hollen *et al.* in 2008 in America on in-patient adolescent mental health and substance use comorbidities found a dual diagnosis in 25% of these patients.[27]

In South Africa, Paruk *et al.* investigated cannabis use in adolescent psychiatric in-patients in a Durban hospital.[28] In this study, 55.6% of the 45 patients with first episode psychosis reported a history of lifetime cannabis use.[28] In another study by Paruk *et al*. conducted on adolescent psychiatric in-patients using a retrospective chart review, the lifetime prevalence of cannabis use was 61.4%, this was followed by nicotine use and alcohol use with prevalence rates of 50% and 41.4% respectively.[29] Lachman *et al*. conducted a study in the Western Cape focussing on inpatient psychiatric adolescents. They extracted epidemiological, clinical and demographic data for those presenting with a dual diagnosis (psychiatric disorder with comorbid substance use disorder), specifically psychotic disorders and substance use. Their results suggested a high lifetime prevalence of substance use among adolescents

presenting with their first psychosis episode. Specifically, the lifetime prevalence of cannabis was 76%, this was followed by methamphetamine and alcohol.[31]

Wilkinson *et al.* described the link between cannabis and psychosis to be in three forms, acute psychosis associated with intoxication, psychosis during the withdrawal phase and persistent psychotic disorder which may lead to schizophrenia.[32] Additionally, another study has supported the idea that cannabis causes cognitive decline, especially in those that have used it for a longer duration.[33]

An association between substance use and the prodromal symptoms of schizophrenia has been described in a study that was conducted by Miettunen *et al.* in 2008. Their study investigated the association between cannabis use and risk of psychosis in 6330 adolescents. They concluded that cannabis use was associated with prodromal symptoms of psychosis in adolescence.[34]

More generally, Boden and Fergusson found that increased alcohol use increases the risk of depression.[35] Certain externalizing psychiatric disorders such as Attention deficit hyperactivity disorder (ADHD) have also been associated with substance use.[9] The presence of comorbid substance use in psychiatric patients may lead to adverse treatment outcomes like treatment adherence, poor treatment response, multiple relapses and hospital admissions and impairment in overall functioning.[31]

2.6 Factors Associated with Substance Use among Adolescents

Factors associated with the development of substance use and substance use disorders in the adolescent population are multifactorial. In order to have intervention strategies for adolescent substance use, it is important to understand the factors associated with the onset and maintenance of substance use in the adolescent

population.[36] Several studies have reported on the factors associated with substance use in the adolescent population.[1,9,37] These factors have been categorized and described differently by different studies. In a review by Whitesell *et al*., factors leading to substance use and substance use disorders in adolescents were described as familial, social and individual risk factors.[9] Familial factors included child maltreatment, a family history of substance abuse, and poor parent-child relationships. Social factors included associations with defiant peers, bullying and gang involvement. Individual factors included the presence of Attention deficit hyperactivity disorder (ADHD) and depression.[9] In certain studies, familial factors such as child abuse, neglect and divorce of parents have been mentioned as environmental factors.[1,9,37] A family history of substance use and psychiatric disorders, the presence of certain psychiatric disorders and medical conditions have also been described as clinical factors by certain studies.[1,37]

2.6.1 Sociodemographic factors

When looking specifically at illicit drug use, the prevalence of illicit drug use in males has been reported to be twice that reported in female adolescents.[1,37-39] With respect to race, some authors have reported higher rates of substance use among white (Caucasian) population compared to other races in South Africa.[1,37]

When looking at substance use in general, certain studies have found that the prevalence of substance use increases with age in adolescents.[21,28,38] Lachman *et al.* found that substance use was associated with a low level of education among adolescents.[31] From a social factor perspective, substance use has been found to be more common among adolescents coming from poorer low-income home environments.[1,28]

Substance use in adolescents has been found to be associated with stressors such as a history of child abuse, neglect and divorce or separation of the parents.[31,40] Problems with family relationship have been shown to be associated with substance use in the adolescent population. Increased parental and sibling conflict has been associated with an increased risk to substance use.[31,40] Both Ololade and Mndzebele and Barret *et al.* reported that adolescents living with both parents were less likely to use substances than those coming from a single-parent household.[41-42]

2.6.2 Clinical profile

A family history of substance use and a psychiatric condition have been found to be associated with substance use in adolescents.[40,43] Research has indicated that the presence of ADHD in adolescents is associated with an increased risk for substance use. This likelihood has been shown to be three times higher than other mental illnesses.[9] The treatment of ADHD in children and adolescents has been shown to decrease the likelihood of substance use by up to 50%.[9]

Depressive disorders in adolescents are also associated with an increased risk for the onset of substance use and substance use disorders.[9] This is thought to be related to multiple factors such the dopamine reward theory and psychosocial stressors, as already mentioned in Section 2.2. Dopamine deficiency in depressed patients may lead to seeking for a substance to increase the levels of dopamine in the brain, and this may in turn lead to excess dopamine in the prefrontal cortex and stimulation of the reward system.[9] This is often referred to as the ‘self-medicating’ theory in depressed individuals. It is often thought that depression predates the onset of substance use.[9] The relationship between depression and substance use is often described as

reciprocal with a common aetiology of genetics, involved anatomical structure, neurotransmitters and psychosocial stressors.[9]

Chronic medical conditions such as human immunodeficiency virus (HIV) and diabetes mellitus have been found to be associated with substance use in adolescents.[44] Substances are used to 'numb the pain' of the psychological stressors associated with these conditions and this has an effect on the treatment adherence and disease control.[44] Adolescents with chronic medical illness were found to use alcohol more frequently than other substances in a study by Davis *et al*.[45] This emphasizes an association between substances in medical as well as mental illnesses.

2.7 Effects of Substance Use in Adolescents

Substance use has been shown to have a negative impact on adolescents which continues in adult life.[46] The direct and indirect impact of early onset of substance use may lead to adverse health and safety outcomes for the individual and community at large.[7] The younger the individual is at onset of substance use, the greater the negative impact and consequences.[47] Substance use also has a negative impact on educational achievement and results in behavioural problems leading to academic under-achievement.[48] Adolescents using substances may terminate school early due to substance use.[48] Even after school completion, they may still face a challenge in finding employment, especially if drug testing is practised. This in turn may lead to unemployment, and, as a result, adolescent substance users are more likely to be involved in criminal activities.[48]

Substance use in adolescents is associated with involvement in high risk behaviours. This in turn leads to situations such as motor vehicle accidents, suicide and homicide.[47] Since the early 2000s, South Africa has had an increase in violence and

severe crimes which are associated with substance use.[46] In a randomized trial by Swartz *et al*. among 18 year olds and above who were involuntary psychiatric patients from North Carolina, it was found that 27% of the 331 patients who had committed a crime associated with violence were under the influence of substances.[48] A Namibian study by Rudatsikira *et al.* in 2007 in school-going adolescents found that substance use was associated with violent behaviour such as physical fights.[49] Substance use in adolescents and in the general population is also associated with an increased risk of contracting HIV and other sexually transmitted illnesses (STI).[20] This is related to poor decision-making and impaired judgment during the period of substance intoxication and intravenous drug use.

Substances such as nicotine, cannabis and alcohol have been described in other studies as gateway drugs for other substances such as cocaine and amphetamines.[50,51] Researchers have described the 'gateway theory', which means that using certain substances may lead one to use other substances which are regarded as 'stronger'.[50,51] The pathway for this includes the psychological and physiological need for something stronger of the same type after the use of nicotine, cannabis or alcohol. The other pathway involves the social interaction where an individual comes into contact with the users of other substances like cocaine and amphetamines. Despite this information, the gateway hypothesis remains a controversial topic of substance abuse. [50,51]

2.8 Summary of the Literature Review

Adolescent substance use is a challenge physically, socially and financially across the globe. Adolescence is a difficult stage where mental illness may emerge, and adolescents may experiment with substances due to their developing brains seeking

novel experiences. Although studies have been conducted globally on substance use in adolescents, there is limited information regarding the epidemic among mental health care users in South Africa. Alcohol has been described in many local and international studies as the main substance of abuse followed by cannabis. However, in studies specifically examining adolescent mental health care user, cannabis has been reported as the most used substance, especially in the South African context. Factors associated with substance use that have been described in adolescents include age, gender, psychosocial stressors, a family history of substance abuse, and peer pressure.

The current study aims to add to the body of research by exploring the factors associated with substance use in adolescents admitted to Tara Hospital adolescent unit.

CHAPTER THREE: METHODOLOGY

3.1 Study Design and Sample Population

This study was a retrospective comparative record review conducted at Tara Hospital. The study population included adolescent patients between the ages of 13 and 18 years who were admitted at the Tara Hospital's adolescent unit during the period of 1 January 2012 until 31 December 2015. While the WHO defines adolescence as ages 10 to 19, the above ages were from the Tara admission criteria for an adolescent.

The list of patients admitted during the period of 1 January 2012 to 31 December 2015 was obtained from the admissions unit. The number of patients admitted for this period was 140. Out of 140 files, only 118 files were obtained with 17 files missing. No information was known regarding the 17 missing files.

3.2 Sample Size Calculation

The sample size was based on the key research question, in this case the comparison of study variables between substance users and substance non-users. This required the use of chi-square test for most variables. Catering for at least a 3x2 table (for 3 categories of a given variable and 2 categories of grouping: substance users and substance non-users), the detection of small, medium and large effect sizes with 80% power and at the 5% significance level, required sample size of 964, 108 and 39 respectively.[52] This study aimed for the detection of at least a medium effect size, should it have existed, thus a minimum sample of 108 patients was required. The actual sample size of 118 was thus adequate.

3.3 Inclusion Criteria

For this study, all data from patients admitted to the adolescent ward from 1 January 2012 to 31 December 2015 were included. Records for adolescents between the ages of 13 and 18 years were included in the study. There were 123 admission records obtained, but it was found that five patients had been admitted more than once. These five cases were only included once, and the information used was taken from the first admission. Therefore there were 118 files used in this research.

3.4 Data Collection

Data used in this study were collected retrospectively from the files of the patients admitted from 1 January 2012 until 31 December 2015 using a data collection sheet (Please see Appendix 3). The list of patients admitted during this period was compiled using the hospital's inpatient database. Information was obtained from the admission clerking sheet and when there was information missing, the patient's ward file was retrieved. The information from the data sheet was then entered on to an electronic spreadsheet which was used for data analysis. To protect the patient's identifying information, each data sheet was assigned a separate code number.

3.4.1 Prevalence of substance use

The primary outcome of the study was to determine the prevalence of substance use in the adolescent inpatients at Tara Hospital. Information about substance use was obtained from the admission clerking sheet and ward file. Substance use, for the purpose of this study, was defined as lifetime use of any psychoactive substance, as noted in the history of the patient. This was ascertained from a self-report of substance use or misuse, a diagnosis of substance-related disorder, a positive multi-drug urine

screen during admission, collateral information or any combination of these. Multi-drug urine test screening for all the inpatients was not done routinely. The researcher only documented the presence of a substance use history and did not assess whether the patients also fulfilled the criteria for a substance use disorder.

3.4.2 Sociodemographic data

This information was obtained from the admission clerking sheet and ward file. This included demographic information pertaining to age, race (recorded as it appeared in a patient's file), educational background (including highest level of education, type of school being attended), and current caregiver.

3.4.3 Clinical profile for psychiatric diagnosis

The psychiatric diagnosis was based on the psychiatric diagnosis which was made on the first clerk at admission and the discharge summary. These diagnoses were categorized based on the Diagnostic Statistical Manual (DSM) IV TR and DSM 5. However, some diagnoses were grouped to minimize the variables. The psychiatric diagnosis were grouped as follows: Attention deficit hyperactivity disorder (ADHD), disruptive disorders (oppositional defiant disorder and conduct disorder), learning disorder, intellectual disorder, psychotic disorders (including psychotic disorder due to another medical condition and substance-induced psychotic disorder), mood and anxiety disorders (including mood and anxiety disorder due to another medical condition and substance-induced mood or anxiety disorder), substance use disorder, personality disorder, and other psychiatric disorders. The other psychiatric conditions were not investigated by the researcher as they were isolated conditions

3.4.4 Substance-related data

The substance-related data were collected in terms of a detailed substance history, including type of substance used, age of onset, duration of substance use and who introduced the substance for the first time to the individual. The duration of substance use was determined in months from the date the patient first used substances prior to the date of admission as there were no patients who only had experimented on substances once and stopped. The introduction of substance for the first time to the individual was obtained from the substance history in the admission template and in the subsequent history in the file.

3.5 Data Analysis

All data were captured on an electronic spreadsheet and then run through the Statistical Analysis System (SAS) (version 9.4 for Windows) statistical package. For continuous variables, the means, medians, standard deviations and interquartile ranges were calculated. Tests of difference between continuous variables were carried out using t-tests for parametric data or the non-parametric Wilcoxon rank sum test when the data did not meet the assumptions necessary to compute a t-test. Categorical data were represented as frequencies and percentages. Tests of difference between categorical variables used the Fisher's exact test, a version of the chi-square test suitable for 2x2 contingency tables. The 5% significance level was used. The descriptive presentation of the results used tables and bar charts.

3.6 Postgraduate Committee and Ethics Committee Approval

This was a retrospective study and the data were anonymous. Names of the patients and other identifying details were not recorded on the data sheet. Patients were not

being treated in the hospital at the time of data collection. The original protocol was sent to Postgraduate Committee and changes that were recommended including the change of title were effected and sent back to the Committee before final approval was granted. Ethical clearance was obtained from Human Research Ethics Committee of the University of the Witwatersrand, Clearance Certificate No. M170410 (Please see Appendix 1). Permission was also granted from Tara Research Committee and the CEO to conduct this study (Please see Appendix 2).

CHAPTER FOUR: RESULTS

4.1 Sample Characteristics

Overall 140 patients were admitted to the Tara Hospital adolescent ward during the study period, however 17 files were missing, and there were also 5 repeat admissions. The final study sample was then 118 patients.

4.2 Sociodemographic Profile of the Overall Sample

The sociodemographic profile is summarized in Table 4.1 overleaf.

The median age of the overall population was 16 years (IQR =15-16), 53.4% (n=63) of the patients were female and 46.6% (n=55) were males. In terms of race, as recorded directly from the files, 44.9% (n=53) were African and 42.4% (n=50) were White, 6.7% (n=8) were coloured. The majority of the patients attended mainstream schooling (78%, n=92), 5.1% (n=6) patients attended special schooling and 8.5% (n=10) of the patients were not in school. The median number of years at school was 8 years (IQR =7-9).

In terms of the present caregiver, 43% (n=51) of the patients were cared for by both parents, 33.9% (n=40) were cared for by mothers only, 4.2% (n=5) were cared for by their father only, 11.9% (n=14) by grandparents, 2.5% (n=3) by adoptive parents, 2.5 (n=3) by other relatives and 1% (n=1) by siblings. The predominant psychosocial stressor was academic difficulties with 45.8% (n=54) followed by conflict with parents with 41.5% (n=49). Other psychosocial stressors included: divorced or separated parents (40.7%, n=48), poor peer relations (24.6%, n=29), parental conflict (21.2%, n=25), early parental loss (15.3%, n=18).

Table 4.1: Sociodemographic Profile of the overall sample (n=118)

		Mdn	IQR
Age (years)		16	15-16
		n	**%**
Gender	Male	55	46.6
	Female	63	53.4
Race	White	50	42.4
	African	53	44.9
	Coloured	8	6.8
	Indian	7	5.9
Main caregiver	Both parents	51	43.2
	Father	5	4.2
	Mother	40	33.9
	Grandparents	14	11.9
	Adoptive parents	3	2.5
	Siblings	1	0.8
	Other	1	0.8
	Other relatives	3	2.5
		Mdn	**IQR**
Years of schooling		8	7-9
		n	**%**
Type of schooling	Mainstream	92	78.0
	Special	6	5.1
	Remedial	7	5.9
	Not in school	10	8.5
	Other	3	2.5
Psychosocial stressors	Academic difficulties	54	45.8
	Divorce/separated parents	48	40.7
	Conflict with parents	49	41.5
	Poor peer relationships	29	24.6
	Parental conflict	25	21.2
	Early parental loss	18	15.3
	Other	2	1.7

Mdn- median, IQR- interquartile range

4.3 Clinical Profile of the Overall Sample

4.3.1 Psychiatric diagnosis

The predominant psychiatric diagnostic category was mood and anxiety disorders (70.3%, n=83) followed by psychotic disorders (29.7%, n=35). Substance use disorder was 12.7% (n=15). Some patients had more than one diagnosis, hence the total is above 100%.The category 'other' included complex trauma, autism spectrum disorder, anorexia nervosa, bulimia nervosa, eating disorder not otherwise specified, conversion disorder, somatic symptom disorder, Tourette disorder, cognitive disorder not otherwise specified. These results are represented graphically in Figure 4.1.

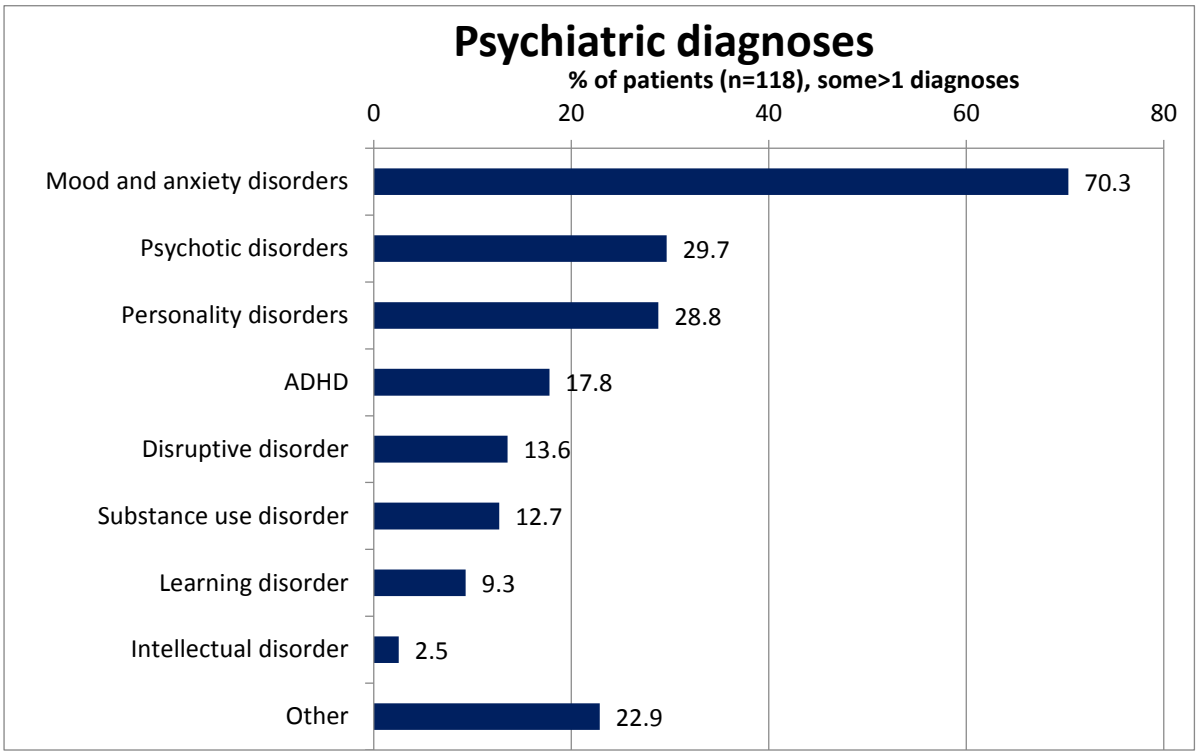


Figure 4.1: Psychiatric diagnoses

4.3.2 Duration of admission

The median duration of admission in hospital was 59 days (IQR = 35-87).

4.3.3 Family history

In terms of family history of psychiatric illness and substance use, 53.5% (n=61) had a family history of psychiatric illness and 41.5% (n=44) had a family history of substance use. There were four (3.4%) patients who were unknown with respect to family history of psychiatric illness and 12 (10.2%) for family history of substance use.

4.4 Substance Use Related Data

The overall prevalence of substance use was 44.1% (n=52) and the median age of onset was 14 years (IQR 13-15 years). Of these patients 46.2 % (n=24) were male and 53.8% (n=28) were female. The median duration of substance use was 20 months with minimum duration of one month and maximum of 72 months (IQR 11-24 months). Majority of these patients reported being introduced to substances by their peers (n=38, 86.4%), followed by family members (n=6, 13.6%). The other eight patients (15.4%) were unknown with regard to introduction of substances. This may be seen in Table 4.2 overleaf. In terms of the types of substances used, cannabis was the commonly used substance (n=36, 69.2%), followed by alcohol (n=33, 63.5%), nicotine (n=29, 55.8%), amphetamines (including methamphetamine) (n=14, 26.9%) and ‘Nyaope’ (n=4, 7.7%), a mixture of cannabis and heroine and other substances, also known as ‘sugars’ or ‘whoonga’. This may be seen in Figure 4.2. Some patients used more than one substance, therefore the percentages do not add up to 100.

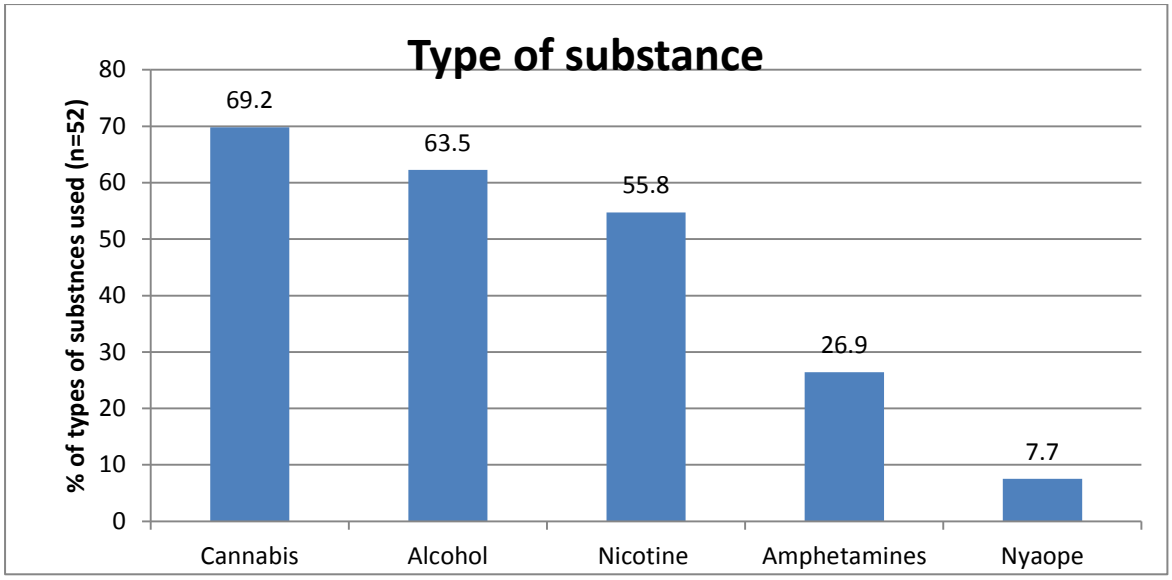


Figure 4.2: Type of substance used

4.5 Comparison of Sociodemographic and Clinical Profile of Substance Users (SU) and Substance Non-Users (SNU)

The comparison of SU and SNU is presented in Table 4.2.

Table 4.2: Sociodemographic profile of SU and SNU

		SU (n=52)		SNU (n=66)		
		Mdn	**IQR**	**Mdn**	**IQR**	**p-value**
Age (years)		16	15-17	15	14-16	0.01*,#
		n	**%**	**n**	**%**	**p-value**
Gender	Male	24	46.2	31	47.0	>0.999
	Female	28	53.8	35	53.0	
Race	White	20	38.5	30	45.5	0.691$
	African	24	46.2	29	43.9	
	Coloured	5	9.6	3	4.5	
	Indian	3	5.8	4	6.1	
Main caregiver	Both parents	15	29.4	36	54.5	0.012*
	Father	2	3.9	3	4.5	
	Mother	24	47.1	16	24.2	
	Grandparents	5	9.8	9	13.6	
	Adoptive parents	3	5.9	0	0	
	Siblings	1	2.0	0	0	
	Other	1	2.0	0	0	
	Other relatives	1	2.0	2	3.0	

		Mdn	IQR	Mdn	IQR	p-value
Years of schooling		9	8-10	8	7-9	0.174
		n	**%**	**n**	**%**	**p-value**
Type of schooling	Mainstream	38	74.5	54	84.4	0.077
	Special	1	2.0	5	7.8	
	Remedial	5	9.8	2	3.1	
	Other	1	2.0	2	3.1	
	Not in school	7	13.7	3	4.7	
Psychosocial stressors	Academic difficulties	23	44.2	31	47.0	0.142
	Divorce/separated parents	27	51.9	21	31.8	0.038 *
	Conflict with parents	32	61.5	17	25.8	<0.001*
	Poor peer relationships	15	28.8	14	21.2	0.391
	Parental conflict	10	19.2	15	22.7	0.823
	Early parental loss	10	19.2	8	12.1	0.310
	None	0	0.0	2	3.0	0.500
Age of onset of substance use		**Mdn**	**IQR**			
		14	13-15			
		n	**%**			
Introduced(reported) to substances by(n=44)						
	Peers/friends	38	86.4			
	Family	6	13.6			
	Unknown	8	15.4			

All p-values calculated using Fisher's exact test except where otherwise stated
IQR- interquartile range, Mdn- median
**=significant*
[#]*= t- test*
[$]*=chi-squared test*

4.5.1 Sociodemographic profile

From Table 4.2 it can be seen that there were no significant differences in the gender profiles of the SU and SNU groups (p>0.999). There were also no significant differences in ethnic distribution between the SU and SNU groups (p=0.691). The median age of the substance user group was 16 years (IQR = 15-17), and this was significantly higher than the median age of 15 years (IQR = 14-16) of the non-

substance use group (p=0.014). There were no statistically significant differences between the two groups with respect to the type of schooling (p=0.077).

In terms of caregivers there was a significant difference between the two groups regarding the main caregiver patterns (p=0.012). In the SNU group, 54.5% (n=36) were cared for by both parents compared to 29.4% (n=15) in the SU group, also in the SNU group, 24.2% (n=16) of the patients were cared for by mothers only compared to 47.1% (n=24) in the SU group. This can be seen in Figure 4.3.

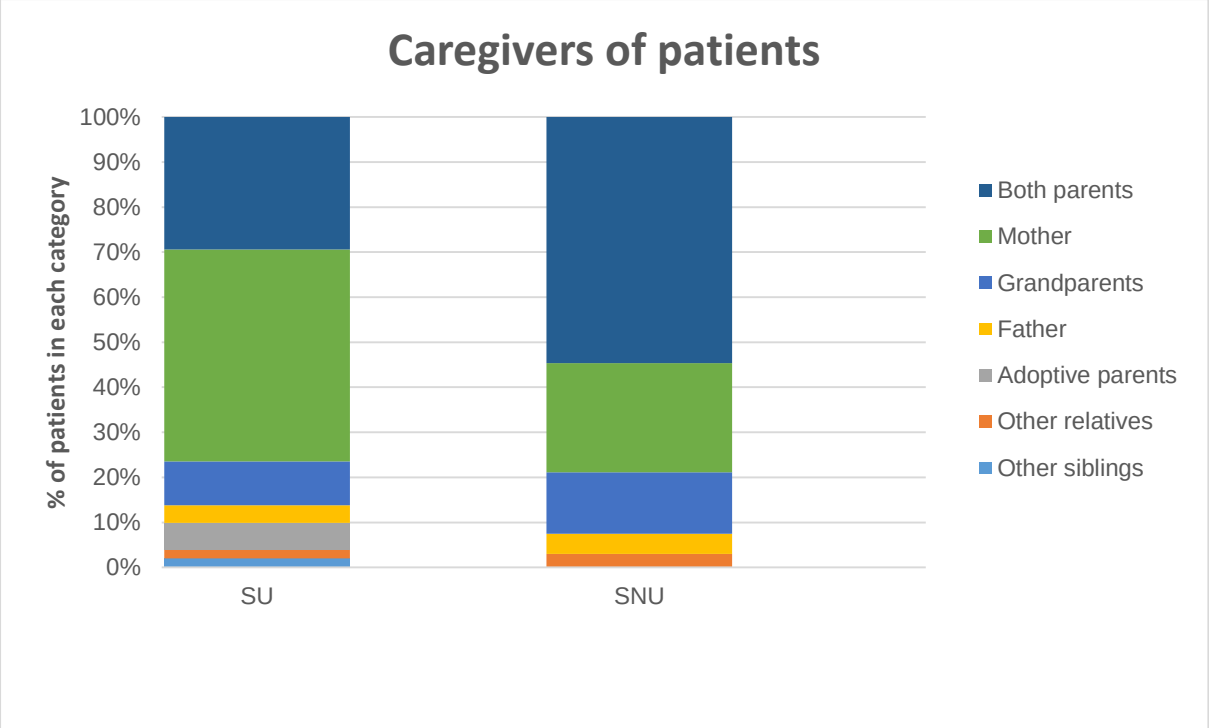


Figure 4.3: Caregivers in SU versus SNU

There was also a significant difference in terms of psychosocial stressors in that 'conflict with parents' in the SU group (n=32, 61.5%) was higher than the SNU group (n=17, 25.8%) (p<0.001). This can be seen in Table 4.2 and Figure 4.4. The other

significant difference was in ‘divorce or separation of parents’. This was more common in the SU group (n=27, 51.9%) compared to the SNU group (n=21, 31.8%) (p=0.038). This can also be seen in Table 4.2 and Figure 4.4. There were no other significant differences in the other psychosocial stressors.

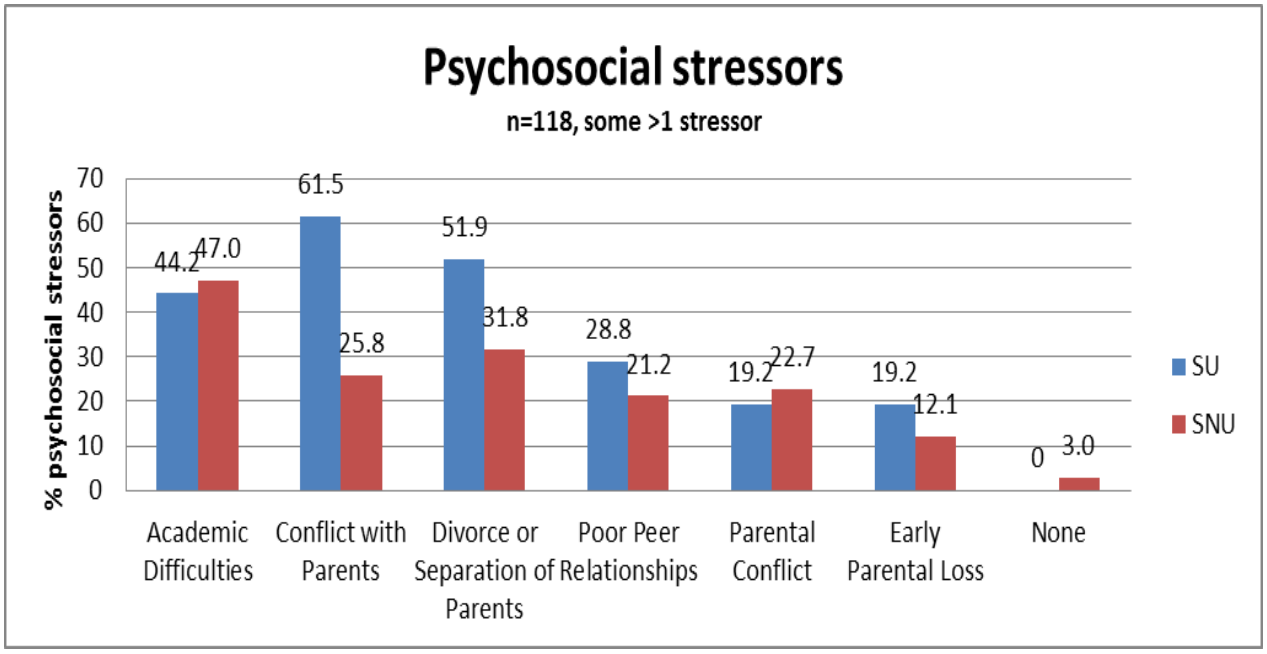


Figure 4.4: Psychosocial stressors in SU and SNU

4.5.2 Comparison of the clinical profile of SU and SNU

In terms of the clinical profile of the two groups, there were no significant differences in the two groups regarding psychiatric diagnosis. This can be seen in Table 4.3 overleaf. No significant differences in the two groups regarding psychiatric diagnosis and family history of psychiatric condition. The percentages were calculated on the numbers known. There was a significant but weak association between the SU group and SNU group and family history of substance use. The proportion of patients with this family history of substance use was higher in the SU group (n=25, 53.2%)

compared to the SNU group (n=19, 32.2%), (p=0.046).The percentages were calculated on the numbers known. This can be seen in Table 4.3.

Table 4.3: Clinical profile of substance users and substance non-users

			SU (n=52)		SNU (n=66)		
		Total	n	%	n	%	p-value
Psychiatric diagnosis	Mood and anxiety	83	37	71.2	46	69.7	>0.999
	Psychotic d/o	35	17	32.7	18	27.3	0.550
	Personality d/o	34	19	36.5	15	22.7	0.111
	ADHD	21	10	19.2	11	16.7	0.812
	Disruptive d/o	16	10	19.2	6	9.1	0.176
	Substance use d/o	15	15	28.8			
	Learning d/o	11	3	5.8	8	12.1	0.341
	Intellectual d/o	3	0	0.0	3	4.5	0.252
Family history of psychiatric condition (n=114)	Yes	61	31	62.0	30	46.9	0.133
	No	53	19	38.0	34	53.1	
	Unknown	4	2	3.85	2	3.03	
Family history of substance use (n=106)	Yes	44	25	53.2	19	32.2	0.046*
	No	62	22	46.8	40	67.8	
	Unknown	12	5	9.62	7	10.6	

All p-values calculated using Fisher's test
' significant'*

4.6 Summary of the Results

There were more females in the overall sample compared to males. More patients were cared for by both parents in the overall sample. In terms of psychiatric diagnosis, mood and anxiety disorders were the most common diagnoses in the overall sample as well as in both the substance user group and substance non-user group. Academic

difficulties and conflict with parents were the most common psychosocial stressors in the overall sample.

The prevalence of substance use in this sample was 44.1%, the most used substance was cannabis, and the majority of the patients were reported being first introduced to substances by their peers. When comparing both substance user and substance non-user groups; there were no significant difference in gender, race and type of school attended. The substance user group was significantly older than the non-user group. There were significant differences in terms of caregiver patterns as well as in the type and psychosocial stressors, in that in the substance use group ‘conflict with their parents’ and ‘divorce or separation of parents’ were the major psychosocial stressors compared to the substance non-users. There was also an association of a family history of substance use and substance use in the adolescent group.

CHAPTER FIVE: DISCUSSION

5.1 Introduction

This research set out with the purpose of describing the clinical profiles of adolescent SU admitted to Tara Hospital in the period from 1 January 2012 to 31 December 2015, and comparing them to those of adolescent SNU, with the hypothesis that adolescent SU would have a different sociodemographic and clinical profile compared to SNU. This current study described the adolescent inpatient population at Tara in this time period and determined the percentage of adolescent inpatients presenting with a substance use history. It also described and compared the sociodemographic and clinical profiles of SU and SNU, and investigated whether there were any which factors that could be associated with a substance use history.

The main findings of this research were that 44.1% of the sample had used substances, with cannabis found to be the most commonly used substance. When this SU group was compared to those who had not used substances, it was found that there were significant differences in caregiver patterns and psychosocial stressors, particularly with respect to ‘conflict with their parents’ and ‘divorce or separation of parents’. A family history of substance use was also more common in the substance user group. There was also a significant difference in the age of SU and SNU group.

5.2 Prevalence of Substance Use

This current study found that adolescents admitted to the Tara hospital inpatient unit had a 44.1% lifetime prevalence of substance use. Olumide *et al*. found that Johannesburg had a high adolescent substance lifetime prevalence of 78.8% in older adolescent between 15 and 19 years old. This lifetime prevalence in adolescents in

Johannesburg was noted to be higher than the lifetime prevalence found in the other four international cities which had been studied.[21] The older age group of the adolescents surveyed in Olumide *et al*. compared to the Tara adolescent inpatient population might have influenced the higher lifetime prevalence in that study, as lifetime substance use has been found to increase with age.[21,23] The 44.1% prevalence in the current sample was higher than that reported in the study by Taukoor *et al*. that investigated comorbid substance use in adolescents with mental illness in Durban using a two-year retrospective chart review. They reported a 38.3% lifetime prevalence, with alcohol being the most commonly used substance (29.6%), followed by cannabis (19.8%). They also found that substance use was higher in older adolescents and those with more severe mental disorders.[23] The current study is nevertheless in line with other studies and has added further confirmation of a high concurrent substance use in adolescents with psychiatric disorders. It is also a concern that the 44.1% prevalence reported here may be interpreted as an almost one-in-two occurrence of substance of substance use by adolescents at Tara Hospital.

This current study showed that cannabis was the most commonly used substance with 69.2% use, followed by alcohol at 63.5% use. Similarly, Paruk *et al.*[29] in Durban and Lachman *et al.* [31] in Cape Town found that cannabis was the most commonly used substance among adolescents in their samples. This also correlates with the South African Community Epidemiology Network on Drug Use (SACENDU) general population report of 2016, which showed an increase in cannabis use in the Gauteng province, placing cannabis as the primary drug of abuse, followed by alcohol.[53]

The current study was concerned with the lifetime prevalence of substance use. Once this use progressed such that a diagnosis of a substance use disorder could be made,

the Tara Hospital adolescent inpatient population had this diagnosis for 12.7% of the inpatients, despite the reported history of use of 44.1%. The rate of diagnosis of a substance use disorder could be interpreted as low in comparison to a study in a United States psychiatric hospitals in 2008, where dual diagnosis, defined as a International Classification of Diseases, Ninth Revision (ICD 9) discharge code for substance use as well as another mental disorder, was recorded in 25% of adolescents discharged from an inpatient units.[27] This rate of 12.7% of a substance use disorder diagnosis may also be seen to be low when compared to Lachman *et al.*, who reported that 54% of adolescents admitted to a Cape Town psychiatric adolescent unit had a dual diagnosis.[31] While it is possible that the official diagnosis of a substance use disorder may have been underreported in this Tara adolescent population, given the 44.1% prevalence of substance use, this study focused on substance use *prevalence* and not substance use *disorder*.

5.3 Introduction to Substances

Lachman *et al.*, found that 69% of patients in the Cape Town study were introduced for the first time to substances by friends or peers and 11% were introduced by family members. [31] The findings of this current study are in keeping with Lachman *et al.* with regards to the reported pattern of introduction to substances. Other research studies have also confirmed that adolescents are more likely to use substances if their peer group engages in substance use.[2,31]

5.4 Age of Onset

The median age of onset of substance use in this current study was 14 years of age which is in keeping with findings of Lachman *et al.* in 2012 in Cape Town in an adolescent psychiatric unit.[31] Moodley *et al.* reported that the age of onset of

substance use among high school children was between 14 and 17 years of age.[22] The 3rd South African National Youth Risk Behaviour Survey in 2013 reported that the national age of onset of substance use was between 13-16 years of age.[54] The finding of this current study is also in keeping with the German study by Behrendt *et al.* in 2009 on subjects of 14 to 24 years of age which showed that the age of onset of substance use was between 14 and 16 years of age.[55] Literature has shown that early onset of substance use is associated with a risk of developing substance use disorders and related disorders.[56] In the study by Behrendt *et al.* which was examining the association between early substance use and progression to the development of a substance use disorder in adolescents, it was found that early substance use among adolescents was associated with an elevated risk of developing substance use disorders for all substances. The duration of progressing from substance use to a DSM IV substance use disorder was the shortest for cannabis.[57]

5.5 Comparison of the Sociodemographic Profile of the SU and SNU Groups

This current study found that SU group had a median age of 16 years compare to median age of 15 years in SNU group (p=0.014). This is in keeping with other studies that found that substance use increases with age.[21,28] There was a significant difference in the family structure and pattern of caregiving between the SU and SNU groups. The largest proportion of the patients (54.5%) from the SNU group were cared for by both parents compare to 29.4% in SU group. In SU group more patients (47.1%) were cared for by their mothers alone compare to 24.2% in SNU group. This finding correlated with other studies that have shown that there is a higher prevalence of substance use in adolescents from single-parent homes.[41-42] Barret and Turner found

that patients from single-parent families, which could be as a result of divorce or separation, had an increased use of substances.[42]

In this current study, factors that were associated with a history of substance use were age, the current caregiver pattern, psychosocial stressors ('conflict with the parents' and 'divorce or separation of parents') and a family history of substance use. These factors correlate with the other studies carried out on adolescents.[21,28,31,40,42,57]

In the overall sample, the most common psychosocial stressor was 'academic difficulties' following by 'conflict with parents', then 'divorce or separation of parents'. 'Conflict with parents' was more common in the SU group (61.5%), compared to the SNU group (25.8%) ($p<0.001$). 'Divorce or separation of parents' was more common in the SU group (51.9%), compared to the SNU group (31.8%) ($p=0.038$). This correlated with study by Lachman *et al*. where 79% of patients using substances had relational factors (family conflict and divorce) as their major stressors, however Lachman *et al* had more numbers than the current study.[31]

5.6 Comparison of Clinical Profile of SU and SNU

Some studies have found correlation between substance use and mood disorders,[25,26] however this current study did not show any correlation between substance use history and any specific diagnostic category. Although the most common diagnostic category overall was 'mood and anxiety disorders', there was no difference between substance users and non-users with regards to the most common diagnostic category. The grouping of conditions in the study might have influenced any potential associations of diagnosis and substance use. Substance-induced disorders were not grouped separately, but were included in the relevant mood, and anxiety or psychotic disorder groupings during data collection. Different way of grouping of

diagnostic categories prior to data collection might have yielded a difference in diagnostic categories between the SU and SNU groups. Lachman *et al.* noted that substance induced psychosis, for example, was more prevalent in their sample than schizophrenia, and these conditions were grouped in this study under the broad category 'psychotic disorders'.[31] Similarly, conduct disorder was grouped with other related disorders into the category 'disruptive disorders' and no association was found between these disorders and a substance use history, although Hollen and Ortiz found a strong association between conduct disorder and a substance use diagnosis.[27]

This current study showed that lifetime adolescent substance use was significantly associated with a family history of substance use (p=0.046). Several studies have shown an association between adolescent substance use and a family history of substance use.[31,43,57] Biederman *et al.* produced strong evidence that exposure to parental substance use predicted offspring substance use.[57] Ali *et al.,* in a national survey on drug use, found that comorbid substance use in mothers but not in fathers was significantly associated with adolescent substance use.[43] Lachman provided evidence that family exposure to substance use is associated with adolescent substance use. This related to exposure of adolescents to substances at home.[31] Eiden *et al.* described the role played by substance user parents in the development of adolescent substance use, which included parent-child relationship difficulties.[58] Essentially they found that parental acceptance of underage drinking was a significant predictor of adolescent alcohol and marijuana use.[58]

5.8 Limitations

The first limitation of this study was that it used one research site, Tara Hospital, in Johannesburg. Other similar studies using the same method of the retrospective chart

review have been performed in Durban[23,29] and Cape Town.[31] Different research sites are going to yield different results, and greater generalisability will only be possible with data collected from more sites. This will be due to more numbers and data from different places. Different places may have different data with regard to substances being used.

The use of quantitative data only is always a limitation in that it gives no chance to explore deeper aspects of the research topic, which could be done using a qualitative approach such as interviewing patients.

Retrospective secondary data were used. This means the data came from a secondary source which was not originally designed for this research. The researcher therefore had to rely on available data. This also meant that there was variance of information in the files due to different medical professionals recording the information. There was also no routine use of multi drug urine tests in the files, so most of the information was based on self-report and collateral which is subject to unreliability.

The other limitation was the grouping of clinical diagnosis into categories, which may have impacted on correlations of individual diagnoses with substance use, especially substance-induced disorders.

The once-off use of substance which is regarded as a normal part of adolescent behaviour was not explored properly in this study. It will be useful to know how many patients with once-off use of substance develop psychiatric conditions, and how long does it take for them to develop psychiatric condition. This was another limitation to this study.

5.9 Summary

This study has shown there to be an almost one-in-two occurrence of substance use by adolescent patients at Tara Hospital. The most commonly used substance was cannabis. SU were mainly reported being introduced to substance use by friends or peers, and a smaller group by their families. This group also tended to come from single-parent families and experienced stress from conflict with their parents. Their families had a history of substance use. Apart from categories reflecting drug use, the SU group did not otherwise differ significantly in their clinical profile compared to the SNU group, and in both cases ‘mood disorders’ was the most frequent diagnosis.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The lifetime prevalence of substance use was found to be 44.1% among adolescents admitted to Tara Hospital's adolescent unit during the study period, a finding consistent with another South African study.[23] Mood and anxiety disorders were the most frequently diagnostic category overall, and cannabis was the substance most frequently used, followed by alcohol. It was hypothesised that there would be a difference in the sociodemographic and clinical profiles of adolescent substance users compared to non-users. In comparing the socio-demographic profiles of the patients with a substance use history and those without, it was found that, the SU group tended to have single parents and were subject to stressors from conflict with their parents and divorce or separation of parents, while the SNU group were more frequently cared for by both parents. A family history of substance use was also found to be more common in the substance user group. There was no difference between the groups with regards to diagnostic categories.

The nearly 50% lifetime prevalence of substance use in this population is particularly important when considering that adolescents with psychiatric disorders already have a serious condition needing special treatment, and in this setting hospitalisation.. Preventive measures are necessary at multiple levels to address adolescent substance use.

6.2 Recommendations

The familial links with substance use suggest that primary intervention may be needed at the family level. While it is not practical to suggest an alternative to the single-parent

family, the importance of the family caregiver patterns and conflict within the family unit of adolescent substance users can be viewed as a potential therapeutic target. More support for these families in the form of psycho-educating the families and the community where adolescents are based may help in preventing or reducing the substance use evident in adolescent psychiatric patients.

The issue of dual diagnosis needs to be addressed. When an adolescent is already needing psychiatric treatment, the complication of substance use also needs strategies to deal with this in the form of treatment programmes to deal with substance use apart from as well as in conjunction with psychiatric issues.

At the wider community level, continuing education is needed with respect to the problems associated with substance use, particularly the psychiatric sequelae. There are many possible platforms for this such as community organizations like schools, churches and clinics, broadcast media, electronic media and social media.

Further research should address the limitations identified in the current research by using more South African research sites with wider demographic representation. The use of qualitative data may afford the chance to explore more detailed aspects of substance use. It would also be important to address current substance use/ substance use disorders versus the experimenting of substances, given that in this current study, there was no information about the experimenting of substances. Finally, more attention to differentiating generally between illicit and legal drugs and then looking more closely at specific substances and their link with particular psychiatric conditions in adolescent patients may serve to create a clearer picture of the issue at hand.

It would also be interesting to look at cannabis specifically and its effects on different mental illnesses as it was the most frequently used substance and illicit at the time of data collection. Now that its personal use has been decriminalised, the prevalence of use may increase. This would need to be monitored over the next few years.

REFERENCES

1. Brook JS, Morejele NK, Pahl K, Brook DW. Predictors of drug use among South African adolescents. *Journal of Adolescent Health*. 2006; 38 (1):26-34.

2. Peltzer K, Phaswana-Mafuya N. Drug use among youth and adults in a population-based survey in South Africa. *South African Journal of Psychiatry*. 2018; 24(1):1-6.

3. United Nations Office on Drugs and Crime. World drug report. 2018. Available at: http://www.unodc.org/wdr2018/. Accessed February 13, 2019.

4. Andersen SL, Teicher MH. Desperately driven and no brakes: developmental stress exposure and subsequent risk for substance abuse. *Neuroscience &Biobehavioral reviews*. 2009; 33 (4):516-24.

5. World Health Organization. Health Topics- Adolescent mental health. Available at: http://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health. Accessed February 13, 2019.

6. Dennis M, Babor TF, Roebuck MC, Donaldson J. Changing the focus: the case for recognizing and treating cannabis use disorders. *Addiction*. 2002; 97 (Suppl 1):4-15.

7. Substance Abuse and Mental Health Services Administration. Results from the 2012 National Survey on Drug Use and Health: Summary of National Findings, NSDUH Series H-46, HHS Publication no. (SMA) 13-4795. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2013. Available at:

https://www.samhsa.gov/data/sites/default/files/NSDUHresults2012/NSDUHresults2012.pdf. Accessed May 01, 2019.

8. Sharma A, Morrow JD. Neurobiology of adolescent substance use disorders. *Child and Adolescent Psychiatric Clinics of North America*. 2016; 25(3):367-75.

9. Whitesell M, Bachand A, Peel J,Brown M. Familial, social, and individual factors contributing to risk for adolescent substance use. *Journal of addiction*. 2013; 2013:1-9.

10. Sussman S, Skara S, Ames SL. Substance abuse among adolescents. *Substance use& misuse*. 2008; 43(12-13):1802-28.

11. University of Witwatersrand. Psychiatry- Specialist hospitals. Available at: https://www.wits.ac.za/clinicalmed/departments/psychiatry/clinical-services/specialist-hospitals/. Accessed February 14, 2019.

12. Bauman A, Phongsavan P. Epidemiology of substance use in adolescence: prevalence, trends and policy implications. *Drug and Alcohol Dependence*. 1999; 55 (3):187-207.

13. Broman CL. The longitudinal impact of adolescent drug use on socioeconomic outcomes in young adulthood. *Journal of child& adolescent substance abuse*. 2009; 18(2):131-43.

14. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th edition. Washington DC: American Psychiatric Association. 2013, pp. 481-83.

15. Steinberg L. A social neuroscience perspective on adolescent risk-taking. *Developmental Review*. 2008; 28 (1):78-106.

16. Sharp EH, Coffman DL, Caldwell LL, Smith EA, Wegner L, Vergnani T, et al. Predicting substance use behaviour among South African adolescents: The role of leisure experiences across time. *International Journal of Behavioral Development*. 2011; 35 (4):343-51.

17. Dworkin JB, Larson RW, Hansen D. Adolescents accounts of growth experiences in youth activities. *Journal of Youth and Adolescence*. 2003; 32 (1):17-26.

18. Johnston LD, Miech RA, O'Malley PM, Bachman JG, Schulenberg JE, Patrick ME. Monitoring the Future National Survey Results on Drug Use, 1975-2017: Overview, key findings on adolescent drug use. Available at: monitoringthefuture.org/pubs/monographs/mtf-overview2017.pdf. Accessed August 18, 2019.

19. Göbel K, Scheithauer H, Bräker AB, Jonkman H, Soellner R. Substance use patterns among adolescents in Europe: a latent class analysis. *Substance use & misuse*. 2016; 51(9):1130-38.

20. Birhanu AM, Bisetegn TA, Woldeyohannes SM. High prevalence of substance use and associated factors among high school adolescents in Woreta Town, Northwest Ethiopia: multi-domain factor analysis. *BMC public health*. 2014; 14(1):1-11.

21. Olumide AO, Robinson AC, Levy PA, Mashimbye L, Brahmbhatt H, Lian Q et al. Predictors of Substance Use Among Vulnerable Adolescents in Five Cities: Findings From the Well-being of Adolescents in Vulnerable Environments Study. *Journal of Adolescent Health*. 2014; 55(6):S39-S47.

22. Moodley SV, Matjila MJ, Moosa MY. Epidemiology of substance use among secondary school learners in Atteridgeville, Gauteng. *South African Journal of Psychiatry*. 2012; 18 (1):2-7.

23. Taukoor B, Paruk S, Karim E, Burns JK. Substance use in adolescents with mental illness in Durban, South Africa. *Journal of Child& Adolescent Mental Health*. 2017; 29(1):51-61.

24. Pasche S, Myers B. Substance misuse trends in South Africa. Human Psychopharmacology: *Clinical and Experimental*. 2012; 27 (3):338-41.

25. Saban A, Flisher AJ, Grimsrud A, Morejele N, London L, Williams DR et al. The association between substance use and common mental disorders in young adults: results from South African Stress and Health (SASH) survey. *The Pan African Medical Journal*. 2014; 17(Suppl 1):1-7.

26. Pacek LR, Martins SS, Crum RM. The bidirectional relationships between alcohol, cannabis, co-occurring alcohol and alcohol and cannabis use disorders with major depressive disorder: results from a national sample. *Journal of affective disorders*. 2013; 148(2-3):188-95.

27. Hollen V, Ortiz G. Mental health and substance use comorbidity among adolescents in psychiatric inpatient hospitals: prevalence and covariates. *Journal of Child & Adolescent Substance Abuse*. 2015; 24(2):102-12.

28. Paruk S, Jhazbhay K, Singh K, Sartorius B, Burns JK. A comparative study of socio-demographic and substance use correlates in early-onset psychosis. *Early intervention in psychiatry*. 2018; 12(3):339-47.

29. Paruk S, Ramlall S, Burns JK. Adolescent-onset psychosis: A 2-year retrospective study of adolescents admitted to a general psychiatric unit. *South African Journal of Psychiatry*. 2009; 15(4):86-91.

30. Niethammer O, Frank R. Prevalence of use, abuse and dependence on legal and, illegal psychotropic substances in an adolescent inpatient psychiatric population. *European Child & Adolescent Psychiatry*. 2007; 16 (4):254-59.

31. Lachman A, Nassen R, Hawkridge S, Emsley RA. A retrospective chart review of the clinical and psychosocial profile of psychotic adolescents with co-morbid substance use disorders presenting to acute adolescent psychiatric services at Tygerberg Hospital. *South African Journal of Psychiatry*. 2012; 18 (2):53-60.

32. Wilkinson ST, Radhakrishnan R, D' Souza DC. Impact of cannabis use on the development of psychotic disorders. *Current addiction reports*. 2014; 1(2):115-28.

33. Shrivastava A, Johnston M, Tsuang M. Cannabis use and cognitive dysfunction. *Indian Journal of Psychiatry*. 2011; 53(3):187-91.

34. Miettunen J, Törmänen S, Murray GK, Jones PB, Mäki P, Ebeling H et al. Association of cannabis use with prodromal symptoms of psychosis in adolescence. *British Journal of Psychiatry*. 2008; 192(6):470-71.

35. Boden JM, Fergusson DM. Alcohol and depression. *Addiction*.2011; 106(5):906-14.

36. Champion KE, Barret EL, Slade T, Teesson M, Newton NC. Psychosocial factors associated with adolescent substance use: a longitudinal investigation. *Advances in Dual Diagnosis*. 2017; 10(4):142-54.

37. Brook JS, Brook DW, Richter L, Whiteman M. Risk and protective factors of adolescent drug use: Implications for prevention programs. Handbook of drug abuse prevention. 2006, pp 265-287.

38. Peiper NC, Ridenour TA, Hochwalt B, Coyne-Beasley T. Overview on prevalence and recent trends in adolescent substance use and abuse. *Child and Adolescent Psychiatric Clinics of North America*. 2016; 25(3):349-65.

39. Gau SSF, Chong M, Yang P, Yen C, Liang K, Cheng ATA. Psychiatric and psychosocial predictors of substance use disorder among adolescents: Longitudinal study. *British Journal of Psychiatry*. 2007; 190 (1):42-8.

40. Becker DF, Grilo CM. Ethnic differences in the predictors of drug and alcohol abuse in hospitalised adolescents. *American Journal on Addictions*. 2007; 16 (5):389-96.

41. Ololade S, Mndzebele S. Factors influencing use of illicit drugs among high school learners in an informal township of Gauteng Province, South Africa. PULA: *Botswana Journal of African Studies*. 2017; 31(1):121-31.

42. Barrett AE, Turner RJ. Family structure and substance use problems in adolescence and early adulthood: examining explanations for the relationship. *Addiction*. 2006; 101 (1):109-120.

43. Ali MM, Dean Jr D, Hedden SL. The relationship between parental mental illness and / or substance use disorder on adolescent substance use disorder: Results from a nationally representative survey. *Addictive Behaviors*. 2016; 59(1):35-41.

44. Weitzman ER, Salimian PK, Rabinow L, Levy S. Perspective on substance use among youth with chronic medical conditions and implications for clinical guidance

and prevention: A qualitative study. *PloS One.* 2019; 14(1):1-17. http://doi.org/10.1371/journal.pone.0209963.

45. Davis M, Eaton CK, Gutierrez-Colina AM, Oshri A, Blount R, Suveg C. Relations between positive temperament, Substance Use, and Internalizing problems among Adolescents and Young Adults with and without Medical Conditions. *Substance use and misuse*. 2018; 53(10):1715-25.

46. Van Heerden MS, Grimsrud AT, Seedat S, Myer L, Williams DR, Stein DJ. Patterns of substance use in South Africa: results from South African stress and Health study. *South African Medical Journal*. 2009; 99 (5):358-66.

47. Gutierrez A, Sher L. Alcohol and drug use among adolescents: an educational overview. *International Journal of Adolescent Medicine and Health*. 2015; 27(2):207-12.

48. Swartz MS, Swanson JW, Hiday VA, Borum R, Wagner HR, Burns BJ. Violence and severe mental illness: the effects of substance abuse and nonadherence to medication. *American Journal of Psychiatry*. 1998; 155(2):226-31.

49. Rudatsikira E, Siziya S, Kazemne LN, Muula AS. Prevalence and associated factors of physical fighting among school-going adolescents in Namibia. *Annals of General Psychiatry*. 2007; 6(1):18-22.

50. Melberg HO, Jones AM, Bretteville-Jensen AL. Is cannabis a gateway to hard drugs? *Empirical Economics*. 2010; 38(3):583-603.

51. Kandel ER, Kandel DB. A molecular basis for nicotine as a gateway drug. *New England Journal of Medicine*. 2014; 371(10):932-43.

52. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioural and biomedical sciences. *Behavior Research Methods*. 2007; 39 (2):175-91.

53. South African Community Epidemiology Network on Drug Use (SACENDU): Monitoring alcohol, tobacco and other drug abuse treatment admission in South Africa. 2016 (Phase 39). Available at: http://www.mrc.ac.za/sites/default/files/attachments/2016-10-06/SACENDUBriefJune2016.pdf. Accessed on January 10, 2019.

54. Reddy SP, James S, Sewpaul R, Sifunda S, Ellahebokus A, Kambaran NS, Omardien RG. Umthente Uhlaba Usamila: The 3rd South African National Youth Risk Behaviour Survey 2011. Cape Town: South African Medical Research Council, 2013. Available at: africacheck.org/wp-content/uploads/2018/10/3rd-Annual-Youth-Risk-Survey-2011.pdf. Accessed on February 14, 2019.

55. Behrendt S, Wittchen HU, Höffer M, Lieb R, Beesdo K. Transitions from first substance use to substance use disorders in adolescence: is early onset associated with a rapid escalation? *Drug and Alcohol Dependence*. 2009; 99 (1-3):68-78.

56. Grant BF, Dawson DA. Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of substance abuse*. 1997; 9(1):103-10.

57. Biederman J, Faraone SV, Monuteaux MC, Feighner JA. Patterns of alcohol and drug use in adolescents can be predicted by parental substance use disorder. *Pediatrics*. 2000; 106(4):792-7.

58. Eiden RD, Lessard J, Colder CR, Livingston J, Casey M, Leonard KE. Developmental cascade model for adolescent substance use from infancy to late adolescent. *Developmental psychology*. 2016; 52(10):1619-33.

APPENDIX 1: ETHICS COMMITTEE CLEARANCE

R14/49 Dr Vuyani Nxumalo

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M170410

NAME: (Principal Investigator)	Dr Vuyani Nxumalo
DEPARTMENT:	Psychiatry Tara Hospital, Johannesburg
PROJECT TITLE:	Factors Associated with Substance Use in Adolescents Admitted to Tara Hospital Adolescent Unit
DATE CONSIDERED:	05/05/2017
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr Yvette Nel
APPROVED BY:	Professor P Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	10/05/2017

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

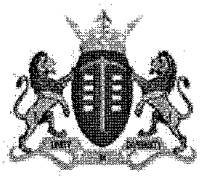
DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third Floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in April and will therefore be due in the month of April each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX 2: TARA HOSPITAL APPROVAL



GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH
TARA the H. Moross Centre
Private Bag X7
RANDBURG 2125
(011) 535-3000
(011) 535-3026

27 February 2017

For attention: **Dr Madigoe and Dr Otieno**

Dear Doctors

Re: Application by Dr Vuyani Wiseman Nxumalo to do research at Tara Hospital

I hereby request permission for Dr Vuyani Wiseman Nxumalo to conduct research at Tara Hospital. Dr Vuyani Wiseman Nxumalo is a registrar in the Department of Psychiatry and currently enrolled as a Masters student at the University of the Witwatersrand. His supervisor is Dr Yvette Nel. The title of his research is: "Factors Associated with Substance Use in Adolescents admitted to Tara Hospital Adolescent Unit". It is a retrospective comparative record review and the aim of the study is to determine if there is any difference in sociodemographic and clinical profiles of adolescent substance users compared to adolescent non-users admitted in Tara Hospital in the period from 1 January 2012 to 31 December 2015. No concerns were raised by the Tara Research Committee.

.....

Date: 27.02.2017

Dr Ronelle Price-Hughes

Chairperson- Tara Research Committee

Recommended/Not Recommended

.....

Dr Thebe Madigoe

Clinical Head

Date: 27/02/2017

Approved/Not Approved (pending Ethics approval)

.....

Dr Florence Otieno

CEO

Date: 27/2/17

APPENDIX 3: DATA COLLECTION SHEET

Factors associated with substance use in adolescents in Tara Hospital data collection sheet

Study code ----------

Age on admission ---------- (age in years and days)

Length of stay ---------- (in days)

Gender
◯ 1 Male
◯ 2 Female

Race
◯ 1 African
◯ 2 Indian
◯ 3 Coloured
◯ 4 White
◯ 5 Other
◯ 0 Unknown

Years of schooling _____ (Number of completed years of schooling)

Current type of school
◯ 1 Not in school
◯ 2 Finished school
◯ 3 Special school
◯ 4 Normal school/mainstream
◯ 5 Remedial school
◯ 6 Hospital school
◯ 7 Other
◯ 0 Unknown

Present caretakers
◯ 1 Both parents
◯ 2 Mother
◯ 3 Father
◯ 4 Grandparents
◯ 5 Stepparents
◯ 6 Adoptive parents
◯ 7 Other siblings
◯ 8 Other relatives
◯ 9 Alone
◯ 10 Other
◯ 0 Unknown

Psychiatric diagnosis
◯ 1 ADHD
◯ 2 Conduct disorder
◯ 3 Oppositional defiant disorder
◯ 4 Learning difficulties
◯ 5 Mood and anxiety disorders
◯ 6 Psychotic disorders
◯ 7 Mood due to Another Medical Condition
◯ 8 Psychosis due to Another Medical Condition
◯ 9 Polysubstance abuse
◯ 10 Personality disorders
◯ 11 Other
◯ 0 Unknown

Medical conditions
◯ 1 Nil
◯ 2 HIV
◯ 3 Epilepsy
◯ 4 Other
◯ 0 Unknown

Psychosocial stressors
◯ 1 Nil
◯ 2 Parental conflicts
◯ 3 Parents separated/ divorce
◯ 4 Early parental loss
◯ 5 Conflict with parent
◯ 6 Academic difficulties
◯ 7 Poor peer relationships
◯ 8 Other
◯ 0 Unknown

Family history of psychiatric condition
◯ 1 Yes
◯ 2 No
◯ 0 Unknown

Family history of substances
◯ 1 Yes
◯ 2 No
◯ 0 Unknown

Substances used by patient
◯ 1 Alcohol
◯ 2 Nicotine
◯ 3 Cannabis
◯ 4 Amphetamines
◯ 5 Nyaope
◯ 6 Other
◯ 7 Nil
◯ 0 Unknown

Age-onset of substance use …….. (Age in years)

Duration of substance use …….. (In years and months)

Introduction to substances
◯ 1 Family
◯ 2 Peers
◯ 3 Other
◯ 0 Unknown

Medical treatment
◯ 1 Anticonvulsants
◯ 2 ARVs
◯ 3 Other
◯ 4 Unknown
◯ 0 Nil

Forensic history
◯ 1 Yes
◯ 2 No
◯ 0 Unknown

APPENDIX 4: TURNITIN

1492220:MMED_turnitin.pdf

ORIGINALITY REPORT

2%

SIMILARITY INDEX

0%

INTERNET SOURCES

0%

PUBLICATIONS

2%

STUDENT PAPERS

PRIMARY SOURCES

Submitted to Tata Institute of Social Sciences

Student Paper

2%

1

Exclude quotes On Exclude bibliography On