PERSONALITY TRAITS AS PREDICTORS OF SUBSTANCE USE AND RISKY SEXUAL BEHAVIOURS AMONG UNIVERSITY STUDENTS IN ETHIOPIA

by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This study was designed to determine the prevalence of substance use and risky sexual behaviours among university students in Ethiopia and examine whether personality traits predict substance use and risky sexual behaviours. Using a cross-sectional quantitative design, data were obtained from 2620 undergraduate students selected through stratified multistage sampling. Personality traits were measured through John, Donahue, and Kentle's (1991) Big Five Inventories [BFI-44]. Substance use and risky sexual behaviours were assessed using risky behaviour scales adapted from Miller et al. (2004) and Zuckerman and Kuhlman (2000). Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) Version 20 and Analysis of Moment Structure (AMOS) Version 22 software.

The findings revealed that 72.18% of the respondents reported that they have used at least one kind of substance in their lifetime and 50.27% of the participants had consumed at least one kind of substance in the past 30 days before the survey. The current prevalence of substance use was 46.3%, 16.1%, 9.9%, 6.8%, and 5.0% for drinking alcohol, chewing khat, smoking shisha, smoking cigarettes and marijuana use respectively. About 40.2% of respondents had sexual intercourse at least once in their lifetime and 25.6% had sex in the past three months before the study. Among sexually active respondents, 35% began sexual intercourse at the age of 17 years old or younger; 64.3% had multiple sexual partners; 53.1% had substance-induced sex, 62.03% had unsafe sex, and 45.3% had casual sex at least once. Males were found to be more at risk of substance use and risky sexual behaviours. Analysis of the structural relation revealed that conscientiousness and agreeableness traits were significant negative predictors and extraversion was a significant positive predictor of substance use and risky sexual behaviours. Neuroticism had a significant direct effect only on substance use. Substance use mediated the effect of personality traits on risky sexual behaviours. There was gender moderation or variation on the effect of personality traits on substance use and risky sexual behaviours. Therefore, the findings may imply that health risk behaviours were highly prevalent among students, which requires special prevention and intervention. Personality traits can be used to identify the vulnerable individuals and design programs aimed at developing behaviours underlying the protective traits.

Key terms: Personality traits, substance use, risky sexual behaviours, university students

CHAPTER ONE

INTRODUCTION

1.1 Background information about university students in Ethiopia

Ethiopia is a developing nation with a demographic profile dominated by a young population. Based on projections from the national census of 2007, the total population is estimated to be about 94,352,000 in 2017, making the country the second-most populous nation in Africa, next to Nigeria. Young people whose age lies between 15 and 24 years old comprise one-third of the total population (Central Statistical Authority [CSA-Ethiopia] and ICF International, 2017).

Ethiopia is among the least-developed countries and most affected by the HIV epidemic. HIV infection and AIDS are still a major public health problem although much progress has been achieved in recent years. The 2011 Ethiopian demographic health survey (EDHS) data demonstrated that the prevalence of HIV among the population age 15-49 years is 1.5% (1.9% for women and 1.0% for men) (Central Statistical Agency [CSA-Ethiopia] and ICF, 2012). According to the Ethiopian Public Health Institute (2017) projection report, about 722,248 people are living with HIV. Because of biological, cognitive, socio-cultural and monetary elements, youngsters, predominantly those aged 15-24 years old, are by and large at a high risk of HIV and AIDS and other reproductive health problems (Hibret, Damen, Kassahun, & Davey, 2007).

Following the dramatic expansion of education in the country in recent years, specifically since the 1990s, there are currently 43 government-owned public universities all of which serve as a place for residence and training of the youth students. The annual intake capacity of these universities in the regular undergraduate programme reached 188,000 in 2016. The total number of students in these public universities from freshman to senior classes in the regular program on average reached 379,389 (Ministry of Education [MOE-Ethiopia], 2017). The majority of these students are youths, whose ages fall between 15 and 24 years. These youngsters are supposed to be the educated and productive manpower of the future Ethiopia. However, survey studies (such

as HIV/AIDS Prevention and Control Office [HAPCO-Ethiopia], 2012) disclosed that the youths are at risk of socio-emotional and health problems.

Education is believed to contribute to better wellbeing and success by outfitting individuals with information and abilities of critical thinking and gives a feeling of control and dominance over living conditions. However, personal observations and survey studies indicate that the youngsters are exhibiting high risk-taking behaviours, for example, having numerous sexual partners, inability to utilize condoms reliably, practising casual sex, drinking liquor, chewing khat (a mild energizer locally-grown green leaf), watching pornographic movies, smoking cigarettes, smoking shisha (a blend that may incorporate tobacco, nectar or molasses, hashish and flavours and is smoked utilizing an oriental tobacco channel or water pipe called hookah), and utilization of other drugs, for example, cannabis (Achenef, Getachew, Abadi, & Gedefaw, 2017; Agegnehu et al., 2015; Alebel, Mesele, & Alemayehu, 2016; Alemu, Animut, Abriham, & Bekele, 2018; Atalay, Derege, Mitike, Getnet, Fikre, & Wuleta, 2007; Dawit et al., 2005; Gezahegn, Andualem, & Mitiku, 2014; Kassa, Endeshaw, & Marta, 2016). These behaviours have consistently been found to increase risk of HIV and other STIs among the general population in general and among college and university students in particular (Dawit et al., 2005; Derege et al., 2005; Hibret, Damen, Kassahun, & Davey., 2013; Likawunt & Mulugeta, 2012; Mavhandu-Mudzusi & Teka, 2016; Wakgari & Aklilu, 2011). Examining the types and current status of risky health behaviours practised by the students and its predictor variables is vital in the scientific endeavour to manage the problem. Therefore, this study looked into the risky behaviour of students and its association with their personality traits.

1.2 Risky health behaviours among the Ethiopian student population

The utilization and abuse of alcohol and drugs is one of the rising significant general health and socioeconomic issues around the world. As per the worldwide report of WHO (2014), liquor utilization brings about roughly 3.3 million deaths every year which represents 5.9% of all deaths. This figure is more prominent than, for instance, the extent of deaths from AIDS (2.8%), violence (0.9%) or tuberculosis (1.7%). The report additionally unveiled that youngsters between the ages of 15 and 29 are typically more vulnerable to liquor-related harm from a given volume of liquor than other age groups.

In 2015, the number of drug-related deaths was estimated at 450,000 (United Nations Office on Drugs and Crime [UNODC], 2018), and most of those deaths were among the younger population of users and were, to a large extent, preventable. Only one out of six drug users globally has access to treatment. Women, specifically, seem to confront barriers to treatment – while one out of three drug users globally is a woman, just one out of five medication clients in treatment is a woman. The report identified Ethiopia as one of the leading exporters of khat and drug trafficking route where the use of psychoactive substances increases with an alarming rate.

Surveys indicated that substance use is one of the most prevalent problems among the world population, particularly among students in many countries. For example, ever use of alcohol, marijuana, and cigarettes were reported to be 60.4%, 35.6%, and 28.9% respectively among students in the US (Kann et al., 2018) and 7.3%, 9.3%, and 27.8% among a sample of University students in neighbouring Sudan (Osman et al., 2016). The 2016 Ethiopian Demographic Health Survey (EDHS) revealed that among Ethiopian adult population aged 15-49 years, 35% of women and 46% of men drank alcohol; 12% of women and 27% of men chewed khat, and 4% of men and 1% of women used tobacco products at some point in their lives. Among the youths in the general public ages between 15 and 24 years, 32% of girls and 42% of boys drank alcohol; 9% of girls and 19% of boys chewed khat; and 1% of boys and 0.5% of girls aged 15-24 years used tobacco products (CSA [Ethiopia] and ICF, 2017).

In particular, studies on the youth population of the Ethiopian public – secondary school, college and university understudies – showed that students are among the most at risk of utilizing liquor and different drugs, for example, khat and tobacco (Alebel et al., 2016; Ayalew, Meaza, Yemane, & Alemayehu, 2015; Derege et al., 2005; Francis, Grosskurth, Changalucha, Kapiga, & Weiss, 2014; Getachew et al., 2016; Hirbo & Addisu, 2017; Measho, Amsalu, & Tesfahhun, 2013). Most often the use of stimulants such as khat, coffee and energy drinks are increasingly used by high school and college students as a means to feel more motivated and energized during study hours and consequently to improve academic performance (Measho et al., 2013; Wakgari & Aklilu, 2011).

Studies on the prevalence of substance use behaviours of students from high schools, colleges and universities in Ethiopia showed that between 26.3% and 52% students drank alcohol; between 10.5% and 41% students chewed khat; between 4.2% and 12.8% smoked shisha; between 3.6% and 13% students smoked cigarettes; and between 2.5% and 4.5% students use illicit drugs like cannabis at least once in their lifetime (Agegnehu et al., 2015; Andualem, Assefa, & Chalachew, 2014; Assefa & Dessalegn, 2016; Ayalew et al., 2015; CSA & ICF, 2017; Ephrem, Matiwos, Desta, & Bosena, 2018; Gezahegn et al., 2014; Measho et al., 2013; Tesfay, Kalayu, & Tedla, 2018). The aforementioned empirical findings suggest that substance use is more prevalent among students compared to their peer group in the general population.

Pertinent to the commonness of risky sexual practices, studies showed that risky sexual practices are the most prevalent problems among youths, particularly among students in different countries. For instance, nationwide, 39.5% of students in US aged 10–24 years had ever had sexual intercourse, 3.4% of students had had sexual intercourse for the first time before age 13 years, and 9.7% had had sexual intercourse with four or more persons. Nationwide, amongst 28.7% of the sexually active students, only 53.8% reported that they had used a condom during last sexual intercourse and 18.8% had drunk alcohol or used drugs before last sexual intercourse (Kann et al., 2018). Among high school students in Eastern Cape, South Africa, 50.7% had been involved in sexual activities in the last 12 months, 55.2% of female students had sex before they attain the age of 18 years, 72.8% of students did not use a condom during the first sexual intercourse, and 32.3% of the sex was unplanned (Adeboye, Yongsong, & James, 2016).

Among Ethiopian general population, the 2011 EDHS results uncovered that 29% of ladies ages 25-49 years had first sex before age 15 and 62% before age 18. Women had a mean of 1.5 lifetime sexual partners, while women who were never married, had the highest mean number (3.5) of lifetime sexual partners. Four percent of men had at least two sexual partners in the previous year with men having a mean of 2.6 lifetime sexual partners. Among men aged 15-49 years with at least two sexual partners in the previous 12 months, just 16% utilized a condom during the last sex. Five percent of men ages 15-49 years have a transactional sex experience which includes the trading of sex for cash, favours, or gifts paid for sex sooner or later in their lives. The extent of men who paid for sex expanded with an increase in men's education and

wealth. Only 30% of men who paid for sex in the previous year reported that they utilized a condom at last paid sex (CSA [Ethiopia] and ICF, 2012).

Specifically, studies on the prevalence of risky sexual behaviours of students from high schools, colleges and universities in Ethiopia showed that between 22.4% and 78% of students were sexually active. Among these sexually active students, between 11.5% and 47.6% students had multiple sexual partners; between 16.3% and 33% students had sexual intercourse with non-regular sexual partners and commercial sex workers; and between 11.10% and 47.3% students had used condom inconsistently (Alebel et al., 2016; Andualem et al., 2014; Atalay et al., 2007; Dawit et al., 2005; Hibret et al., 2007; Hirbo & Addisu, 2017; Kassa et al., 2016; Likawunt & Mulugeta, 2012; Teshome & Gedif, 2013; Zelalem, Melkamu, & Muluken, 2013). The Federal Democratic Republic of Ethiopia HIV/AIDS Prevention and Control Office (2010) report on the progress towards the implementation of the UN declaration of commitment on HIV/AIDS, also indicated that students who were involved in high-risk commercial sex transactions, (from high school through university) are among the most vulnerable groups to HIV infection. Available data in the report also suggested that substance abuse (alcohol and khat) was considered as a factor that exacerbates the spread of HIV.

Studies, furthermore, demonstrated that drinking alcohol, chewing khat and smoking cigarettes considerably and essentially increase the probability of having hazardous sexual practices such as numerous sexual associations and lower or inconsistent utilization of condoms during sexual intercourse (Achenef et al., 2017; Agegnehu et al., 2015; Andualem et al., 2014; Getachew et al., 2016; Hirbo & Addisu, 2017; Kassa et al., 2016; Mavhandu-Mudzusi & Teka, 2016; Solomon, Negga, Solomon, & Hiwot, 2018). The use of marijuana before sexual activity was also found to increase the likelihood of engaging in risky sex (Abebaw, Atalay, & Hanlon, 2007, Bryan, Schmiege, & Magnan, 2012; Lashley & Yearwood, 2011; Parks, Collins, & Derrick, 2012). Similarly, smoking shisha was identified as a factor that contributes to involvement in risky sexual behaviours (Agegnehu et al., 2015).

The statistical and research reports mentioned above are indicators of how substance use and risky sexual behaviours are becoming a serious social, psychological, health and economic

problems in Ethiopia, specifically among the youth. Therefore, this study aims to determine the predominance of substance use and risky sexual behaviours among university students in Ethiopia and to examine the predictors of these risky behaviours. Knowledge of the predictors of risky health behaviours will contribute to designing appropriate strategies to prevent and control these public health problems.

1.3 Predictors of risky health behaviours

There are three different theoretical positions (the person, situation and person-situation interaction) concerning factors that predict risky health behaviours. The first position (situationist or contextual theories) such as ecological system theory (EST) (Bronfenbrenner, 1994) and social norm theory (SNT) (Berkowitz, 2005) hypothesize that situation or environment is a key to influencing behaviour. The second position (personologist or personality and health relationship models) like the health behaviour model, the predisposition model and the Five-Factor Model of personality (Costa & McCrae, 1987, 1992; McCrae & Costa, 1986) presume that individual differences in personality traits can predict a substantial portion of the variance in risky health behaviours. The third position (interactionist) such as proponents of problem behaviour theory (PBT) (Jessor, 1987, 1991; Jessor & Jessor, 1977, 2017) and social cognitive theory (SCT) (Bandura, 1978), on the other hand, assumes that all behaviour emerges out of the structure and interaction of three systems: the behaviour system, the personality system, and the perceived environment system. It indicates that both personality factors and situation or context factors might contribute to an individual's decision to engage in risky health behaviours. Most contemporary researchers and psychologists agree with interactionists, assuming that both the person and the situation, and their interaction, are essential in determining health-related behaviour (Cooper, 2010; Fleeson, 2004; Funder, 2009; Larsen & Buss, 2010; Speirs-Bridge, 2006). They also point out that while personality factors can best explain inter-individual variations, situation factors can explain intra-individual variation in health behaviours.

The role of a situation or contextual factors in health behaviour is also supported by empirical evidence. Most empirical studies showed that a number of situational or environmental factors might be associated with health behaviours. The school environment (such as sex education, parental involvement, teachers' support and peer interactions) was proven to be determinants of

6

risky behaviours (Denny et al., 2011; Kirby, Laris, & Rolleri, 2007; Walsh, Harel-Fisch, & Fogel-Grinvald, 2010). Besides, parent-adolescent relationship quality, peers and partners were also found to be directly linked with adolescents' risky health behaviours (Buhi & Goodson, 2007; Chen, Thompson, & Morrison-Beedy, 2010; Tomé, Matos, Simões, Diniz, & Camacho, 2012).

Another most popular theoretical position in predicting health behaviours is that personality traits directly influence health behaviours (Bogg & Roberts, 2004; Costa & McCrae, 1987, 1992; Eysenck, 2000; McCrae & Costa, 1986; Smith & Spiro, 2002). While some personality and health relationship models like the health behaviour model, the predisposition model and the Five-Factor Model of personality, posit direct relationships between personality and health behaviours, some other theories of health behaviour such as the health belief model (HBM) (Becker, 1974; Janz, & Becker, 1984; Rosenstock, 1974), the theory of reasoned action (TRA) (Ajzen & Fishbein, 2004; Fishbein, 1979), the theory of planned behaviour (TPB) (Ajzen, 1985), and problem behaviour theory (PBT) (Jessor, 1987, 1991; Jessor & Jessor, 1977, 2017) hypothesised that personality traits influence health behaviours indirectly through other cognitive variables such as beliefs, intentions, and perceptions. Some empirical studies also argued that personality traits are significant predictors of health behaviours (Miller, Lynam, Zimmerman, Logan, Leukefeld, & Clayton, 2004; Paunonen, 2003; Raynor & Levine, 2009; Turiano, Hill, Roberts, Spiro, & Mroczek, 2012; Turiano, Whiteman, Hampson, Roberts, & Mroczek, 2012; Vollrath & Torgerson, 2008; Zietsch, Verweij, Bailey, Wright, & Martin, 2010; Zuckerman & Kuhlman, 2000).

Personality traits are relatively stable, consistent and enduring internal properties of persons that cause individual variation in behaviours (Costa & McCrae, 1992, 1995; Raynor & Levine, 2009). Although there are different classifications of personality traits, this study reviewed the Five-Factor Model of Costa and McCrae (1992, 1995), which identified five major dimensions of personality: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. *Openness to experience* refers to being clever, centred around knowledge and workmanship, creative, inquisitive, adaptable, and progressive; *Conscientiousness* alludes to making progress toward capability and accomplishment, and acting naturally taught, systematic,

dependable, mindful, and deliberative; *Extraversion* is described by getting a charge out of the organization of others and being dynamic, talkative, confident, and looking for incitement; *Agreeableness* is portrayed as being well disposed, trusting, liberal, tolerant, and empathetic as opposed to adversarial and; *Neuroticism* alludes to easily encountering terrible and negative feelings, for example, dread, tension, cynicism, threatening vibe, trouble, precariousness and frailty (Raynor & Levine, 2009).

The empirical findings of previous studies on the relationship between personality traits, substance use and risky sexual behaviours were reviewed. Studies show that neuroticism, as well as extraversion, were positively associated with cigarette smoking (Hampson, Goldberg, Vogt, & Dubanoski, 2007; Lahey, 2009; Mroczek, Spiro, & Turiano, 2009; Raynor & Levine, 2009 Otonari et al., 2012), with alcohol drinking (Hong & Paunonen, 2009; Lahey, 2009; Mroczek et al., 2009; Otonari et al., 2012; Raynor & Levine, 2009), and with risky sexual behaviours (Lahey, 2009; Ingledew & Ferguson, 2007; Miller et al., 2004; Raynor & Levine, 2009; Schmitt & Shackelford, 2008). However, several studies (e.g., Maglica, 2011; Miller et al., 2004; Otonari et al, 2012; Schmitt, 2004; Torres, 2006) have failed to replicate the aforementioned associations.

Agreeableness and conscientiousness were negatively associated with cigarette smoking (Hampson, Goldberg, Vogt, & Dubanoski, 2007; Hong & Paunonen, 2009; Maglica, 2011; Raynor & Levine, 2009; Turiano et al., 2012), with alcohol drinking (Raynor & Levine, 2009; Turiano, Mroczek, Moynihan, & Chapman, 2013), and with risky sexual behaviours (Ingledew & Ferguson, 2007; Miller et al, 2004; Raynor & Levine, 2009; Schmitt & Shackelford, 2008; Torres, 2006). However, some studies (such as Maglica, 2011; Torres, 2006) reported the relationship as negligible.

Although some studies (such as Schmitt, 2004) found no significant association between openness to experience and risky health behaviours, some studies reported inconsistent significant associations. For example, while Miller et al. (2004) and Ingledew and Ferguson (2007) reported that openness to experience was inversely related to risky sexual behaviours,

Schmitt and Shackelford (2008) found a positive association between openness to experience and risky sexual behaviours.

Besides, several studies conducted on the relationship among personality traits, substance use and risky sexual behaviours indicated that the links vary across sex (Hong & Paunonen, 2009; Schmitt & Shackelford, 2008), across culture (Schmitt, 2004; Schmitt & Shackelford, 2008) and across world regions (Ingledew & Ferguson, 2007; Schmitt & Shackelford, 2008). They also point out that the reason why societies change in the personality associates of risky sexual conduct ought to be a significant area for future research.

Although several theoretical positions and empirical studies argued that contextual factors might determine health behaviours, the current study focussed on personality factors predicting substance use and risky sexual behaviours which was ignored in the previous studies in Ethiopia. The emphasis is because the researcher believes that studying personality traits has much to offer in understanding and controlling health risk behaviours. Since personality traits consist of stable internal factors that make individual's behaviour persistent and different across different situations (Burger, 2011; McCrae & Costa, 2008), identifying those traits most related to health risk behaviours enables to identify at-risk individuals and design mechanisms of protecting youths from health-risk behaviours regardless of their setting or context. Identifying those traits most related to health risk behaviours can also help parents, teachers, counsellors, and youths themselves to guide and shape behaviour towards a balanced personality. Therefore, this study focussed on the function of personality trait variables in health behaviour; its findings might play an important role for devising appropriate strategies and techniques of interventions that develop individuals' self-control in their life.

1.4 Statement of the problem

Recent trends and studies indicated that substance use and risky sexual practices are raising major public health and socio-economic problems worldwide, particularly in developing countries like Ethiopia (Alemu et al, 2018; Ayalew et al., 2015; Francis et al., 2014; WHO, 2004, 2006). The use of substances like alcohol, khat, cigarettes, shisha, and cannabis and risky sexual practices are escalating dramatically. Especially, the young segments of the Ethiopian population

(from high school through college and university students) are among the most at risk of using substances and practising risky sexual activities (Achenef et al., 2017; Alemu et al., 2018; Atalay et al., 2007; Derege et al., 2005; Francis et al., 2014; HAPCO, 2010; MOH, 2009; Wakgari & Aklilu, 2011; WHO, 2004, 2006).

Youths who use alcohol and other drugs persistently face adverse academic, social, developmental, emotional, health, and economic consequences (Anteneh, Telake, & Solomon, 2014; Ayalew et al., 2015; WHO, 2004, 2006). The combined use of alcohol and khat could increase sexual risk behaviours (Agegnehu et al., 2015; Anteneh et al., 2014; Dawit et al., 2005). Individuals who engage in risky sexual behaviours run the risk of unwanted pregnancy, unplanned childbirth, abortion, school dropout, inadequate prenatal and postnatal care and birth with a variety of defects (Agegnehu et al., 2015; Kassa et al., 2016). Engaging in volatile sexual behaviour additionally will increase the possibility of contracting HIV or other sexually transmitted diseases (Miller et al., 2004; Ritchwood, 2012). While alcohol consumption, khat chewing, cigarette, shisha and cannabis smoking, and risky sexual practices are becoming major problems that contribute to HIV and other psychosocial problems among the youths of Ethiopia (Atalay et al., 2007; Derege et al., 2005; Francis et al., 2014) the problem is not adequately studied, especially in the context of university students where the majority of the youth who are assumed to be the future leaders and skilled manpower of the country reside.

The elevated rate of substance use and hazardous sexual practices also created a need to apprehend the indicators of substance use and dangerous sexual practices. In Ethiopia, some investigations evaluated the role of environmental factors on substance use and risky sexual practices (Agegnehu et al., 2015; Andualem et al., 2014; Dawit & Teferi, 2013; Kassa et al., 2016; Wakgari & Aklilu, 2011). However, there are no studies that have been conducted so far to assess the role of individuals' personality traits in determining the identified risky behaviours. Even though there are studies conducted in the global contexts on the relationship between personality traits and risky behaviours, their findings reported inconsistent results. Also, the studies conducted in other countries did not include 'khat' and 'shisha' as variables, which are the most widely consumed drugs in Ethiopia.

It is hoped that the result of this study, on the relationships between personality traits and substance use and risky sexual behaviours, will offer valuable insight on the health behaviour of youths, especially in the context of universities. First, it will describe health behaviours associated with specific types and levels of personality traits. Second, knowing which traits are strongly associated with substance use and high-risk sexual behaviour enables identification of at-risk people and could be critical to developing interventions that educate vulnerable youths about explicit procedures for increasing their self-control behaviours. Developing self-control and other psychosocial skills of the at-risk children and adolescents will enable the youth and the nation to prevent a social, emotional, economic and health crisis such as HIV and AIDS which is often aggravated by substance use and risky sexual behaviours.

Potential interventions planned for changing single or different aspects of personality could incorporate changing the underlying intellectual or mental process linked with specific personality characteristics or the health practices related to specific traits. A comprehensive intervention intended for health-related behavioural problems requires the knowledge of both environmental and personality factors associated with health behaviours. In this regard, this study will play its part by indicating the personality traits associated with substance use and risky sexual behaviours. Studying and identifying the personality traits strongly related to substance use and risky sexual behaviours will also contribute its part in filling the gap (inconsistent findings in previous studies) in the field. Furthermore, the study may lay the foundation for further future Ethiopian studies in the field of personality and health.

Thus, the main purpose of this study is to assess the prevalence of substance use and risky sexual behaviours among a sample of university students in Ethiopia and to examine the extent to which their personality traits predict their behaviours.

1.5 Research questions

The following basic research questions are set to meet the stated purpose of the study:

1. What is the prevalence of substance use behaviours (chewing 'khat', drinking alcohol, smoking 'shisha', smoking cigarettes, and use of cannabis) in a sample of Ethiopian

university students?

2. What is the prevalence of risky sexual behaviours (sex with many partners, sex under the influence of alcohol or drugs, not using a condom, sex with a casual partner, and early sexual debut) in a sample of Ethiopian university students?

3. To what extent do personality traits predict substance use behaviours?

4. To what extent do personality traits predict risky sexual behaviours?

5. Do substance use behaviours mediate the association between personality traits and risky sexual behaviours?

6. Is there a gender difference in the predictive relationship of personality traits with substance use and risky sexual behaviours?

The research hypotheses that were used to explore the research questions above are provided in Chapter 3.

1.6 Structure of the thesis

The thesis is organised into six chapters. Chapter 1 presents the problem in context and defines the aims, research questions, hypotheses, and key concepts.

Chapter 2 provides an in-depth review of the literature. The theoretical views of personality traits and health behaviour and the empirical findings on the relationship among personality traits, substance use and risky sexual behaviours will be reviewed.

Chapter 3 deals with the research methodology for the study. It covers the research design, sampling procedures, instruments for data collection, data collection procedures and analysis techniques. The ethical considerations for the study will also be presented.

Chapter 4 presents the results of the statistical analysis of the empirical data.

Chapter 5 discusses the results as well as the practical implications of the findings.

Chapter 6 presents the overall conclusions that can be drawn from the study. Methodological limitations of the present study and suggestions for future research will also be pointed out.

1.7 Conclusions

Chapter 1 gave orientation to the study. The context of Ethiopian university students was introduced. The magnitude of substance use and risky sexual behavioural problems among the youths in Ethiopia was highlighted. The aim of this study, namely to examine the predominance of substance use and risky sexual behaviours and its predictive relationship with the personality traits of university students in Ethiopia, was explained.

Chapter 2 will familiarise the reader with the theoretical viewpoints and empirical findings regarding the relationships among personality traits, substance use and risky sexual behaviours.

CHAPTER TWO

LITERATURE REVIEW: PERSONALITY TRAITS AND HEALTH RISK BEHAVIOUR

2.1 The scope of the literature review and the strategy used for searching

The review of literature in this study has covered the most important aspects of personality traits, substance use and sexual risk behaviours to familiarise the researchers to the existing knowledge in the problem of interest. The theories and models of personality and health behaviours were reviewed thoroughly which was used as a basis for the development of the conceptual framework of the study. The literature reviewed also focused on the relationships among personality traits, substance use, and risky sexual behaviours of youths paying special attention to university students.

While searching for relevant literature, a narrative literature review was conducted mainly via databases in the UNISA online library which include include 'EBSCO host' and 'Sabinet'. Furthermore, 'PsycINFO', 'PubMed', 'Google Scholar', Google search engine, and websites of different organisations were utilized. The following search terms were utilised to locate articles specific to this study: *personality traits, substance use, risky sexual behaviours, health risk behaviours, and university students.*

Although the number of hits in the initial searches was very large, after reading the titles and abstracts only the most relevant papers were selected by the researcher manually using the following inclusion criteria:

- Articles were restricted to English language only.
- All pieces of literature were available until September 5, 2019.
- Studies that present theories and models of personality and health behaviour.
- Studies that present the relation between personality traits and health risk behaviours.
- Studies that present the prevalence of substance use behaviours (include drinking alcohol, chewing khat, smoking shisha, smoking cigarettes, and using marijuana) among youths especially among university students.

- Studies that present the prevalence of risky sexual behaviours (include early sexual debut, unsafe sex, casual sex, having multiple sexual partners, and substance-induced sex) among youths particularly among university students.

The following exclusion criteria were also used:

- Studies that were published in languages other than English.
- Studies that were published after September 5, 2019.
- Studies that do not include theories and models of personality and health behaviour.
- Studies that do not explain the association between personality traits and health risk behaviours.
- Studies that present the prevalence of substance use other than drinking alcohol, chewing khat, smoking shisha, smoking cigarettes, and using marijuana among youths.
- Studies that present the prevalence of risky sexual behaviours other than the early sexual debut, unsafe sex, casual sex, having multiple sexual partners, and substance-induced sex.

2.2 An overviews of 'personality versus situation' debate in the study of health behaviour

One of the major goals of psychology is explaining the cause of human behaviour. In view of that, psychologists have been concerned with explaining the etiology of health behaviours for centuries. However, there are disagreements among psychologists on whether the person-related factors or situations determine the acquisition of health behaviours. This debate is commonly said to be the person-situation controversy. The debate actually has three sides, not two, namely the person side, situation side and interaction view (Funder, 2009; Speirs-Bridge, 2006).

Proponents of the person side or personologists believe that the key to predicting behaviour lies within the person (Costa & McCrae 1987, 1992; Eysenck, 2000; McCrae & Costa, 1986; Paunonen, 2003; Smith & Spiro, 2002; Vollrath & Torgerson, 2008; Zietsch, Verweij, Bailey, Wright, & Martin, 2010). Although no single definition is adequate to all personality scholars, personality can be defined as the arrangement of enduring psychological characteristics and components inside the person that are organised and impact the individual's interactions and

adjustments within the physical, and social environments (Cervone & Pervin, 2015; Larsen & Buss, 2010).

Personality and health relationship models like the five-factor model (FFM) (McCrae & Costa 1986) assume that people can be depicted as far as their degrees of valid and enduring dispositions and individual differences in these dispositions can foresee a considerable segment of their change in behaviour. Accordingly, variations in health behaviour resulted from variations in these valid and enduring personality traits (Zietsch et al., 2010).

Advocates of situation, on the other hand, see the situation or the environment as a key to influencing behaviour (Matthews, Deary, & Whiteman, 2009). Some theories such as the ecological system theory (EST) (Bronfenbrenner, 1994) and social norm theory (SNT) (Berkowitz, 2005) are on the situation side of the controversy.

The third group of psychologists supports an interactional view and they suggest that it is the interface between the person and the situation that needs to become the focus for research, and not only the situation or the person (Fleeson, 2004; Funder, 2009; Jessor, 1987, 1991; Jessor & Jessor, 1977, 2017; Speirs-Bridge, 2006). For example, problem behaviour theory (PBT) (Jessor, 1987, 1991; Jessor & Jessor, 1977, 2017) believes that all behaviours arise out of the structure and communication of three frameworks: the behaviour system, the personality system, and the perceived environment system. It indicated that both personality and situation or context factors contribute for individuals to engage in different forms of health behaviours. Most contemporary researchers and psychologists pledge to the interaction view, assuming that both the person and the situation, and their combined effect, are essential in determining health behaviours (Cooper, 2010; Fleeson, 2004; Funder, 2009; Larsen & Buss, 2010; Matthews et al., 2009; Speirs-Bridge, 2006).

Since the major purpose of this study is to examine whether personality traits determine substance use and sexual risk behaviours, this section of the study is limited to review theories and empirical pieces of evidence provided by personality and health theorists and researchers working on the person side of the debate. Accordingly, the following sections reviewed some basic theoretical approaches in personality, the role of personality traits on health behaviours,

some models of personality and health, and the relationships among personality traits, substance use and risky sexual behaviours.

2.3 Theories of personality

There are different theoretical approaches in the science of personality psychology, which explain the source of individual differences or the nature of personality in different ways. Each hypothetical viewpoint on personality might be centred around a fundamentally significant piece of human mental functioning, yet each perspective independent from anyone else doesn't catch the entire individual (Larsen & Buss, 2010). The major approaches to personality are highlighted to provide a relative understanding of different personality theories proposed over the past century. These are the psychodynamic approach, humanistic approach, trait approach, biological approach, behavioural learning approach, cognitive approach, social cognitive approach and socio-cultural approach.

The psychodynamic or intra-psychic approach is concerned with factors within the mind that influence behaviour, thoughts, and emotions. The pioneer of this domain was Sigmund Freud, though new perspectives have advanced beyond his original ideas. This domain deals with the fundamental psychological systems of a personality, a considerable part of which work outside the domain of conscious awareness. Hypotheses inside this area frequently start with essential suppositions about the motivational framework, even those outside of awareness, can be powerful and that their manifestations in real behaviours can be examined through observation (Larsen & Buss, 2010).

In contrast, the humanistic approach identifies personal responsibility, conscious needs and thought processes to develop and sentiments of self-acknowledgement as the key reasons for differences in personality. It assumes that the meaning of any person's life is found in the choices that a person makes and the responsibility he or she takes for those choices (Burger, 2011; Maslow, 1943; Rogers, 1975). According to the humanistic approach, motives can be used to explain why people do what they do. Motive explanations are unique in that they imply a goal that pulls individuals to think, act, and feel in certain ways (Larsen & Buss, 2010).

The centre of assumption within the biological approach is that people are, as a matter of first importance, collections of natural frameworks, and these frameworks give the building blocks for behaviour, thoughts, and feelings. It also appears that our genetic makeup influences behaviour patterns associated with personality, such as how active we are, whether or not we are aggressive, and whether we like to be with others or prefer to spend time by ourselves (Burger, 2011).

The trait/dispositional approach is concerned with the most important characters or internal properties in which people vary from one another. They are additionally keen on the sources of these significant individual variations and in how they develop and are maintained. The dispositional domain emphasizes the aspects of personality that are stable and make people different from each other which are recognized as traits by trait psychologists (Cattell, 1983; Costa & McCrae, 1987; Goldberg, 1990; McCrae & John, 1992). In terms of person-situation controversy, this view is at the person's edge of the debate. Personality traits predispose individuals to behave in some ways that can be dangerous or promote their health. Identification of these personality factors and the investigation of their association with various health risk behaviours may give us information about which individuals are vulnerable and how their well-being can be improved (Markey, Markey, Ericksen, & Tinsley, 2006).

The behavioural learning approach assumes that the behaviour of people should be explained in terms of environmental forces that determine the trajectories of our lives. It presumes that there is no more need to explain a person's behaviour in terms of his or her attitudes, feelings, or personality traits. It assumes that thoughts and feelings as behaviours are caused by the environment (Cervone & Pervin, 2015). As far as the person-situation debate, the learning viewpoint lies in the 'situation' end of the spectrum. This point of view additionally infers that character is vulnerable to moulding that can be polished by the situations that form the person's uniqueness (Carver & Scheier, 2000).

The cognitive/experiential approach concerns subjective experience and other mental processes, for example, thoughts, feelings, beliefs, and desires about oneself as well as other people. One of the focal ideas in this area is the *self*. A few parts of these depict how we see ourselves: our

knowledge of ourselves, our pictures of past selves, and our pictures of conceivable future selves are viewed as the sources of our distinction (Larsen & Buss, 2010).

Social-cognitive perspective centres its analyses of personality on uniquely human-cognitive capacities. Individuals are seen to have the capacity to influence their own experiences and development through their ability to think about themselves, their past, and their future. Since these thinking processes develop through interaction with the social environment, they are called social-cognitive. The social-cognitive theory addresses personality processes in two primary ways. First, the principle of reciprocal determinism captures the back-and-forth influences between personality and the environment. Second, personality is construed as a cognitive-affective processing system (Bandura, 1978, 1999; Mischel, 2004).

In view of socio-cultural approaches, personality does not just reside within the nervous systems and genes of individuals. Rather, it influences and is influenced by, the cultural and social setting. At the social level, obviously, groups differ from each other. Some societies are individualistic: individuals want to settle on their own choices and to be dependable basically for them. Other societies are more collectivistic. People prefer to see themselves as part of a social group and do not think of their individual needs as more important than their group's needs. Personality differences among these groups may be instances of transmitted culture or evoked culture (Bronfenbrenner, 1994).

All theories of personality may have their own contribution in understanding human behaviours including health-related behaviours. Since this study is intended to see how personality trait differences predict risky health behaviours, it primarily relies on the trait or dispositional approach to personality in explaining health behaviour.

2.3.1 Trait approach in personality psychology

Personality psychologists differ in their formulations of what traits or dispositions mean, how many traits there are and what the correlations and consequences of these traits on behaviour are. Some personality psychologists view these traits as interior or hidden properties of people that cause their behaviour. Other personality psychologists utilize these quality terms just to portray

the enduring aspects of a person's behaviour without any presumptions about causality. Psychologists who recognize traits as internal characters presume these interior properties of the person as different from overt behaviours and assume causal relationships between them. Advocates of the other alternative define traits just as illustrative outlines of qualities of people; they make no presumptions about internality or causality (Saucier & Goldberg, 2001).

Trait psychologists agree on the definition that traits or dispositions are the dynamic psychological organizations within the individuals that coordinate their experience and action (Larsen & Buss, 2011). Thus, personality traits can be viewed as individual difference variables that enable us to understand and group individuals based on the extent to which they manifest particular characteristics. Psychologists like Gordon Allport, Raymond B. Cattell, Hans J. Eysenck, Robert R. McCrae, and Paul T. Costa are the most popular proponents of this view (Burger, 2011; Fiest & Fiest, 2008).

Another most significant inquiry for distinction among personality psychologists is; "What number of traits or personal dispositions does an individual have"? During the previous 25 to 45 years, several individuals and researchers, (for example, Cattell, 1983; Costa and McCrae, 1992; Eysenck, 1997; McCrae and Costa, 2003) have adopted a factor analytic strategy to addressing these inquiries. Though numerous contemporary scholars accept that five is the magic number, prior scholars recognized the different number of traits through the lexical methodology and factor investigation. For example, Allport and Odbert (1936) identified thousands of English-language trait names. Cattell (1983) assembled these terms into equivalent words, accumulated evaluations on the subsequent clusters, and factored them as the initial phase in the improvement of the sixteen-personality factor (16PF) survey. Hans J. Eysenck demanded that only three central factors can be recognized by a factor logical methodology. Eysenck's factor analysis provided three broad bipolar factors or types, specifically extraversion/introversion, neuroticism/stability, and psychoticism/superego. McCrae and Costa (1985) in turn factored the Cattell's 16PF scales into three broad domains of personality: Neuroticism, Extraversion, and Openness to Experience (NEO).

Based on the extensive factor analytic studies, Costa and McCrae (1992) integrated previous studies and later developed the NEO into the Revised NEO Personality Inventory (NEO-PI-R) or the five-factor model (FFM) by including two new traits, namely Agreeableness (A) and Conscientiousness (C). The NEO-PI-R is now the leading instrument used to assess the five domains/traits of personality – N, E, O, A, and C (Larsen & Buss, 2010). These terms differ somewhat from researchers to researchers, but the underlying factors are quite the same. Recently, the FFM has been further formulated as a theory.

Although there are different trait or factor classifications such as Raymond Cattell's 16PF and Hans Eysenck's three-factor theory, the five-factor theory of Costa and McCrae (1992) has been preferably used in this study, because it is able to measure diverse traits of personality without overlapping (Burger, 2011; Larsen & Buss, 2010). Many researchers also thought that Cattell's view was very complicated and Eysenck's was too narrow in scope. Subsequently, the five-factor theory became known to illustrate the fundamental traits that are the building blocks of personality. Nowadays, most modern psychologists consider that there are five basic factors or aspects of personality (Costa & McCrae, 1995; Goldberg, 1990; McCrae & Costa, 2008; McCrae & John, 1992; Saucier & Goldberg, 2001).

2.3.2 Stability versus change debate on personality

The most important area of debate among personality theorists and researchers in studying the relationship between personality and behaviours is to see whether personality remains stable or changes across time and situations. Stability and change are usually manifested by correlations between personality traits scores across two points in time, which is through test-retest correlations (Caspi, Roberts & Shiner, 2005; Gordon, 2009; Zeng, 2006).

Empirical findings in the field of psychology support both sides of the 'stability versus change' controversy. The consistency or inconsistency of personality highly depends on how personality is operationally defined and measured (Ardelt, 2000; Caspi et al., 2005; Gordon, 2009; Wilk, 2009; Zeng, 2006). If personality is defined strictly as biologically based temperament and basic tendencies or traits, we would expect a higher level of stability or similarity across time and situations (Gordon, 2009; Wilk, 2009; Zeng, 2006). This is an essentialist's view or classical trait

perspective which considers personality development essentially as an intrinsic biological-based maturational process, with the social environment exerting little influence (Eysenck & Eysenck, 1987; McCrae, Scally, Terracciano, Abecasis, & Costa, 2010; McCrae & Costa, 2008; Zeng, 2006). Trait theorists propose that personality may be defined by just five broad dimensions (neuroticism, extroversion, openness to experience, agreeableness, and conscientiousness) derived from factor analysis of a wide range of traits (Costa & McCrae, 1992). This model is commonly known as the five-factor theory, popularly known as the 'big five' theory of personality (Costa & McCrae, 1992, 1997).

However, if the definition of personality is expanded to include motives, life goals, attitudes and overall psychological functioning, then there may be room for change (Magidson, Roberts, Collado-Rodriguez & Lejuez, 2014; Mroczek & Spiro, 2007; Turiano et al., 2012; Zeng, 2006). This assumption of change is viewed as a radical contextual perspective. The radical contextual perspective gives emphasis to the role of life events and transitions in personality development and recommends that character ought to be liquid, inclined to change, and give low test-retest relationship coefficients (Caspi et al., 2005; Lewis, 2001). Considerable evidence also implies that personality traits might be variable, raising the likelihood that personality traits generally identified with health issues can be formed with intervention through a bottom-up approach. That is, by targeting core behaviours that underlie personality traits intending to develop new, healthier patterns of behaviour, which may bring about changes in traits or characteristics (Magidson et al., 2014; McCrae & Costa, 2008; Mroczek & Spiro, 2007; Turiano et al., 2012).

Concerning how the measurement procedures influence the stability and change of personality, three types of measurement have been identified (Ardelt, 2000; Caspi et al., 2005; Gordon, 2009; Wilk, 2009; Zeng, 2006).

- Rank-order stability, generally surveyed by test-retest relationships, is the degree to which people keep up their relative positions within a population in the distribution of a specific trait over time (Gordon, 2009; Zeng, 2006).
- Mean-level stability is the degree to which individuals who share maturational and historical processes, as a group, maintain their average traits level as they age, which

indicate whether the sample as a whole remains stable on a trait, as measured on two or more separate occasions in longitudinal studies (Caspi et al., 2005; Gordon, 2009; Zeng, 2006).

- Individual-level and ipsative stability, which refers to whether an individual's trait/s remains unchanged over time. It denotes the change/stability profile of each individual across time, usually measured through Q-sort methods (Gordon, 2009; Wilk, 2009).

Rank-order correlations provide evidence for personality stability (Caspi et al., 2005; Wilk, 2009) while the individual level and the level of group mean reveal change over time (Caspi et al., 2005; Wilk, 2009). Reports on the degree of stability and change also vary among studies and the results highly depend on the length of the test-retest interval, the age of samples, the measurement instrument, gender (Ardelt, 2000), and the aspect of personality measured (Ardelt, 2000; Caspi et al., 2005; Gordon, 2009; Zeng, 2006). Both rank-order and mean level stability of personality increase with age (Ardelt, 2000; Caspi et al., 2005; Gordon, 2009). Personality tends to be less stable if the retest interval is large and if samples are younger in age (Ardelt, 2000; Caspi et al., 2005). An overall personality measure (big five traits measure) yields higher stability scores than the measure of individual aspects of personality (Ardelt, 2000; Caspi et al., 2005). While Ardelt (2000) found that women tend to be stable in the early years (before 30) and lower in later ages compared with men, Caspi et al. (2005) revealed that men and women change in the same ways over the life course. Measuring instruments designed by Costa and McCrae (FFM) for self-report data are found to produce higher levels of stability than other instruments (Ardelt, 2000; Caspi et al., 2005).

Although most earlier studies on the relationship between personality and wellbeing solely propose traits as unchanging indicators of health behaviours, there are different investigations reporting that personality traits do change (Ardelt, 2000; Mroczek & Spiro, 2003, 2007; Turiano et al., 2012; Wilks, 2009), even though they will in general change gradually after some time and they don't change for everyone; some individuals do stay stable. As indicated by Mroczek and Spiro (2007) and Turiano et al. (2012), their findings are relevant to the study of personality change. It is assumed that if personality is changing, it does not lose its predictive power. Their

discoveries demonstrate that personality traits comparatively hold their predicting power, regardless of whether they change.

Change in the trait level could predict the change in health-related behaviour. For example, change in the level of agreeableness and sociability predicted the change in substance use behaviour (Hong & Paunonen, 2009; Turiano et al., 2012), and increase in neuroticism was associated with an increase in smoking or use of alcohol and other drugs (Mroczek & Spiro, 2007). Change in the level of conscientiousness over the years was found to be positively associated with the change in both preventive health-related behaviours and self-perceived physical health (Hong & Paunonen, 2009; Bogg & Roberts, 2004; Takahashi, Edmonds, Jackson, & Roberts, 2013).

Although the trait approach is built on the assumption that personality characteristics are relatively stable across time and context which govern the day to day behaviours of individuals, it is not to mean that personality does not change (Burger, 2011; McCrae & Costa, 2003, 2008). This theory further proposed that personality trait change is more likely to occur, along with initial trait level which is essential in predicting changes in health behaviours and outcomes.

2.4 Theories and models of personality and health

The role of personality in health has been studied using varied conceptual models. Based on their explanation of the possible mechanisms through which personality factor affects health, the conceptual models of personality and health can be categorized into direct effect models and indirect effect models. Direct effect models, such as reactivity hypothesis, regarded personality as part of the behaviour pattern or emotional reaction makes direct physiological changes with potential health consequences (Strike, Perkins-Porras, Whitehead, McEwan, & Steptoe, 2006). Direct effect models, such as structural weakness hypothesis, also propose that personality traits are hereditary that most of the personality-related characteristics, for example, timidity and hostility, share the equivalent hereditary or natural foundation with some physiological issues that are related with or even cause substantial health issues (Cloninger, Svrakic, & Przybeck, 1993).

Indirect impact models clarify a second potential component connecting personality and health is through health-related behaviours, called the health risk behaviour hypothesis (Bogg & Roberts, 2013; Turiano et al., 2012). Health and disease are influenced by behaviours that express risks or protect against them. Behaviours may convey health wellbeings or otherwise protect people from disease. Diet and exercise are often cited as protective behaviours, and health risk behaviours such as tobacco use, drug use, alcohol abuse and high-risk sexual activity are activities that have harmful effects on health (Cooper, Wood, & Orcutt, 2003).

The current study also presumes the indirect effect model which hypothesized that personality factors are determinants of health through the mediating role of health risk behaviours. Plainly, it assumes that personality traits affect health behaviours and health behaviours, in turn, affect health.

The role of personality traits on health behaviours is examined by some theories and models of personality and health such as the health belief model (HBM), theory of reasoned action (TRA), theory of planned behaviour (TPB), social cognitive theory (SCT), problem behaviour theory (PBT) and the five-factor model (FFM) of personality.

2.4.1 The health belief model (HBM)

HBM (Becker, 1974) grew out of behaviourism and cognitive theories, hypothesizes that personality trait differences are associated with health behaviours, but their influence is indirect, through the proximal variables like individual beliefs and perceptions (Becker, 1974; Janz, & Becker, 1984; Rosenstock, 1974). Certain personality trait groups are assumed to engage in risky behaviour more likely than other groups of the same traits, because of differences in the proximal variables. Because personality traits are treated as distal variables that do not have a direct effect on health behaviours (see Figure 2.1).

Modifying Factors　　　　　　**Individual Beliefs**　　　　　　**Action**
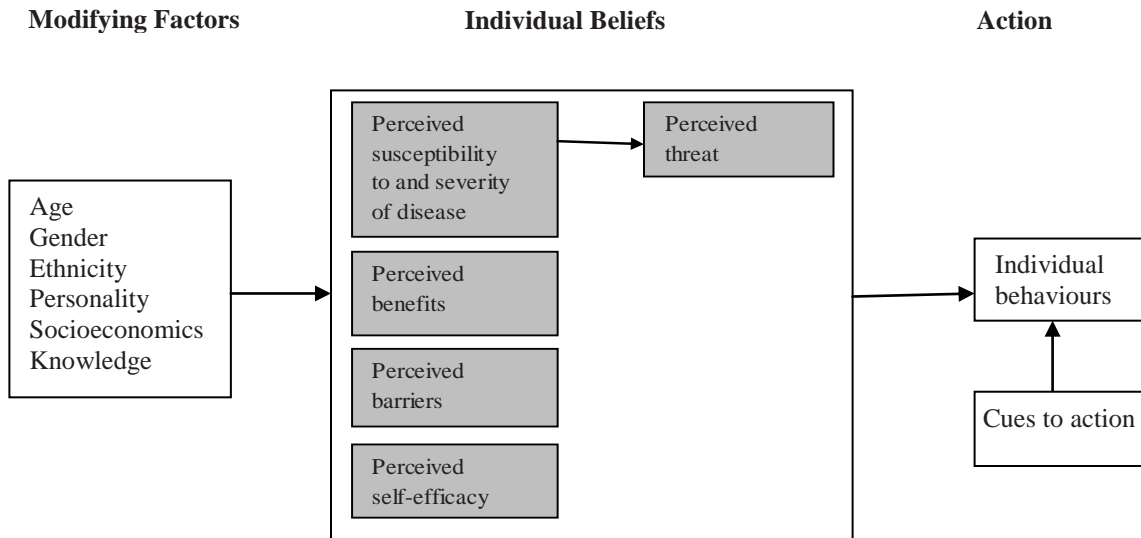
Figure 2.1. Relationship among constructs in health belief model (Adapted from Janz & Becker, 1984, p. 4)

The HBM recommends that, for people who display high-risk practices, perceived susceptibility and self-efficacy are important before focusing on changing these hazardous practices can happen. For people who don't accept that they are in danger and can change, the exertion and benefits of activity are insignificant (Janz and Becker, 1984). Studies addressing connections between HBM constructs, (such as perceived susceptibility, perceived severity, perceived benefits, perceived barriers and perceived self-efficacy) and risky sexual behaviours have focused on youths and most researchers have found a significant association between condom use and perceived vulnerability to negative outcomes, such as contracting with HIV or other sexually transmitted infections (Hounton, Carabin, & Henderson, 2005).

2.4.2 Theory of planned behaviour (TPB) and theory of reasoned action (TRA)

The theory of planned behaviour (TPB) was developed by Ajzen (1985) and is seen as an extension of the theory of reasoned action (Fishbein, 1979; Fishbein & Ajzen, 1977). The theory of reasoned action holds that the intention (inspiration) to perform a certain behaviour is dependent on whether individuals evaluate the behaviour as positive (attitude) and if they judge

26

others as wanting them to perform the behaviour (subjective norm). TPB expands on this hypothesis and provides a framework for predicting risky behaviours and outcomes based on individuals' attitudes towards behaviour, perceived parental and peer attitudes about one's behaviour, and perceived behavioural control or self-adequacy (see Figure 2.2).
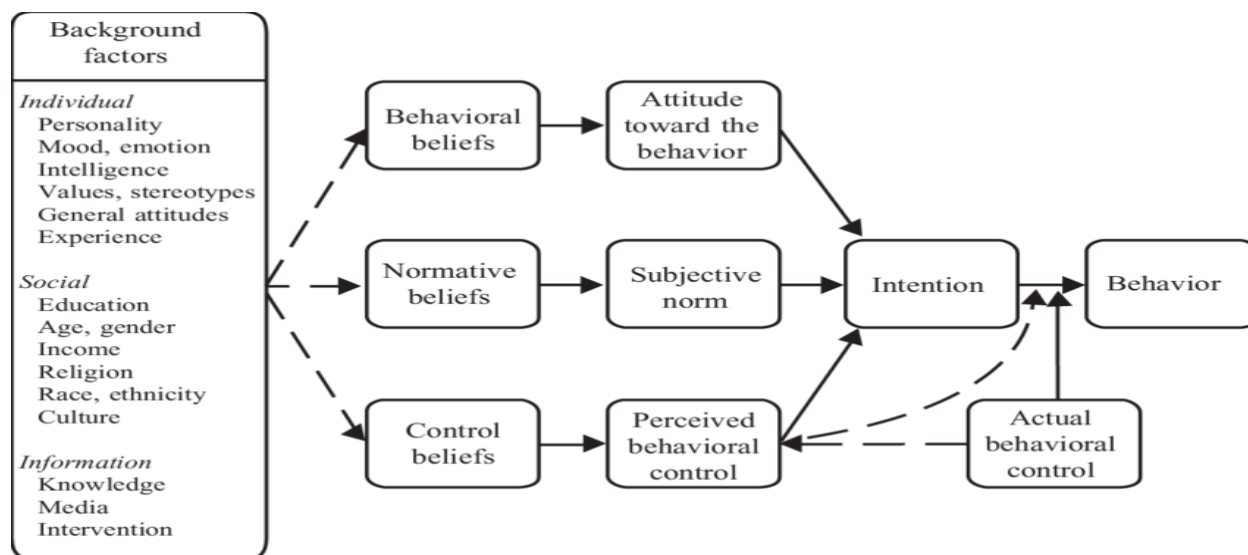
Figure 2.2. Integrated schematic presentation of the theory of planned behaviour and theory of reasoned action (Adapted from Fishbein & Ajzen, 2011, p. 22)

Like in the HBM, both TPB and TRA hypothesize that the influence of personality on health behaviours is indirect, through the theoretical constructs like motivation, beliefs, intentions, perception and attitudes. Albarracin, Johnson, Fishbein, and Muellerleile (2001) and Buhi and Goodson (2007) found that the components of the theories of planned behaviour (TPB) – attitudes, perceived parental attitudes, and self-efficacy – correlate with risky health behaviours.

2.4.3 Social-cognitive theory (SCT)

The social-cognitive theory provides important concepts and methods for describing how individuals come to encounter and react to situations in ways that ultimately affect their health. Instead of the broader and static traits, as in the FFM, social-cognitive theory include smaller, more essential units of cognition, affect, and social behaviour that describe personality processes (Smith & Spiro, 2002). Social cognitive theory (Bandura, 1999) encompasses both cognitive

(intra-personal) and behavioural (environmental) approaches and it assumes that both environmental and intrapersonal or psychological factors are responsible for both desirable and undesirable behaviours (see Figure 2.3).
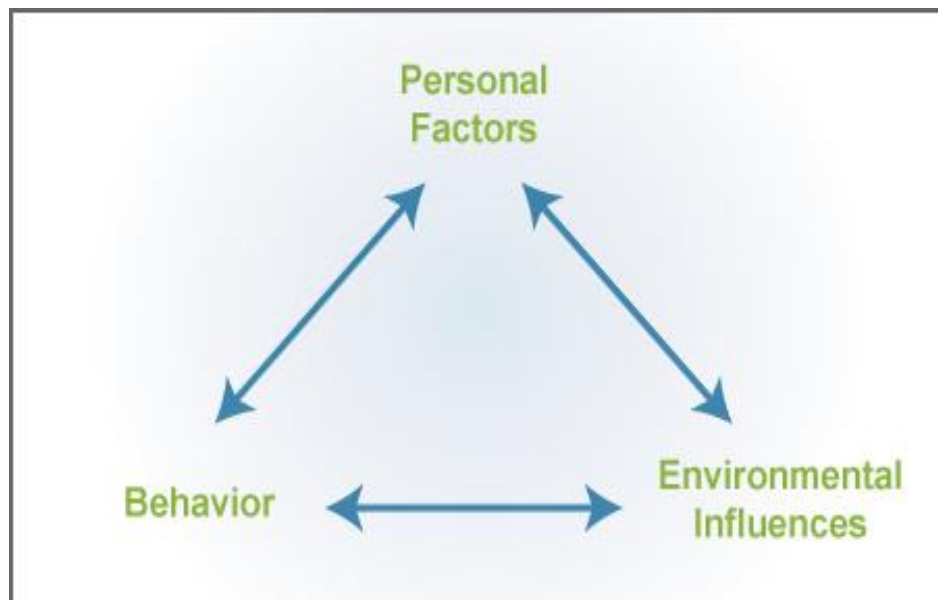
Figure 2.3. Visual presentation of social cognitive theory (Adapted from Bandura, 1978, p. 345)

Social learning theory can be used to explain the development of deviant risky health behaviours. Theoretically, if an individual never observed or was exposed to substance use, or risky sexual practices, the individual would never adopt the behaviour. Behaviourists further point out that once a behaviour is adopted, the consequences will determine whether the behaviour is continued. Emerging out of Bandura's SCT his self-efficacy theory (1978, 1999), posit that self-efficacy or outcome expectancy as the belief that one can successfully engage in a behaviour that is required to produce the desired outcome is a critical factor in determining the individual to engage in a certain behaviour and the execution of cognitive and behavioural coping skills. More than all, schematic representation of Bandura's (1978) principle of '*reciprocal determinism*' posits that personality, behaviour, and the environment must be understood as a system of forces that mutually influence one another. An individual's behaviour is uniquely determined by the combination of these three forces/factors (Kelder, Hoelscher & Perry, 2015). Social cognitive theory has been used to inform, enable, guide, and motivate individuals to have habits that

promote health and to reduce habits that deteriorate health (Bandura, 1999). It has also been used to explain the mechanisms of the ways people may learn about risky behaviours: for example, from observing smoking in movies.

2.4.4 Problem behaviour theory (PBT)

Problem behaviour theory (PBT) (Jessor, 1987, 1991; Jessor & Jessor, 1977, 2017) assumes that all behaviour comes out out of the structure and interface of three systems: the behaviour system, the personality system, and the perceived environment system. While the behaviour system incorporates both problem and conventional behaviour structures, the personality system includes the persuasive induction structure, the individual conviction structure, and the individual control structure. The perceived environment system involves two structures: distal (inclusive of an individual's relationship to their support group of people) and proximal which deals with an individual's environment related to accessible role models of behaviours (see Figure 2.4).
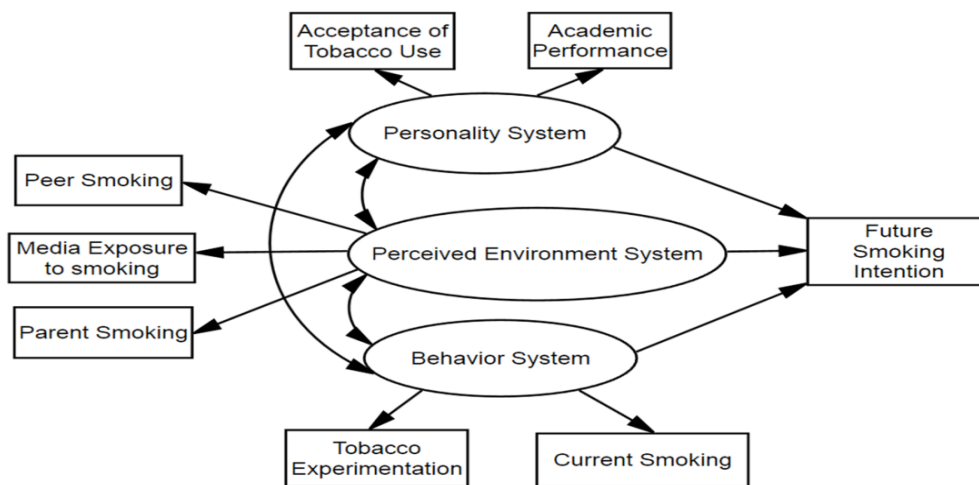
Figure 2.4. Jessor's model for associations between problem behaviour variables and adolescent future smoking intentions (Adapted from Jessor & Jessor, 2017, p.83)

Problem behaviour theory proposes that when the personality system and perceived environment system conflict, behavioural problems happen to manifest (Jessor, 1987, 1991; Jessor & Jessor, 2017). It assumes that adolescents' substance abuse and risky sexual behaviours shall be seen as

part of the behavioural system that interacts with the personality and environmental systems. This notion is almost similar to that of Bandura's (1978) model of reciprocal determinism.

2.4.5 Five-factor model/theory of personality (FFM)

The predominant trait approach to personality, the Five-Factor Model (FFM) of McCrae and Costa (1986) is useful in explaining health behaviours. The FFM/theory of Costa and McCrae (1992) is a parsimonious taxonomy that classifies all personality traits into five broad dimensions/factors, commonly labelled as openness (O), conscientiousness (C), extraversion (E), agreeableness (A), and neuroticism (N). It explains the functioning of a person as the operation of the universal personality system with definite categories of variables and dynamic processes that impact one another. The model/theory assumes that the five personality dimensions or basic tendencies are assumed to form the substantive nucleus of the personality system as indicated in Figure 2.5.
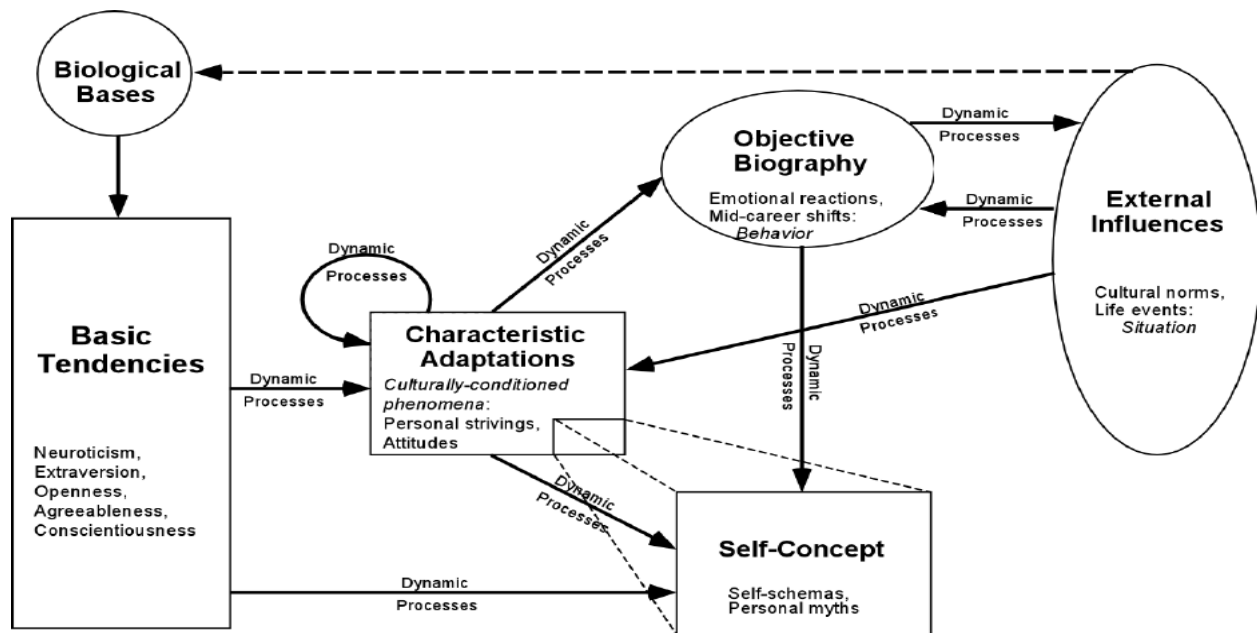
Figure 2.5. Components of the personality system according to FFT [Rectangles represent core components; ellipses represent peripheral components. Arrows signify the direction of causal influences working as the dynamic processes] (Adopted from McCrae & Costa, 2008, p. 163)

McCrae and Costa's five-factor theory of personality presumes that the personality system consists of personality components and the dynamic processes that show how these elements are interrelated. It also assumes that behaviour is explained by considering the three core/central and three peripheral components of the personality system.

As classified by McCrae and Costa (2003, 2008), the three core/central segments of personality include basic tendencies, characteristic adaptations, and self-concept. Basic tendencies of personality are the universal qualities of personality capacities and dispositions that are inferred rather than manifested. Basic tendencies may be inherited or resulted from early experiences that characterize the individual's potential and direction. In the perspective of McCrae and Costa the personality traits: more specifically, the five dimensions (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness) are basic tendencies. The fundamental nature of basic tendencies is their foundation in biology and their constancy across time and circumstances.

Characteristic adaptation is another core component of personality in the Five-Factor theory. It is the learned structure of personality that develops as people adapt to their surrounding environment. Based on the degree of consistency, whereas basic tendencies are quite stable, characteristic adaptations can fluctuate and be influenced by situations. All acquired and specific behaviours are characteristic adaptations to specific acquired behaviours. While characteristic adaptations are what we learn, basic tendencies are factors that determine how we learn. Besides, our characteristic adaptation is directly impacted or formed and shaped by our dispositions and tendencies. What makes them characteristic is their uniqueness and consistency; hence, they reflect the function of stable traits. They are adaptations since they are shaped by the environment. They likewise enable us to fit into or adjust to our ecological circumstances on a progressing premise (McCrae & Costa, 2008; Terracciano & McCrae, 2012).

McCrae and Costa (2008) explained that self-concept is also a characteristic adaptation, but it has its own box in the model because it is such an essential adaptation. The convictions, mentalities, and sentiments one has toward oneself are trademark adjustments which impact how one acts in a given circumstance.

The three peripheral components - *biological bases*, *objective biography*, and *external influences* - mark the interface with systems outside personality. Biological bases and external influences are the inputs representing interactions of personality with the physical body and with the environment. The objective biography is the output representing the whole thing that the person does, thinks, or feels across the lifespan (McCrae & Costa, 2003).

McCrae and Costa (2003, 2008), proposed that basic tendencies have four assumptions: individuality, origin, development, and structure. According to the *individuality* postulate, individuals have a distinctive set of traits and arrangement of trait patterns. The definite amount of the five basic traits is unique to all of us, and much of our uniqueness results from the differences in our genotype. This assumption has the same opinion with Allport's view that uniqueness is the essence of personality (Feist & Feist, 2008). The *origin* postulate is somewhat controversial which presupposes that all personality traits universal aspects of human nature that are the result exclusively of internal factors, such as heredity, the endocrine system, and the nervous system than products of life experience (McCrae & Costa, 2003, 2008).

The *development* postulate stipulates that traits develop and change during childhood, but their development and change slow in adolescence, and change in personality nearly stops by early to mid-adulthood (McCrae & Costa, 2003). They hypothesized that there might be some evolutionary and adaptive causes for these changes. The *structure* postulate asserts that traits are sorted out progressively from specific to broad (see Table 2.1). This assumption grows out of McCrae and Costa's longstanding position that the number of traits is five and only five (Feist & Feist, 2008; McCrae & Costa, 2003, 2008).

Table 2.1 *McCrae and Costa's Hierarchical Structure of Personality Traits*

Number	Personality traits/dimensions	Facets/sub-traits
I	Neuroticism	Anxiety Angry Hostility Depression Self-Consciousness Impulsiveness Vulnerability
II	Extraversion	Warmth Gregariousness Assertiveness Activity Excitement Seeking Positive Emotions
III	Openness	Fantasy Aesthetics Feelings Actions Ideas Values
IV	Agreeableness	Trust Straightforwardness Altruism Compliance Modesty Tender-Mindedness
V	Conscientiousness	Competence Order Dutifulness Achievement Striving Self-Discipline Deliberation

Note: Adapted from McCrae and John (1992, pp. 178-179)

Although there has been little agreement among factor theorists on the specification of traits, the FFM has been developed using a top-down strategy, beginning with the five well-established factors or domains - N, E, O, A, and C - and subdividing each into six more specific facet scales. The facets of each domain were consistent with the broad constructs and selected to represent the

distinct aspects of the domain (Costa & McCrae, 1995; Goldberg, 1990; McCrae & Costa, 2003, 2008; McCrae & John, 1992) maximally.

Neuroticism (N) is defined primarily by anxiety and depression. It refers to easily experiencing negative and unpleasant emotions, such as fear, anxiety, distrust, unhappiness, and insecurity The six dimensions of neuroticism include anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability. *Extraversion (E)* is the degree of sociability or withdrawal a person tends to exhibit. It includes enjoying the company of others, and being active, conversational, assertive, and seeking inspiration. Its six dimensions include warmness, sociability, assertiveness, activity, sensation seeking, and positive emotions. *Openness (O)* refers to the breadth of experience to which a person is amenable. It includes being intelligent, creative, inquisitive, flexible, and broad-minded. The six facets of openness include fantasy, aesthetics, feelings, actions, ideas, and values. *Agreeableness (A)* is a tendency of being considerate, good-natured, helpful, tolerant, and sympathetic rather than antagonistic. The six facets of agreeableness are trust, truthfulness, altruism, conformity, modesty, and tender mindedness. *Conscientiousness (C)* refers to striving for competence and achievement and being self-disciplined, organized, consistent, and deliberative. The six dimensions of conscientiousness involve competence, order, dutifulness, achievement striving, self-discipline and thoughtfulness (Costa & McCrae, 1995; McCrae & Costa, 2008; McCrae & John, 1992; Raynor & Levine, 2009).

In clinical and other scientific practices, the analysis of a hierarchical profile of personality traits can make an understanding of the client easier. The five domains of personality scores help to rapidly portray the layouts of the client's personality, while facet scales enable to fill in the details. Since they are all the more solidly attached to explicit practices and encounters, all things considered, aspect scales will frequently demonstrate more valuable than space scales in deciphering the customer's conduct and in choosing the specific intervention. Domain level scales are helpful for understanding different domains of personality characteristics that are not directly observed. While analysis of the domain level traits yields a quick understanding of the individual, analysis of specific facet scales helps to provide more detailed information (Costa & McCrae, 1995).

In the five-factor model, traits have been used as predictors of health behaviour and outcomes. In this way, the FFM could identify a number of broader and smaller traits that influence health (Costa & McCrae, 1987, 1992; Miller, Lynam, Zimmerman, Logan, Leukefeld, & Clayton, 2004; Raynor & Levine, 2009; Turiano et al., 2012).

Concerning the association between traits and behaviours Costa and McCrae (1987, 1992) and McCrae and Costa (1986) posit 'adaptation' postulates, which may explain how personality traits influence health behaviours. The postulate of adaptation explains that traits influence how we adjust to the changing situations. Over time, individuals react to the changing environmental situations by developing prototypes of thoughts, feelings, and behaviours consistent with their traits. Moreover, our traits result in our seeking and choosing specific ecological circumstances that go with our characters. For example, an extraverted individual may join a move club or other social settings, though a confident individual may turn into a legal advisor or business official.

Personality and health behaviour models, in general, suggest that personality traits are associated with health habits, such as drinking, smoking, fast driving or careless diet. These propensities, thusly, might intercede the relationship between traits and health. This impact of character could be reliable crosswise over time and circumstances, or character could moderate the degree to which health behaviours (e.g., drinking alcohol and smoking) change in response to the situation (Bogg & Roberts, 2004; Friedman et al., 1995; Hampson et al., 2007; Hampson et al., 2013; Smith et al., 2007; Smith & Spiro, 2002).

2.4.6 Conceptual model of the study

Guided by the aforementioned theoretical frameworks of the study, the researcher developed a conceptual model that shows the relationship among personality traits, substance use and risky sexual behaviours and the mediating role of substance use in the relationship between personality traits and risky sexual behaviours. The conceptual model of the study, depicted in Figure 2.6, juxtaposes three broad variable domains capturing direct and indirect relationships. The conceptual framework basically relies on McCrae and Costa's (2008) Five-Factor model of personality, which explains the direct impact of personality traits on health behaviours.

Neuroticism

Extraversion

Openness

Agreeableness

Conscientiousness

Substance Use Behaviour

Risky Sexual Behaviour
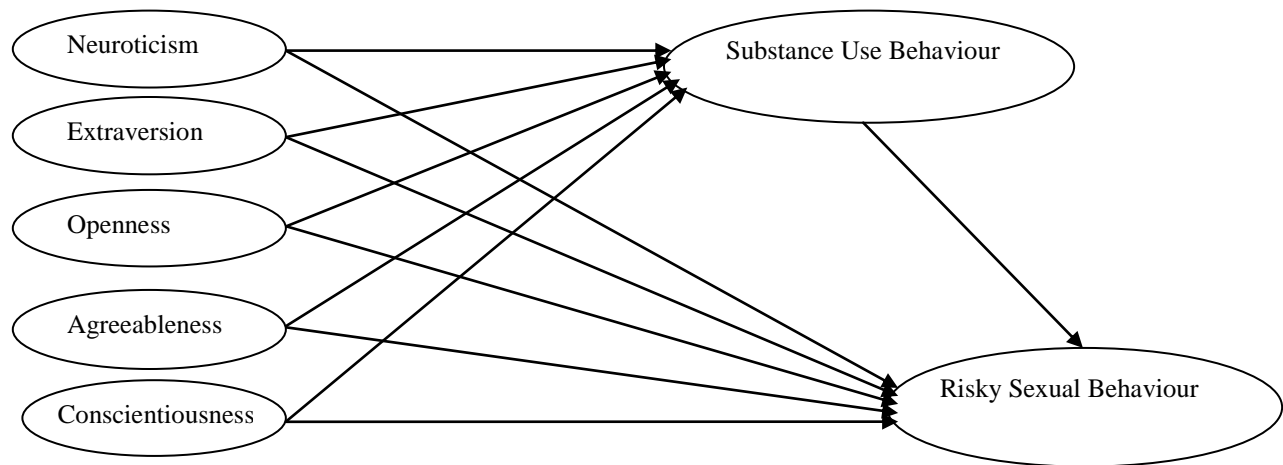
Figure 2.6. Conceptual model for the relationships among personality traits, substance use and risky sexual behaviour variables

This conceptual framework is consistent with social cognitive theory (SCT) and Problem behaviour theory (PBT), which explain the direct influence of personal variables (such as personality) on health behaviours. The conceptual model is also partially consistent with the health belief model (HBM), the theory of reasoned action (TRA), and the theory of planned behaviours (TPB), which explains the indirect association of personality traits with health behaviours. These theories indicated how personality traits like other distal environmental factors influence health behaviours, through proximal variables like motivation, beliefs, attitudes and intentions. Consideration of the health belief model, the theory of reasoned action and theory of planned behaviours in this study is assumed to be essential. Because they clearly indicated how personality traits interact with the environment and influence cognitive or psychological processes like motivation, beliefs and intentions and these beliefs and intentions in turn influence health behaviours especially for intervention purposes.

The conceptual model, in general, depicts that the five broad traits of personality directly influence substance use behaviours (include drinking alcohol, chewing 'khat', smoking 'shisha', smoking cigarette and smoking marijuana use). The five broad traits also directly influence risky sexual behaviours (includes early initiation of sexual activity, having multiple sexual partners,

unprotected sex, sex with a casual partner and substance-induced sex). The model further portraits that, in addition to its direct effect, personality traits indirectly influence risky sexual behaviours through the mediated role of substance use behaviours.

2.5 An overview of health risk behaviours

Health behaviour refers to thoughts and actions concerning health and wellbeing. Our health behaviours may be health-promoting or risky. *Health-promoting behaviour* is defined by the World Health Organization (2014), as those behaviours that enable people to increase control over their health and thereby improve their health. In contrast, health-risk behaviours (for example, substance use and misuse, absence of physical action and exercise, high-risk games, unfortunate dietary patterns, hazardous sexual conduct, and risky driving) are by definition contributory elements for poor health and mortality (Hampson et al., 2007; Hampson et al., 2013; Hong & Paunonen, 2009; Vollrath, Knoch & Cassano, 1999; Zuckerman & Kuhlman, 2000). However, this study is limited to examine theoretical and empirical literature related to substance use and risky sexual behaviours as the two broad forms of risky health behaviours. Even though the complex question of why individuals take part in health-advancing versus health-hazard practices can be tended to from an assortment of points of view (e.g., hereditary inclinations, social cognitive theory, health belief models), personality characteristics constitute a significant class of informative factors (Miller et al., 2004; Raynor & Levine, 2009; Turiano et al., 2012).

2.5.1 Substance use behaviours

According to the diagnostic and statistical manual of mental disorders (DSM-5), substance use behaviour encompasses consumption of 10 separate classes of drugs: alcohol; caffeine; cannabis; hallucinogens; inhalants; opioids; sedatives; stimulants; tobacco; and other (or unknown) substances. It refers to the use of psychoactive drugs or substances that impair proper social, emotional, cognitive and physical functioning of an individual, especially during intake of high doses (American Psychiatric Association, 2013; CDC, 2012; UNODC, 2013). Although there are many more forms of substances in different countries, this study is limited to five kinds of substance use which are most common in Ethiopia, namely drinking alcohol, chewing 'khat', smoking 'shisha', use of cannabis/marijuana and smoking cigarette/tobacco. According to

previous studies, alcohol and 'khat' are the most frequently used and abused substances in Ethiopia followed by cigarette, 'shisha' and cannabis. Hard drugs like heroin and cocaine are seldom used (Abebaw, Atalay, & Hanlon, 2007; Agegnehu et al., 2015; Andualem, Assefa, & Chalachew, 2014; Gezahegn, Andualem, & Mitiku, 2014; Hibret, Damen, Kassahun, & Davey, 2007).

2.5.1.1 Drinking alcohol

Alcohol is a depressant that reduces our awareness of situations, cognitive functionings, responses to sensory stimulation, and in larger doses, result in increased tiredness and sleepiness (Bryan, Schmiege, & Magnan, 2012; WHO, 2014). Commercially produced alcoholic products such as beer, wine, and draft and traditionally home-brewed intoxicating products such as '*tella*', '*areke*' and '*tej*' are the usually consumed alcoholic products in Ethiopia. Home-brewed traditional intoxicating drinks with their varied alcoholic content are parts of the cultural fabric in many social groups in Ethiopia. '*Tella*' is the most commonly home-brewed alcoholic beverage made from germinated barley and '*gesho*' (an evergreen shrub) leaves and has an alcoholic content of 2-4%. Filtered *tella* has a higher alcohol content ranging from 5% to 6%. '*Tej*' is a traditional wine made from fermented honey and '*gesho*' and contains 7-11% alcohol. '*Areke*' is an alcoholic liquor distilled from fermented cereals and '*gesho*' leaves with an alcoholic content up to 45%. Following an increased production of alcoholic beverages in Ethiopia in recent years, drinking industrial products of alcohol such as beer, draft, wine, and flavoured '*areke*' also rise (Abebaw et al., 2007; Derege et al., 2005; Gezahegn et al., 2014; Wakgari & Aklilu, 2011; WHO, 2004). In this study, drinking alcohol involves either use or abuse of locally produced alcohols, commercially prepared alcohols or both.

2.5.1.2 Chewing 'khat'

Khat (Catha edulis) is an evergreen plant that grows mostly in Ethiopia, Yemen and some other African nations alongside the coast of the Indian Ocean. The source of khat is not clearly defined but it is generally believed to be native to Ethiopia (Abebaw et al., 2007; Al-Motarreb, Baker, & Broadley, 2002; Cox & Rampes, 2003; Measho, Amsalu, & Tesfahhun, 2013; Tilahun, Daniel, Kristina, & Mubarek, 2017). As indicated by numerous prevalence studies, khat is extensively

chewed among the young population of Ethiopia (Abebaw et al., 2007; Alemu, Animut, Abriham, & Bekele, 2018; Andualem et al., 2014; Derege et al., 2005; Gezahegn et al., 2014; Hibret et al., 2007; Likawunt & Mulugeta, 2012).

The fresh leaves of khat (indicated in Figure 2.7) can be chewed or consumed as a tea. In countries where khat is cultivated, the chewing of khat for social and psychological reasons has been practised for centuries (Dawit et al., 2005). For most youths chewing khat is perceived as a method of increasing energy and alertness, elevating mood, improves self-esteem, creates a sensation of excitement, enhances imagination and the capacity to analyse ideas, and enhance the ability to communicate, which in turn improves work performance (Alemu et al., 2018; Derege et al., 2005; Wakgari & Aklilu, 2011).

Figure 2.7. Picture of fresh khat leaves

The stimulant effect of khat is because of the alkaloid ingredient cathinone. Cathinone has a similar chemical structure to amphetamine and amphetamine increases levels of dopamine release. The main central effects of cathinone also include hyperactivity, euphoria, excitability, restlessness and anorexia (Al-Motarreb et al., 2002; Ayalew, Meaza, Yemane, & Alemayehu, 2015; Cox & Rampes, 2003; Dawit et al., 2005; Derege et al., 2005; Tilahun et al., 2017). Several case studies and survey reports have publicized that there is a clear link between profound consumption of khat and psychosis (Abebaw et al., 2007; Al-Motarreb et al., 2002; Cox & Rampes, 2003; Derege et al., 2005).

Some khat chewers take alcohol following consumption of khat to counteract the stimulant properties of khat and facilitate sleep, however, the combined use of khat and alcohol has been found to reduce rational thinking and decision-making capacities and increase sexual risk-taking behaviour (Agegnehu et al., 2015; Andualem et al., 2014; Derege et al., 2005; Kassa, Endeshaw, & Marta, 2016). Khat is also associated with increased risk of cardiovascular complications, myocardial infarction and cardiac arrhythmias, complications in the gastrointestinal tract, a fall in urinary flow rate, and sexual disorders (Al-Motarreb et al., 2002; Derege et al., 2005). In countries like Ethiopia, regular chewing of khat has led to a misuse of work hours, decreased production, malnutrition and wastage of money to buy more khat (Abebaw et al., 2007; Al-Motarreb et al., 2002; Cox & Rampes, 2003; Tilahun et al., 2017).

2.5.1.3 Smoking tobacco/cigarettes

Smoking cigarettes/tobacco is the practice of burning the dried leaves of the tobacco plant and inhaling the smoke, which consists of particle and gaseous phases. A more extensive definition may incorporate essentially taking tobacco smoke into the mouth, and afterwards discharging it, as is finished with stogies. At the point when the dried leaves of the tobacco plant have been folded into rice paper into a little, round chamber it is known as a cigarette. On account of cigarette smoking, dynamic substances are contained in a blend of vaporized particles and gasses which incorporate the pharmacologically dynamic alkaloid nicotine. During inward breath and profound entrance into the lungs, retention into the circulation system of the dynamic substances happens (Flouris et al., 2012).

The harm caused by smoking tobacco includes diseases damaging the heart and lung. It also has many adverse social and economic consequences (Flouris et al., 2012). The World Health Organization (WHO, 2004, 2014) attributed more than 5.4 million deaths a year to tobacco use and this figure was expected to increase to 10 million deaths a year by 2020. Moreover, it was identified as a growing public health challenge in the developing world. The WHO estimate also indicated that approximately 47% of men and 12% of women smoked cigarettes worldwide in 2010. According to the 2011 EDHS report, among men with the age range of 15–49 years, 6% smoke cigarettes. Despite the fact that there is no complete information on the predominance of smoking among women, it announced that under 2% of women in Ethiopia smoke cigarettes (CSA [Ethiopia] & ICF International, 2012).

2.5.1.4 Smoking 'shisha'/hookah

Shisha is a combination of different substances which may involve tobacco, honey or molasses, hashish or marijuana and spices and is smoked from an oriental tobacco pipe or water pipe called Hookah (Derege et al., 2005; Maziak, 2011). Hookah is also called *narghile, argileh, shisha pipe, hubble-bubble*, and *goza*. A *hookah* is a solitary or multi-stemmed device used to smoke tobacco. The *shisha* is warmed in the bowl at the highest point of the hookah and the smoke is filtered through the water in the base of the hookah, giving a cooling impact on the smoke that is breathed in. The client breathes in the water-filtered smoke through a tube and mouthpiece (see Figure 2.8).

Figure 2.8. Picture of Hookah device

Shisha gives a pleasant smell when warmed gradually with consuming charcoal and arrives in an assortment of flavours including apple, strawberry, rose, mango, cappuccino, banana, peach, lemon, orange, mint, and liquorice. Hookah use goes back at any rate 500 years, accepted to have started in India, and is a social convention over the Center East, Persia, Afghanistan, Turkey and the North-Eastern pieces of Africa.

Prevalence studies indicated that there is growing popularity of shisha smoking or hookah use among youth and young adults especially among high school, college and university students in Ethiopia (Binyam, 2012; Dawit, 2011; HAPCO, 2010, 2012) and in many other countries including Malaysia, Australia, Canada, USA, Britain, France, Russia, and also in South East Asia (Al-Naggar & Bobryshev, 2012; Fiala, Morris, & Pawlak, 2012). Hookah smoke contains a high amount of carbon monoxide, nicotine, tar, and heavy metals. Health risks of smoking shisha include lung, mouth, throat, stomach and different tumours; coronary illness; lung harm; and dental ailment (Kadhum, Sweidan, Jaffery, Al-Saadi, & Madden, 2015; Maziak, 2011).

Although youth and young adults recognize hookah use as less harmful than smoking cigarettes (Smith, Curbow, & Stillman, 2007), the combination of charcoal and tobacco makes hookah smoking special. Notwithstanding the wellbeing impacts of tobacco use, the charcoal used to warm tobacco can raise wellbeing dangers by delivering significant levels of carbon monoxide, metals, and malignant growth causing synthetic compounds. Besides, the utilization of shared mouthpieces during smoking sessions can spread irresistible illnesses, for example, tuberculosis, herpes, influenza, and hepatitis. Children born to hookah smoker moms are likewise at expanded hazard for respiratory illnesses (Kadhum et al., 2015).

2.5.1.5 Cannabis /marijuana use

Cannabis is the general term used to describe the psychoactive substance derived from the *Cannabis sativa* plant, which has delta-9-Tetrahydrocannabinol (THC) and related psychoactive substances, which can enhance the senses, distort time, increase the sense of well-being and excitement, and sometimes result in hallucinations. Many recognize cannabis by other names such as marijuana, hashish, dagga, bhang, ganja, weed, pot or reefer, to name just a few (Andrade, Carroll, & Petry, 2013; Budney & Stanger, 2012). The most common method of

administration of cannabis is smoking. The leaves and flower tops of the cannabis plant (see in Figure 2.9) are dried to create a tobacco-like substance that is scorched and the smoke is breathed in or smoked. Gadgets for smoking reach from cigarettes (joints), pipes, water pipes (bongs or hookahs), and most as of late burrowed out stogies that are normally called blunts (Agrawal, Budney, & Lynskey, 2012; Budney & Stanger, 2012; Peters, Budney, & Carroll, 2012, Volkow, Baler, Compton, & Weiss, 2014). *Hashish* is a related item made from the pitch of cannabis blossoms and is commonly smoked (without anyone else's input or in a blend with tobacco) yet can be ingested orally. Marijuana can likewise be utilized to get ready tea, and its oil-based concentrate can be blended into nourishment items (Volkow, Baler, Compton, & Weiss, 2014).

Figure 2.9. Picture of Cannabis Sativa plant

Cannabis is the most widely produced, trafficked, and abused illegal drug worldwide and marijuana use has an annual prevalence rate of nearly 147 million people or nearly 2.5% of the global population (Bridgeman & Abazia, 2017). Marijuana/cannabis contains known toxins and cancer-causing chemicals (WHO, 2007). Some of the short-term effects of marijuana use include palpitations, reddening of the eyes, impaired concentration and hunger (Agrawal, et al., 2012; Budney & Stanger, 2012; Peters et al., 2012; Volkow et al., 2014; WHO, 2007).

Long term nonmedical use of marijuana is associated with a motivational syndrome which may include apathy, impairment of decision-making ability, memory and concentration and loss of interest in personal appearance and pursuit of personal goals (WHO, 2007). It also has detrimental effects on psychomotor activities and complex cognitive abilities such as decision making and problem-solving abilities. Numerous studies also indicate that marijuana smoke is an important risk factor for respiratory disease, addiction, chronic psychosis disorders (including schizophrenia), cognitive impairment, poor educational outcome and diminished life satisfaction (Bryan et al., 2012; Budney & Stanger 2012; Hall, 2010; Vandrey & Mintzer, 2009; Volkow et al., 2014).

Despite these negative health effects of smoking marijuana scientific data indicated the potential therapeutic values of cannabis, primarily THC, for specific medical conditions such as for pain relief, control of nausea and vomiting, reduce addictions and deaths related to pain killers, reductions in hospitalizations related to opioid dependence or abuse and OPR overdose and appetite stimulation (Hill, 2015; Powell, Pacula, & Jacobson, 2018; Shi, 2017). The synthetic cannabinoid nabilone has been accepted for use in cancer patients undergoing chemotherapy (Bridgeman & Abazia, 2017; Scott, Dalgleish, & Liu, 2014). An oro-mucosal spray extract, which contains THC and cannabidiol, is permitted for use to manage some health problems such as muscle spasticity in patients with multiple sclerosis and for neuropathic pain in cancer patients in Canada and New Zealand (Budney & Stanger 2012).

Consequently, the debate in regards to its sanctioning has developed since the early twentieth century to develop globally with still no accord and a resultant wide scope of national and local strategies. Pro-cannabis groups have been calling for decriminalization or legitimization for a long time, with latest efforts coordinated at authorization for medicinal use (Bridgeman & Abazia, 2017; Budney & Stanger 2012). In general, the legality of cannabis for medical as well as recreational use varies from country to country. As of 2016, most countries of the globe such as China, Egypt, France, Indonesia, Japan, Malaysia, Nigeria, Norway, Philippines, Poland, Saudi Arabia, Singapore, South Korea, Thailand, Turkey, Ukraine, the United Arab Emirates and Vietnam have the strictest cannabis laws and use of cannabis was illegal. However, some countries like Uruguay, Spain, Portugal, Netherlands, Czech Republic, Chile, Colombia,

Jamaica, Australia, Canada and some states of USA legalized the use of cannabis under some conditions, especially for medical and personal use.

Ethiopia is not a major producer of illicit drugs and cannabis possession is illegal. However, its location on the trafficking routes from southern Africa and Asia renders it an important link in the international network especially for markets in West Africa, Europe and the U.S.A (Green, 2012). Although little is known about the introduction of cannabis to Ethiopia and its subsequent use, some studies show that it grew wild and its use was limited to monasteries in Ethiopia (Abebaw et al., 2007; Kassaye, Sherief, Fissehaye, & Teklu, 2017). Cannabis is also spread to some parts of the country through tourists and guides who visited the monasteries, as a result, some religious students are said to use cannabis to assist their learning.

It is reported that farmers in some parts of the nation are now cultivating cannabis for business-related purpose and is trafficked across the country to Eritrea, Sudan, Djibouti and Egypt (Abebaw et al., 2007; Kassaye et al., 2017). Cannabis is used by drug traffickers' street children and in school and out of school youths in some parts of the country (Abebaw et al., 2007; Dawit, 2011; Derese, Seme, & Misganaw, 2014; HAPCO, 2010; Kassaye et al., 2017).

It has been shown that youth may become susceptible to HIV infection due to impaired judgments that result in risky sexual behaviours that follow moments of 'clouded consciousnesses associated with drug and alcohol use (CDC, 2012; Lashley &Yearwood, 2011; Miller et al., 2004). For college-level students and youth in general, drug use has also been linked with other negative outcomes, including academic underachievement and dropout, societal problems, negative health effects and drug-related motor accidents.

2.5.2 Risky sexual behaviour

Psychologists and health behaviour researchers have had difficulty in defining the term risky sexual behaviour due to the different dimensions of the behaviours and consequences related to the variable. The main variable that has been used in research to define and measure risky sexual behaviour is sexual risk-taking or unsafe sex or sex without condom use. However, there are a number of different variables that can be used to define risky sexual behaviour, such as the

number of sexual partners, casual or unintended sex with someone whose health status is unknown (Grossman & Markowitz, 2005; Miller et al., 2004), age at first intercourse, level of loyalty in the relationship, and substance-induced sex (Miller et al., 2004).

Risky sexual behaviour in this study is conceptualized as any sexual activity that puts one or both sexual partners at risk of unintended pregnancy, HIV and other sexually transmitted infections. The high-risk sexual behaviours that are used in this study include early initiation of sexual activity, sex with multiple sexual partners, unprotected sex, sex with a casual partner and substance-induced sex (Bryan et al., 2012; CDC, 2012; Miller et al., 2004; Zuckerman & Kuhlman, 2000). These behaviours have consistently been found to increase the risk of HIV and other STIs among the general population, and college students in particular (Alemu et al., 2007; Hong & Paunonen, 2009).

2.6 Personality traits as predictors of risky health behaviours

Our health behaviours can be influenced by a variety of factors. Different theoretical positions (such as the person, situation and person-situation interaction) offer different explanations concerning what factors predict health behaviours. While there are ample evidences on the role of a situation or contextual factors on health behaviours (Kirby, Laris, & Rolleri, 2007; Walsh, Harel-Fisch, & Fogel-Grinvald, 2010), evidence concerning the influence of personality on health behaviours and health outcomes is also rising (Raynor & Levine, 2009; Turiano et al., 2012). Studies attested that personality plays a key role in understanding the interactions between human behaviour and the environment and as a vital predictor in determining the health outcomes of individuals. Our personality traits are those characteristics that account for consistent patterns of thinking, feeling and behaving which affect us in important ways including the way we think and behave about our health (Miller et al., 2004; Raynor& Levine, 2009; Turiano et al., 2012; Vollrath & Torgerson, 2008; Zietsch et al., 2010; Zuckerman & Kuhlman, 2000).

Accordingly, this study reviewed the five broad personality traits – openness to experience, extraversion, neuroticism, agreeableness, and conscientiousness (Costa & McCrae, 1992) to examine which personality traits and to what extent they predict substance use behaviours (like

drinking alcohol, chewing khat, smoking shisha, smoking cannabis/marijuana/and cigarettes) and risky sexual behaviours (which includes sex with many partners, failure to use a condom during sex, sex with a casual partner, sex under the influence of drug or alcohol, and early sexual debut).

2.6.1 Conscientiousness as predictors of substance use and risky sexual behaviours

Conscientiousness is viewed as the dimension of personality strongly associated to individual differences in the tendency to be disciplined, think before acting, goal-oriented, self-controlled, responsible to others, hardworking, orderly, and prefer planned rather than spontaneous behaviour (John & Srivastava, 1999). It represents a personality trait that has been most consistently linked to important health functioning and outcomes throughout the life span (Hampson et al., 2007; Hampson et al., 2013), longevity (Lahey, 2009), and less risky health behaviours (Bogg & Roberts, 2004, 2013; Hong & Paunonen, 2009; Torres, 2006).

Robust empirical findings of cross-sectional studies on the relationship between personality traits and substance use behaviour showed that conscientiousness is negatively associated with smoking cigarettes (Bogg & Roberts; 2004, 2013; Hampson et al., 2007; Hampson et al., 2013; Hong & Paunonen, 2009; Raynor & Levine, 2009; Turiano et al., 2012) and drinking alcohol (Bogg & Roberts, 2004, 2013; Hong & Paunonen, 2009; Raynor & Levine, 2009; Turian et al., 2012).

Some longitudinal studies also proved that childhood conscientiousness was associated with less adulthood smoking and better adult self-rated health (Hong & Paunonen, 2009). Friedman et al. (1995) combined the existing archival data and employed integrative approaches, in which data from different longitudinal studies were statistically combined to address lifespan personality–health relation causal models. They found that conscientiousness has been shown to predict health behaviours like physical health and longevity. These findings add to the growing evidence that childhood personality traits predict adult health outcomes.

Moreover, Turiano et al. (2012) have examined whether alcohol use and smoking behaviour mediate the personality–mortality association through structural equation models and their

finding attested that personality traits predict both health behaviours and mortality risk across the life course and heavy drinking and smoking were found to mediate the conscientiousness–mortality association by 42%.

It is also evident that there are indeed negative relationships between the conscientiousness trait and some forms of risky sexual behaviours. Conscientiousness was negatively related to the use of alcohol or marijuana during sex (Miller et al., 2004), lower level of safer sex (Ingledew & Ferguson, 2007), relationship infidelity (Schmitt, 2004), and sex with individuals other than a regular partner (Schmitt & Shackelford (2008). Other researchers (such as Bogg & Roberts, 2004) also found that conscientiousness is negatively related to all forms of risky health behaviours including drug use, unhealthy eating, risky driving, risky sex, tobacco use, suicide and violence. Bogg and Roberts (2004) and Miller et al. (2004) further pointed out that conscientiousness-related specific traits or facets (such as self-control) were negatively associated with a variety of health-risk activities.

However, some studies (such as Maglica, 2011; Torres, 2006) reported that the relationship between conscientiousness and risky health behaviours is negligible.

2.6.2 Agreeableness as predictors of substance use and risky sexual behaviours

Since an agreeable personality reflects the tendency to be compassionate, well-mannered and cooperative rather than suspicious and antagonistic towards others, it is the most related variable to individuals' health behaviours. Ample evidence signified that, like conscientiousness, agreeableness is negatively associated with cigarette smoking (Atherton, Robins, Rentfrow, & Lamb, 2014; Hampson et al., 2007; Hong & Paunonen, 2009; Maglica, 2011) and with alcohol drinking (Atherton et al., 2014; Raynor & Levine, 2009). Facet level analysis also argued that low straight-forwardness, low compliance and low integrity (agreeableness facets) were related to smoking behaviour (Hong & Paunonen, 2009). Another finding by Torres (2006) indicated that there was a gender difference in the existence of agreeableness trait and its relationship with risky health behaviours. Males were found to be less agreeable compared to females, and thus males tended to be engaged in more violent acts, more tobacco use, and more illegal drug use in general.

There is also evidence that agreeableness is negatively associated with risky sexual behaviours (Ingledew & Ferguson, 2007; Miller et al., 2004; Raynor & Levine, 2009; Schmitt & Shackelford, 2008; Torres, 2006). Miller et al. (2004) reported that the broad dimension of agreeableness has predictive relations with some of the sexual risk behaviours. Low in agreeableness was related to having multiple sexual partners, substance use during a sexual incidence, casual sex (for men only), and sexual debut. Facet level analysis also indicated that while low trust (a facet of agreeableness) was associated with having multiple partners, low straightforwardness was related to substance-induced sex. Moreover, both low trust and low straightforwardness were related to sex with a casual partner. The results suggest that both the broad and the specific dimensions of agreeableness could account for variance in the risky health behaviours.

Schmitt and Shackelford (2008), in their cross-cultural study of personality traits and sexual behaviour, found that low levels of agreeableness have been related to short-term mating behaviours, promiscuity, disloyalty, and the poaching of other people's regular life partners. Their examination additionally uncovered that agreeableness was related to lower short-term mating inclinations at the national level. For instance, in nations where men were disagreeable, short-term mating interest were higher at the national level. Schmitt and Shackelford further pointed out that the most agreeable men were found in Africa (e.g., Ethiopia), and these countries contained men who were exceptionally low in short-term mating interests. Conversely, most disagreeable men were found in Europe and South America and these nations had men who were comparatively high in short-term mating interests. Based on the same data of the International Sexuality Description Project (ISDP), Schmitt (2004) implied that low agreeableness is related to relationship unfaithfulness across almost all world regions.

2.6.3 Extroversion as a predictor of substance use and risky sexual behaviours

Extraversion trait incorporates features like positive emotions, surgency, assertiveness, sociability and talkativeness. This trait refers to the social behaviours of individuals and it has a role in their health behaviours. Most health-related behaviours including risky sexual behaviours and substance use behaviour are practised in company with others. Several studies argued that

extraversion is positively associated with cigarette smoking (Atherton et al., 2014; Hampson et al., 2007; Otonari et al., 2012; Raynor & Levine, 2009), and with alcohol drinking (Atherton et al., 2014; Hampson et al., 2007; Hampson et al., 2013; Hong & Paunonen, 2009; Otonari et al., 2012; Raynor & Levine, 2009). However, several studies (such as Maglica, 2011; Torres, 2006) did not find similar results.

For example, a large-scale survey was conducted by mail on 12,948 cohorts aged 50–74 years by Otonari et al. (2012) in Kyushu University (in Japan) on the association between personality traits and lifestyle-related diseases. The result revealed that extraversion was positively associated with both smoking and alcohol use. A cross-sectional survey conducted on 583 college students by Raynor and Levine (2009), also found that highly extraverted students were more likely to smoke cigarettes and consume alcohol.

Several investigators have found that extraversion is positively associated with risky sexual behaviours (Ingledew & Ferguson, 2007; Miller et al., 2004; Raynor & Levine, 2009; Schmitt & Shackelford, 2008). In their longitudinal study, Miller et al. (2004) found that extraversion was significantly related to three kinds of risky sexual behaviours. Extraversion was positively associated with the number of sexual partners by age 20, substance-induced sex and early sexual debut (for men only). Analysis of extraversion facets indicated that while high activity level was related to substance use in conjunction with sex, high gregariousness and low warmth were associated with having multiple sexual partners. In addition, another two facets of extraversion (high excitement seeking and low openness to fantasy) had a significant correlation with an early sexual debut. The results suggest that the broad domains, as well as the specific facets, of extraversion, could account for variation in the risky sex practices. Using the same data, Schmitt (2004) reported that sexual promiscuity does relate to different personality traits, but it more strongly relates to the broad trait-extraversion. Raynor and Levine's (2009) study on college students also indicated that high extraversion was associated with having multiple sexual partners and being less likely to use condoms.

As part of the international sexuality description project, 13,243 college and community participants from 46 nations (including Ethiopia) responded to self-report measures of

personality and mating behaviour (Schmitt & Shackelford, 2008). The results show that extraversion was positively correlated with interest in short-term mating with casual sex partners, having multiple sexual partners, having engaged in short-term mate poaching attempts, and lacking relationship exclusivity. The study also revealed that in nations with more introverted people, such as South Korea, Hong Kong, Japan, and Ethiopia, short-term mating tends to be lower. This result was consistent among men and among women, and within nations and across nations.

However, some studies (such as Maglica, 2011; Torres, 2006) did not find similar results. For instance, the hierarchical regression analysis results of Maglica's (2011) study on 341 high school students show that extraversion does not contribute substantially to the explanation of risky sexual behaviours.

2.6.4 Neuroticism as a predictor of substance use and risky sexual behaviours

Costa and McCrae (1992) defined neuroticism as a tendency to experience unpleasant emotions easily, such as anger, sadness, anxiety, guilt, depression, and vulnerability. Those who score high on this negative affect domain are more likely to consume more substances as a means to reduce negative emotions or increase positive states of feelings. Growing pieces of evidence show that neuroticism is positively associated with cigarette smoking (Lahey, 2009; Mroczek, Spiro, & Turiano, 2009; Raynor & Levine, 2009), with alcohol drinking (Lahey, 2009; Mroczek et al., 2009), and with risky sexual behaviours (Lahey, 2009; Schmitt & Shackelford, 2008). Based on his analysis of archival data, Lahey (2009) reported that there is a link between neuroticism and physical health and the link is through behaviours that increase the risk for health problems such as smoking cigarette, drinking alcohol, use of other drugs, and unprotected sex or risky sexual behaviours.

Based on the result obtained from a self-report measure of personality and mating behaviour conducted on 13,243 college and community participants in 46 nations, neuroticism was associated with short-term mating, but the link was less consistent across sex and nation (Schmitt & Shackelford, 2008). Countries with people high in neuroticism were found to have lower short-term mating tendencies. However, gender differences were observed in which women's

neuroticism was linked with higher short-term mating compared to men. When compared across countries, in North America, Western Europe, the Middle East, and Oceania, neuroticism was associated with increased short-term mating only among women. In contrast, neuroticism was related to decreased short-term mating among women and men in Eastern Europe. More neurotic men from the Middle East and Africa were more oriented toward short-term mating.

However, several studies (e.g., Hong & Paunonen, 2009; Maglica, 2011; Miller et al., 2004; Otonari et al., 2012; Schmitt, 2004; Torres, 2006) have failed to replicate the aforementioned associations. For example, while Otonariet et al. (2012) found that neuroticism was positively associated with smoking but unrelated to alcohol use, Torres (2006) reported that there were no statistically significant associations between sexual risk behaviour and neuroticism. In sum, the studies mentioned above highlight significant disparities in findings regarding the links between neuroticism and sexual risk behaviours.

2.6.5 Openness to experience as predictors of substance use and risky sexual behaviours

Basically, openness to experience trait involves an appreciation for art, adventure, emotion, curiosity, unusual ideas, and variety of experience. Because openness reflects the extent of mental curiosity, creativity and a preference for novelty and variety a person has, in most studies this trait related to academic and other intellectual achievements rather than health behaviours. Most studies (such as Hong & Paunonen, 2009; Schmitt, 2004*)* found no significant association between openness to experience and risky health behaviours.

However, some other studies reported inconsistent significant associations between openness and sexual risk behaviour. For example, Miller et al. (2004) and Ingledew and Ferguson (2007), reported that openness to experience was inversely related to risky sexual behaviours. They also found that low openness to experience, characterized by being conservative and traditional in regard to their political, religious, and family-related views, was related to several sexual behaviours including having sex without using a condom and having sex at an early age (for men only). Low levels of fantasy (a facet of openness) were related to early sexual debut. In contrast, while Turiano et al. (2012) found positive predictive relationships between higher levels of

openness and longitudinal substance use, Schmitt and Shackelford (2008) found a positive association between openness to experience and risky sexual behaviours.

Another study on 46 nations by Schmitt and Shackelford (2008) found a positive association between openness to experience and short-term mating with casual partner/s, but the links were inconsistent across sex and nation. For example, in countries where highly open men reside, there was a tendency for men to have higher short-term mating interests and higher socio-sexuality. In nations where highly open women reside, there was a tendency for women to have higher short-term mating interests and higher socio-sexuality. However, among North American men - only openness was negatively associated with all measures of short-term mating. North American women exhibited a different pattern. Those women who were higher on openness were more likely to manifest interest in short-term mating and unrestricted socio-sexuality.

2.6.6 Summary

Although there are some inconsistencies, the findings have thus indicated that conscientiousness is often negatively associated with substance use behaviours including drinking alcohol, smoking cigarettes and using marijuana and risky sexual behaviours such as unsafe sex, relationship infidelity, sex with a non-regular partner and using substances during sex. Like conscientiousness, agreeableness is negatively associated with drinking alcohol, smoking tobacco, the use of other drugs, having unsafe sex, sex with multiple partner sexual intercourse at an early age, promiscuity, relationship infidelity and substance use during sexual intercourse. Findings also reported gender differences in the prevalence and association of agreeableness and health risk behaviours. Males were found to be less agreeable than females, thus males tended to be involved in more violent acts, more tobacco use, more illegal drug use and risky sexual behaviours.

Extraversion and neuroticism traits, in contrast, are often positively associated with the use of substances such as tobacco and alcohol and with risky sexual behaviours like using marijuana or alcohol during a sexual encounter, early sexual debut, sexual promiscuity, having multiple sexual partners, and having unprotected sex. While most studies reported negligible/insignificant association between openness and health risk behaviours, few studies reported significant

negative relationships with risky sexual behaviours like having unprotected sex and having sex at an early age and significant positive association with other types of risky sexual behaviour such as short-term mating with casual partners.

2.7 Interrelationships among substance use and risky sexual behaviours

Both substance use behaviour and risky sexual behaviour are broad constructs that cannot be observed or measured directly. Thus, the interrelationship among some indicators/observed variables of substance use behaviour such as consumption of alcohol, cannabis, khat, and tobacco and some indicator variables of risky sexual behaviour like having multiple sexual partners, sex under the influence of alcohol or drug, unprotected sex, early sexual debut, and sex with a casual partner has been examined.

There are contradictory research findings on the relationships between substance use and risky sexual behaviour variables. While most researchers found evidence associating alcohol and drug use with increased risky sexual activity among adolescents and young adults (Hibret et al., 2007; Choudhry, Agardh, Stafström, & Östergren, 2014; Desale, Argaw, & Yalew, 2016; Ritchwood, Ford, DeCoster, Sutton, & Lochman, 2015; Tadesse & Yakob, 2015), other studies (e.g., Grossman & Markowitz, 2005; Rees, Argys, & Averett, 2001) reported that a causal relationship between substance use and risky behaviours is unlikely. Some other literature (e.g., Sen, 2002), suggests that the impact of substance use on the likelihood of engaging in sexual intercourse depends on how much alcohol or drugs one consumes. The above research reports are indicators of vast and debating literature in the field concerning the association between substance use and risky sexual behaviours. Thus, specific reviews on the nature of the relationship among different types of substance use behaviours and varied forms of risky sexual behaviours are presented in the following subsections.

2.7.1 Drinking alcohol and risky sexual behaviours

Alcohol is a psychoactive substance that produces dependency. Harmful use of alcohol ranks among the top five risk factors for disability, disease, and death among the world population (WHO, 2014). Studies examining the interrelationship among drinking alcohol and other risky

health behaviours show that there is ample evidence that supports the link between alcohol consumption and risky sex. For instance, using a review of the past 10 years' research done on college students drinking alcohol and getting involved in risky sex behaviours, Cooper (2002, 2006) found that drinking alcohol has a strong link with the decision to have sex and to indiscriminate forms of risky sex (e.g., having casual or many sex partners), and unprotected sexual behaviours (e.g., inconsistent or no condom use) in both between-persons and within-persons analyses. Similarly, other studies (such as Alebel et al., 2016; Choudhry et al., 2014; Grossman & Markowitz, 2005; Ritchwood et al., 2015, & Tadesse & Yakob, 2015; Yeshalem & Yemane, 2014), reported that adolescents' heavy drinking is associated with risky sexual behaviours like sex with many partners, sex with casual partners and having unprotected sex.

A study conducted in Bahir Dar town, Northwest Ethiopia argued that alcohol intake was significantly associated with having sex with a non-regular sex partner (Derege et al., 2005; Hibret et al., 2007). Similarly, other survey studies found that the use of alcohol was significantly associated with different forms of risky sexual activities (Abebaw et al., 2007; Derese et al., 2014; HAPCO, 2010, 2012; Tadesse & Yakob, 2015; Teshome & Gedif, 2013).

The subset of data from 2,712 sexual events of 251 women bar drinkers indicated that women tended to engage in risky sex when drunk prior to sexual incidence (Parks, Collins, & Derrick, 2012). Despite the inconsistency of pieces of evidence, a widely accepted causal interpretation of the relationships between drinking alcohol and risky sexual behaviours prove that substance use (liquor use specifically) has a disinhibiting impact on sexual conduct. The most predominant suppositions are that substance use increases one's odds of engaging in intercourse, enhances the sexual involvement in some way, or potentially supports sexual risk behaviours that put one in danger for explicitly transmitted contaminations (Cooper, 2006).

While the past investigations have discovered critical relations between drinking liquor and hazardous sexual conduct, the accompanying examinations raise a question about the connection between the factors. An examination by Rees et al. (2001) inspected the impacts of liquor use on the sexual acts of secondary school age youngsters and discovered little proof to propose that substance use affects the likelihood of being sexually active and the likelihood of having unsafe

sex. In particular, they show that, for females, intoxication has no effect on the likelihood of engaging in sexual relations and utilizing condoms. For guys, intoxication has no effect on the likelihood of engaging in sexual relations, however, it might prompt a higher likelihood of having unsafe sex.

Following Rees et al.'s (2001) findings, Sen (2002) used bivariate probity to separate the samples by gender and concluded that any alcohol use increases the chance of sexual encounter and unsafe sex for both genders but does not necessarily imply that drinking alcohol causes risky sexual behaviours. In contrast, Bailey, Gao, and Clark (2006) and Leigh, Vanslyke, Hoppe, Rainey, Morrison, and Gillmore, (2008) examined the relationship between drinking alcohol prior to intercourse and condom use among adolescents and did not find a significant link between drinking alcohol and risky sexual behaviours.

2.7.2 Cigarette smoking and risky sexual behaviours

Nicotine is one of the chemicals in cigarettes and it's smoke. It is this chemical that makes *tobacco* addictive or habit-forming. Although, smoking cigarettes/tobacco is associated with adverse health outcomes, including cancer and other respiratory diseases (Warren, Alberg, Kraft, & Cummings, 2014; WHO, 2014), there are some research pieces of evidence on the causal relationship between smoking cigarettes and risky sexual behaviours. However, some studies have found significant associations between cigarette smoking and risky sexual behaviours. The result of a cross-sectional survey carried out on a randomly selected 725 undergraduate students in Haramaya University (Eastern Ethiopia), revealed that smoking cigarettes was significantly associated with risky sexual activities (Derese et al., 2014). A review of national studies also indicated that cigarette smoking is associated with risky sexual behaviours (HAPCO, 2012). Dawit's (2011) survey on Addis Ababa city high school students revealed that 47.3% of sexually active students had had sexual intercourse without condoms. Among those students who have had sexual intercourse without condoms, 21% were cigarette smokers. However, Grossman and Markowitz (2005) using archival data reported that the relationship between the two variables is debatable in the sense that cigarette smoking cannot be related to a temporary lapse in judgments.

2.7.3 Cannabis /marijuana/ hashish use and risky sexual behaviours

Cannabis consists of cannabinoids or psychoactive substances that can enhance the sense of well-being and excitement, and occasionally result in hallucinations and impaired judgments (Atalay et al., 2006; Hibret et al, 2007). There are also ample evidences supporting the association between cannabis use and some forms of risky sexual activities (Abebaw et al., 2007; Andrade et al., 2013; Bryan, Schmiege, & Magnan, 2012; Lashley & Yearwood, 2011; Parks et al., 2012; Ritchwood et al., 2015; Tadesse & Yakob, 2015; Walsh, Fielder, Carey, & Carey, 2014). The result of a longitudinal study on 728 adolescents indicated that greater marijuana use was associated with a decline in condom use both at global and at the event level (Bryan et al., 2012). Similarly, Grossman and Markowitz (2005) and Lashley and Yearwood (2011) reported that adolescents' cannabis and other illegal drugs use is associated with risky sexual behaviours like sex with many partners, sex with casual partners and having unprotected sex.

Sex difference in the relationship between cannabis use and risky sex was observed in a study by Parks et al. (2012). Using the subset of data included 2,712 sexual events from 251 women bar drinkers aged 18–30, Parks et al. found that women were more likely to engage in risky sex (failure to use a condom) on days when they had marijuana-induced sexual activity. This gender difference may also imply the complex feature of the interrelationship between substance use and risky sex.

However, studies by Rees et al. (2001) and Voisin et al. (2007) examined the effects of marijuana use on the sexual practices of adolescents and found no evidence to suggest that marijuana use has a causal impact on the likelihood of being sexually active and the chance of having sex without a condom.

2.7.4 Shisha smoking and risky sexual behaviours

While flavoured tobacco is the most commonly used substance, hashish/cannabis and other non-tobacco products are also substances consumed during shisha smoking (Sutfin, Song, Reboussin, & Wolfson, 2014). As shisha consists of cannabis and other substances, chronic use of shisha may impair perception, memory and judgments which have many forms of negative health

consequences. The association between smoking shisha and risky sexual behaviours is not well researched. However, there are some studies indicating that there is a link between smoking shisha and unprotected sex. For instance, the report by HAPCO (2010), indicated that shisha use substantially and significantly related to less use of condoms compared with those who do not use shisha. Dawit and Teferi's (2013) survey on Addis Ababa city high school students also identified that 47.3% of sexually active students had sexual intercourse without condoms and among those students who had sexual encounter without condoms, 20% were shisha smokers. Similarly, other studies supported the association between smoking shisha and risky sexual behaviours (Alamrew, Bedimo, & Azage, 2013; Negeri, 2014; Tadesse & Yakob, 2015).

2.7.5 'Khat' chewing and risky sexual behaviours

Khat contains two alkaloids – cathinone and cathine – which act as stimulants. Khat consumption induces mild euphoria and excitement. Khat can induce manic behaviours and hyperactivity, similar in effects to those produced by amphetamine (Abebaw et al., 2007; Dawit et al., 2005; Derege et al., 2005). Some empirical pieces of evidence point out that chewing khat has significant effects on different forms of risky sexual behaviours. For example, a cross-sectional study conducted on 628 out-of-school youths aged 15-24 years, in Bahir Dar town (Northwest Ethiopia), indicated that chewing khat was significantly associated with having sex with either a commercial or a non-regular sexual partner (Agegnehu et al., 2015; Andualem et al., 2014; Hibret et al., 2007). A national studies review by HAPCO (2010, 2012) and Abebaw et al. (2007), demonstrated that khat use substantially and significantly increases the likelihood of having multiple sexual partnerships; those who chew khat are about twice more likely to have multiple sexual partners than those who do not chew khat. Condom use is less by at least 50% among khat users than those who do not chew. Similarly, other national surveys indicated that use of khat has significant associations with risky sexual activities, especially with unprotected sex (Agegnehu et al., 2015; Alebel et al., 2016; Andualem et al., 2014; Derege et al., 2005; Elias, 2014; Likawunt & Mulugeta, 2012; Gezahegn et al., 2014; Tadesse & Yakob, 2015; Trhas, Zelalem, & Tigist, 2016; Yeshalem & Yemane, 2014).

In sum, although the results from the studies explained above highlight some variations in findings regarding the causal relationship between substance use and risky sexual behaviour, almost all studies argue that there are positive associations between substance use and risky sexual behaviours.

2.8 Summary

There was debate among psychologists on whether the environment or personality predicts health behaviours. However, today most personality and health psychologists turned their face towards the interactionist view which assumes that both the person and the environment and their interaction play a vital role in determining the health behaviour of individuals. At least, in part, personality differences best explain inter-individual variations in health behaviour at a given situation, and the environment best explains intra-individual variations in health behaviour across situations. Because of its primary purpose to explain students' variation in risky health behaviours, this study reviewed models and theories explaining the role of personality on health behaviours. Although there are different approaches in personality psychology, the study emphasized a trait approach in personality, which attributes individual differences to variation in relatively stable internal characters or dispositions.

The trait approach to personality is built on the assumption that personality characteristics are relatively stable across time and situations and govern the day to day behaviours of individuals. There are different classifications of personality traits. However, this study focused on Costa and McCrae's (1992) five broad dimensions or traits of personality namely neuroticism, extraversion, openness, agreeableness and conscientiousness which are assumed to predict health behaviours. While some models and theories of personality and health such as the health belief model (HBM), theory of reasoned action (TRA), and theory of planned behaviour (TPB) presuppose the indirect role of personality traits on health behaviours and outcomes, the reciprocal determinism view of social cognitive theory (SCT), problem behaviour theory (PBT) and the five-factor model (FFM) of personality hypothesize that personality traits directly influence health behaviours.

There are robust research findings concerning the relationship between the five broad traits of personality and risky health behaviours. Most empirical studies argued that conscientiousness and agreeableness were negatively associated with different types of substance use behaviours (such as drinking alcohol, drug use and cigarette smoking) and risky sexual behaviours (such as inconsistent condom use, having many sexual partners, and sex with casual partners). Neuroticism and extroversion were found to be positively related to substance use and risky sexual behaviours in the majority of studies. Openness was an equivocal correlate of risky health behaviours. In addition to the five broader traits, some specific traits such as impulsiveness and sensation-seeking (indicators of low conscientiousness and high in extraversion and neuroticism), were positively and consistently associated with substance use and risky sexual behaviours.

The previous explorations are supportive of a growing body of evidence indicating that personality traits can best explain health behaviour differences among individuals. Although there were some inconsistencies, especially in the study of Schmitt (2004) and Schmitt and Shackelford (2008), in terms of the relationship between some personality traits (such as neuroticism and openness) and risky sexual behaviours across sex and world region, these pieces of literature may also suggest that the reason why cultures vary in the personality traits distribution, personality correlates of risky health behaviours, and why some traits appear to relate more consistently to risky sexual behaviours, are other important areas for future research.

CHAPTER THREE

RESEARCH METHODS

3.1 Purpose of the study and hypotheses

The present study aims to investigate the prevalence of substance use and risky sexual behaviours, the predictive relationships between personality traits and substance use as well as risky sexual behaviours of students in Ethiopian universities. The research questions (as set out in Chapter 1) were explored at the hand of the following hypotheses:

H1: There is a high prevalence of substance use behaviours among a sample of Ethiopian university students.

H2: There is a high prevalence of risky sexual behaviours among a sample of Ethiopian university students.

H3: Personality traits significantly predict substance use behaviour.

H4: Personality traits significantly predict risky sexual behaviour.

H5: Substance use behaviour has a significant mediating effect on the predictive relationships between personality traits and risky sexual behaviours.

H6: There is gender disparity/moderation in the predictive relationship among personality traits, substance use and risky sexual behaviours.

3.2 Research design

A quantitative, cross-sectional research design was employed to test the hypotheses of the study. A cross-sectional research design was preferred as it allows to make inferences about a population based on self-report data collected at one point in time. A questionnaire was utilised to collect the data.

3.3 Population and sampling

The target population of this study was regular undergraduate program students of Ethiopian public universities. Out of the total of 379,389 (252,716 males and 126,673 females) undergraduate regular program students in 43 Ethiopian public universities in the 2017/2018 academic year, a sample of 2,620 students were selected from five universities through multistage sampling.

Concerning the sample size determination, in structural equation modelling (SEM), maximum likelihood (ML) estimation follows N:q rule where N is the number of cases and q is the number of model parameters (Kline, 2016). An ideal respondents-to-parameters ratio would be 20:1 and the less ideal would be an N:q ratio of 10:1 (Byrne, 2016; Kline, 2016). In addition, Hair, Black, Babin, and Anderson (2014) suggested that the required sample size for SEM must consider model complexity (number of indicator variables in the study and number of parameters to be estimated), the nature of data, and the estimation method used. They suggested that the larger the sample size, the more accurate and stable the parameter estimates of the population would be for statistical inferences. When the data depart more from the assumption of multivariate normality, the samples to parameters proportion shall be higher. In this study, the initial (hypothesized) model had 131 parameters to be estimated. Thus, the ratio of sample to parameters to be estimated was 2610:131 (almost 20 respondents per parameter estimates), which is a maximum sample-parameter ratio and could satisfy the large sample requirement of non-normal data.

As the current study included non-normal data, it should be mentioned that researchers are always encouraged to provide sufficient sample size (greater than 2,500) to minimize the sampling error's impact and to undertake other alternative estimation techniques such as asymptotic distribution-free (ADF) which was specially designed for non-normal data but works poor with sample sizes less than 2,500 (Brown, 2015; Byrne, 2016; Hu & Bentler, 1999; Ullman & Bentler, 2013). Furthermore, the bootstrapping approach (with AMOS) does not work well with small samples (Byrne, 2016; Ichikawa & Konishi, 1995; Nevitt & Hancock, 2001; Yung & Bentler, 1994). Thus, the fairly large sample size (N = 2610) used in the current study also fulfilled the requirements of non-normal estimation methods and bootstrapping techniques. Table 3.1 presents the number of proportionally selected samples based on their gender and university.

Table 3.1 *Respondents by Gender and their Respective Universities (N = 2620)*

Name of participants' universities	Total no. of undergraduate regular program students	No. of participants (n)
Bahir Dar University	22876 (11952 M, 10924 F)	829 (433 M, 396 F)
Debre Berhan University	11758 (7268 M, 4490 F)	426 (263 M, 163 F)
Dilla University	14069 (9090 M, 4979 F)	510 (330 M, 180 F)
Dire Dawa University	10121 (6470 M, 3651 F)	367 (235 M, 132 F)
Wollo University	13467 (8020 M, 5447 F)	488 (291 M, 197 F)
Total	72291 (42800 M, 29491 F)	2620 (1552 M, 1068 F)

Out of 43 Ethiopian public universities divided into five clusters, five universities were selected using cluster sampling (one university from southern, one from northern, one from eastern, one from western and one from central Ethiopian universities). One university from each cluster was selected using a simple random sampling or lottery method. The clustering of universities was made by considering their differences in geographical location, access for substances and the culture of the society in which the universities were located.

Because the number of departments in universities was very large, it was impossible to select samples from all departments. Thus, only some departments were chosen from strata or colleges and faculties through the application of a stratified random sampling method. In applying stratified random sampling, first the sub-total number of samples to be chosen from each sample university, faculty and department were determined based on proportion or balance. After determining the number of departments required from each college and faculties, the name of departments in a college were written on small papers and then papers were rolled and put in a container. After shuffling the rolled papers in the container, the required numbers of departments were drawn from the container (Singh, 2007). And similar procedures were applied for other colleges and faculties. Students of all batches (from the first year to 5th year) from the selected departments were represented in the study.

Finally, individual samples from the identified departments and classes were drawn using systematic random sampling. In applying systematic random sampling, the actual list of students was taken from the departments. Then, by dividing the total number of students to the required number the lists were divided into classes or intervals where after one student from the first interval was selected using the lottery method and then the nth students from subsequent intervals were drawn. However, among the selected participants, those who were not prepared to participate in the study were not forced to participate in the study for ethical reasons.

3.4 Variables of the study

The study consisted of both latent and indicator or observed variables. The five personality traits (neuroticism, extraversion, openness, agreeableness, and conscientiousness) were included as a latent predictors/exogenous variables or factors. From the Benet-Martínez and John's (1998) big five inventory (BFI), 44 items were used as indicators of the latent personality factors (8 items for extraversion, 9 for agreeableness, 9 for conscientiousness, 8 for neuroticism, and 10 items for openness).

Substance use and risky sexual behaviour were included in the study as latent outcome variables. Under substance use behaviour, there were five indicator variables (chewing 'khat', drinking alcohol, smoking shisha, smoking cigarettes, and smoking marijuana). Risky sexual behaviour consisted of five indicator variables – the number of sexual associates, substance-induced sex, unsafe sex or sex without a condom, sex with a non-regular partner, and age at the first sexual encounter.

Substance use behaviour was also studied as a mediator variable in examining the predictive association between personality traits and risky sexual behaviours. Substance use behaviour was studied as a mediator variable for personality traits and was proposed to have both direct effect and indirect effect (through substance use behaviours) on risky sexual behaviours. Gender/sex was studied as a moderator variable.

3.5 Measuring instruments

A self-report questionnaire composed of open and close-ended items was used to collect the relevant data. A questionnaire was developed by reviewing pertinent literature and previously utilised standardized tools and procedures.

3.5.1 Demographic profile

The demographic profile of students (such as sex, age, the name of the university and year of study) was obtained with open-ended and closed items (see Appendix D, Section I).

3.5.2 Personality trait measure

Trait researchers typically rely on self-report assessment procedures in their work (Burger, 2011). One of the most widely used self-report personality trait measuring instruments is the Costa and McCrae (1992) NEO-PI-R test. The original version of Costa and McCrae's (1992) NEO-PI-R consists of 240 items (48 for each of the dimensions – openness to experience, extraversion, neuroticism, agreeableness, and conscientiousness). The internal consistency of the scale is .86 to .95 for the domain scales. However, many contemporary trait researchers developed and used short versions of the NEO-PI-R. For example, Costa and McCrae's (1992) 60-item NEO Five-Factor Inventory [NEOFFI-60], Goldberg's (1992) International Personality Item Pool [IPIP-50], and John, Donahue, and Kentle's (1991) 44-item Big Five Inventories [BFI-44] are some of those brief versions. For the purpose of this study, John et al.'s (1991) 44-item BFI [BFI-44] was utilized. The 44-item BFI was designed to be a short, efficient and non-commercial research measure of the five factors of personality (Benet-Martínez & John, 1998; John & Srivastava, 1999; Schmitt, 2004; Soto & John, 2009; Thalmayer, Saucier, & Eigenhuis, 2011).

Researchers like Benet-Martínez and John (1998), John and Srivastava (1999), Schmitt (2004) and Soto and John (2009) suggested that when respondents have ample time, are well educated and need meaning and knowledge out of the test, and the instrument needs for the measurement of many aspects for each of the big five, then the full 240-item NEO PI-R is more essential. Otherwise, the 44-item BFI is recommended to assess the core attributes of the big five traits that

is at least as efficient and easily understood. Both tools are assessing fundamentally the same dimensions of personality traits, but their classification of this range is to some extent different. In this study, the 44-items BFI has been used to score the five broad personality domains.

Sample items from the BFI include 'I see myself as someone who is friendly, outgoing' (i.e., extraversion), 'I perceive myself as somebody who is supportive and generous to others' (i.e., agreeableness), 'I perceive myself as somebody who is a dependable worker' (i.e., conscientiousness), 'I perceive myself as somebody who worries a lot' (i.e., neuroticism), and 'I perceive myself as somebody who is inquisitive about many different things', which measures openness (Schmitt, 2004; Schmitt, Allik, McCrae, & Benet-Martínez, 2007). See Table 3.2 and Appendix D, Section II for a complete list of items.

Table 3.2 *The Five Traits of Personality with their Respective Indicator Items*

Traits	Indicators (items)	Traits	Indicators (items)
I. Extraversion	1. Is talkative	IV. Neuroti-cism	4. Is depressed, blue
	6. Is reserved		9. Is relaxed, handles stress well
	11. Is full of energy		14. Can be tense
	16. Generates a lot of enthusiasm		19. Worries a lot
	21. Tends to be quiet		24. Is emotionally stable, not easily upset
	26. Has an assertive personality		
	31. Is sometimes shy, inhibited		29. Can be moody
	36. Is outgoing, sociable		34. Remains calm in tense situations
I. Agreeableness	2. Tends to find fault with others		
	7. Is helpful and unselfish with others		39. Gets nervous easily
	12. Starts quarrels with others	V. Openness	5. Is original, comes up with new ideas
	17. Has a forgiving nature		
	22. Is generally trusting		10. Is curious about many different things
	27. Can be cold and aloof		
	32. Is considerate and kind to almost everyone		15. Is ingenious, a deep thinker
			20. Has an active imagination
	37. Is sometimes rude to others		25. Is inventive
	42. Likes to cooperate with others		30. Values artistic, aesthetic experiences
II. Conscientious-	3. Does a thorough job		
	8. Can be somewhat careless		35. Prefers work that is routine
	13. Is a reliable worker		40. Likes to reflect, play with

ness	18. Tends to be disorganised		ideas	
	23. Tends to be lazy		41. Has few artistic interests	
	28. Perseveres until the task is finished		44. Is sophisticated in art, music, or literature	
	33. Does things efficiently			
	38. Makes plans and follows them through			
	43. Is easily distracted			

Note. BFI scale scoring ("R" denotes reverse-scored items)

     Extraversion: 1, 6R, 11, 16, 21R, 26, 31R, 36
     Agreeableness: 2R, 7, 12R, 17, 22, 27R, 32, 37R, 42
     Conscientiousness: 3, 8R, 13, 18R, 23R, 28, 33, 38, 43R
     Neuroticism: 4, 9R, 14, 19, 24R, 29, 34R, 39
     Openness: 5, 10, 15, 20, 25, 30, 35R, 40, 41R, 44

The self-report ratings were made on a scale ranging from 1 (disagree strongly) to 5 (agree strongly) for every one of the 44 items. This self-report tool was utilised due to its briefness and ease for management and it has proven usefulness for cross-language and cross-cultural research (Benet-Martínez & John, 1998). The BFI was translated from English into 29 languages and administered to 17,837 participants from 56 countries involving Ethiopia from the African continent. The five personality traits scale demonstrated high levels of internal consistency across world regions (Rammstedt & John, 2007; Schmitt, 2004; Soto & John, 2009; Soto et al., 2011). The two independent assessment tools of the big five (the BFI and the NEO-PI-R) displayed reasonable cross-cultural agreement (Schmitt, 2004; Soto et al., 2011).

According to John and Srivastava (1999), the original (English version) Five Factors scales of personality had reliabilities of .88, .79, .82, .84, and .81 for extraversion, agreeableness, conscientiousness, neuroticism, and openness respectively. On the study conducted across 56 nations and 10 world regions, the internal consistencies of the BFI scales (using Cronbach's itemized alpha coefficient) across different societies were .77, .70, .78, .79, and .76 for extraversion, agreeableness, conscientiousness, neuroticism, and openness respectively (Schmitt et al., 2007).

The reliability of the scales translated into Amharic language and administered in this study has reliability .909, .940, .931, .935, and .924 for extraversion, agreeableness, conscientiousness,

neuroticism and openness respectively, which was higher than the original scales and the reliability of the scales that had been translated to different languages and administered in different cultures including Ethiopia (Schmitt et al., 2007).

3.5.3 Substance use behaviour measure

In the current study, five substance use behaviours (drinking alcohol, chewing 'khat', smoking cigarettes, smoking 'shisha', and using marijuana) were measured. The substance use behaviour questionnaire was adapted from the Centers for Disease Control and Prevention (CDC) (2012) and Zuckerman and Kuhlman's (2000). It consisted of yes/no items and Likert type items. The original survey instruments cover many different health risk behaviours, but for this study, the researcher only used items concerning the behaviours of interest like tobacco use, alcohol use, marijuana and other drug use. The internal reliability of substance use behaviour was .65 (Zuckerman & Kuhlman, 2000).

The substance use items were designed to assess both the lifetime and current (the recent 30 days) prevalence. This timeline was chosen because it corresponded most closely to recent illegal drug and alcohol use studies questions (Grossman & Markowitz, 2005; WHO, 2004). To assess the participants' lifetime experience of using alcohol and drugs, they were required to answer the 'yes/no' questions, "During your life, have you ever consumed alcohol, shisha, khat, cigarette and marijuana (for each type of substances separately)?" Respondents past 30 days experience (current use and experience) was assessed by asking the question, "During the past 30 days, how many times have you used alcohol, shisha, khat, cigarette and marijuana (for each type of substances separately)?" Respondents could choose between responses ranging from 0 days (1), 1 or 2 days (2), 3 to 5 days (3), 6 to 9 days (4), 10 to 19 days (5), 20 to 29 days (6), to all 30 days (7). See Appendix D, Section III for the substance use behaviour measuring instrument.

3.5.4 Risky sexual behaviour measure

The risky sexual behaviour questionnaire was adapted from the work of Miller et al. (2004). It consisted of 'yes/no' items and Likert scale type items. The original survey instruments covered many different health risk behaviours, but for this study, the researcher used only questions

concerning the behaviours of interest which include the number of sexual partners, sex under the influence of alcohol or drugs, sex without a condom, sex with casual partners, and early sexual debut. The internal reliability of the risky sexual behaviour questionnaire was .65 (Zuckerman & Kuhlman, 2000).

Sexual behaviour items were designed to assess both the lifetime and current (the last three months) experiences. This time period was chosen because it corresponds most closely to recent youths' risky behaviour survey questions (Grossman & Markowitz, 2005; WHO, 2004). Participants' lifetime and current sexual experiences were assessed using two independent 'yes/no' questions – "Have you ever had sexual intercourse in your lifetime?" and "Have you had sexual intercourse in the past three months?" Specific sexual experiences were measured as follows:

a) *The number of sexual partners was assessed* using an item asking, "During your life, how many sexual partners have you had sexual intercourse with?'' Responses ranged from 1 to 5, 1 indicated that the participant did not have sex before, 2 = one person, 3 = two persons, 4 = three persons and 5 = four or more partners.

b) *Sex under the influence of drugs or alcohol* was assessed by asking, "How often do you drink alcohol or use drugs before you have sexual intercourse?"Alternative answers ranged from never (0) to always (5).

c) *Sexual intercourse without a condom* was assessed by asking, "How often do you have sex without a condom?" The alternative answers ranged from never (0) to always (5).

d) *Sex with a casual partner* was assessed by asking, "How often do you have sex with a casual partner whose health status is unknown or anyone other than your main partner?'' The responses ranged from never (0) to always (5).

e) *Early sexual debut:* Respondents' age at first sexual intercourse was asked using the question, "How old were you when you had sexual intercourse for the first time?" Alternative responses included: at 14 years old or younger (1), at 15 years old (2), at 16 years old (3), at 17 years old

(4), at 18 years old or older (5), and I have never had sexual intercourse before (6). During analysis, the scores were reversed to indicate that sexual intercourse at 14 years old or younger is the highest-risk sexual behaviour and never had sexual intercourse (abstinence) is the least risky sexual behaviour.

3.6 Translation, back translation, pilot test and validation of instruments

3.6.1 Translation

Since Amharic is a national and official language for university-level students in Ethiopia, the Amharic language version of the questionnaire was administered. The original English version of the instruments was translated from English to Amharic using Cicchetti's (1994) and Van Widenfelt, Treffers, Beurs, Siebelink, and Koudijs' (2005) four-step translation procedures. First, each scale was translated by three independent bilinguals from a different educational field of studies (from English language, psychology and public health). Three of them were Master's Degree holders and PhD candidates in their respective fields of study. Second, the three Amharic versions of the scales were compared, and then potential differences were corrected through group discussion. The consensual item would contain culture appropriate words, meanings, sentence structures and expressions. Third, three other bilinguals from similar disciplines carried out back translations from Amharic to the English language. This was then followed by group discussion until consensus was reached. Finally, the original and back-translated versions of each scale were cross-checked, before the provisional forward translation of the Amharic version was pilot-tested.

3.6.2 Pilot test

As a prerequisite to the actual study, a pilot test was carried out on 270 members of the relevant population to ensure the clarity of instructions, questions, and scale items and evaluate the validity and reliability of the questionnaire translated into the Amharic language. Participants of the pilot study were selected from two universities (Debre-Berhan University and Bahir-Dar University) and later excluded from the final study. Participants of the pilot study on average took 20-25 minutes to complete or filling out and returning the questionnaires.

After completion of the pilot data collection process, the analysis was done by considering both written and oral comments. During analysis, the parametric properties of item responses and the internal consistency of the scales (Cronbach's alpha) were assessed for all measurement scales and corresponding sub-scales using SPSS V-20. The following basic findings of the pilot study had direct implications for the actual study. The non-normal psychometric property of the pilot data suggested the appropriateness of using a large sample size for the actual study, which was necessary to try out different estimation methods and bootstrapping techniques to manage non-normality. The reliability of all measured scales was Cronbach's alpha coefficients of 0.7 and above which deemed acceptable. However, based on the results of the reliability test, minor improvements/rephrasing without changing the main contents were made on items with low or negative item-total correlation indexes. Modifications and clarifications were made to the instructions based on the obtained oral and written feedback. Other relevant feedback such as feasibility in terms of time, cost and manpower were obtained and used as input for the final study.

3.7 Procedures of data collection

The final version of the questionnaire was administered during January 2018 by five well-trained data collectors assigned from their respective universities. The data collectors have been trained by the researcher of this study on how to and what to communicate and interact with respondents before, during and after administration of the questionnaire. The aim of the study and its confidentiality had been explained to the participants. Participating students were informed that they were allowed to exempt themselves from the study if they were not interested. However, almost all the selected participants volunteered to participate in the study.

The questionnaire was administered to the selected participant students in their classrooms. Prior to their classes, communications have been made and permissions were obtained from course instructors to use the last 20 minutes from their respective sessions. Accordingly, respondents have completed and returned the questionnaire on the spot for the purpose of confidentiality. In addition, envelopes were provided with the questionnaires so that respondents could return it by putting in and closing the envelope for the purpose of maximizing confidentiality. Following the completion of the data collection, analysis has been performed.

3.8 Data analyses methods

In this study, quantitative data analysis methods were used. The statistical analysis was performed by using the Statistical Package for Social Sciences (SPSS) Version 20 and Analysis of Moment Structure (AMOS) Version 22 software. The data analysis process was commenced with the entry of the data into SPSS and it then underwent various preliminary analyses followed by the main analysis. Figure 3.1 presents the steps followed in the preliminary and main analyses of the data.

Stage 1– Preliminary analysis	Data screening and cleaning
	↓
	Assessing normality
	↓
	Confirmatory factor analysis
	↓
	Reliability and validity analysis
Stage 2 - Main analysis (hypothesis testing)	Descriptive statistics
	↓
	Chi-square test of independence
	↓
	Multivariate analysis of variance
	↓
	Bivariate correlation
	↓
	Analysis of the structural model
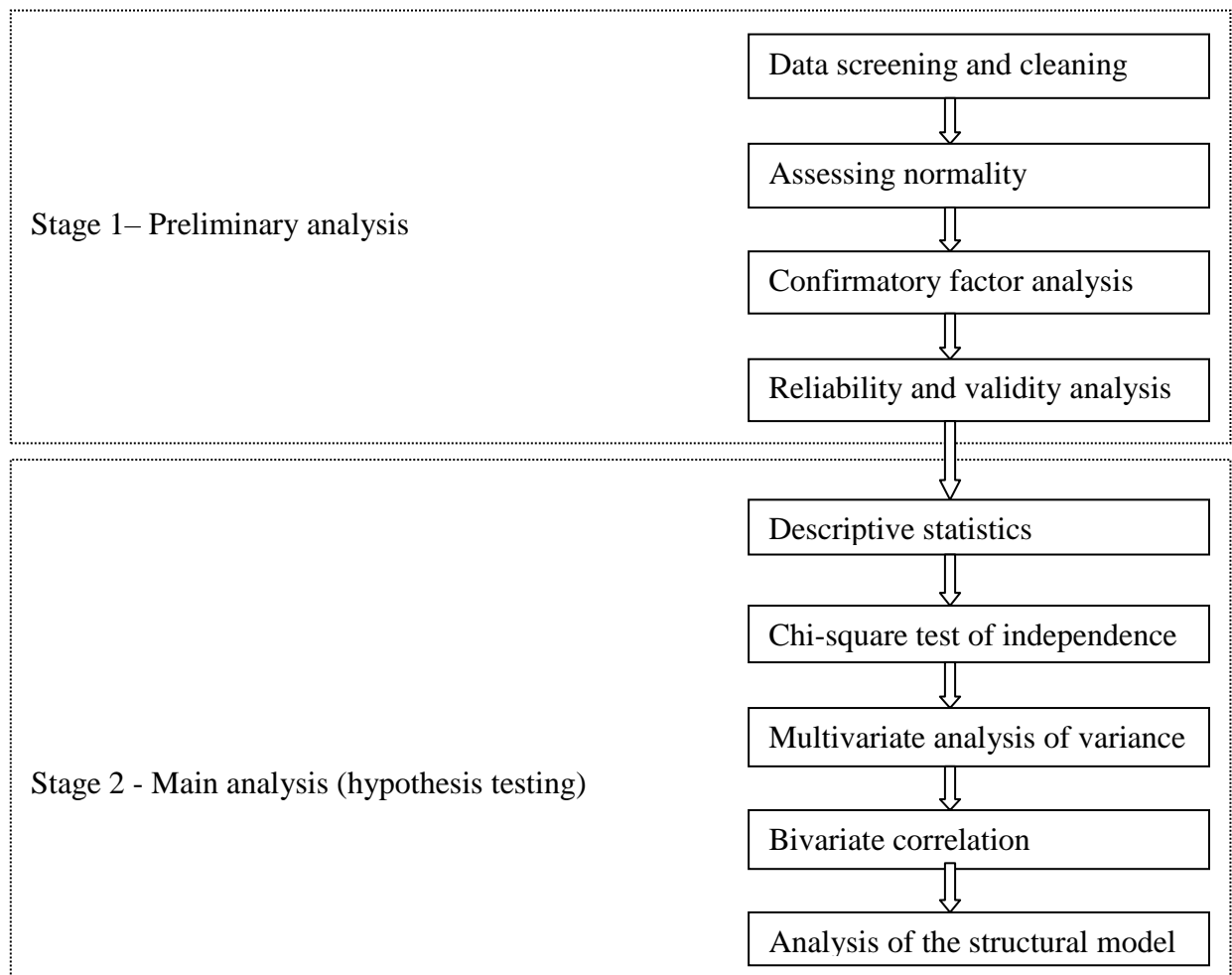
Figure 3.1. Stages of data analysis

As Figure 3.1 depicts, there were two stages of data analysis in this study. *Stage One* attempted to do initial statistical analyses such as data screening and cleaning, assessing normality,

Confirmatory Factor Analysis (CFA), and reliability and validity analysis aimed at fulfilling preconditions for the main analysis. *Stage Two* included statistics such as descriptive statistics, Chi-square test of independence, analysis of variance, bivariate correlation, and analysis of the structural model aimed at answering the research questions. The specific procedures of data analysis are presented in the next subsections.

3.8.1 Preliminary analyses

The preliminary statistical analyses such as data screening and cleaning, assessing normality, Confirmatory Factor Analysis (CFA), and reliability and validity analysis procedures were conducted to fulfil preconditions for the main analysis of data. The specific activities and actions undertaken under each procedure are presented in the following subsections.

3.8.1.1 Data screening and cleaning

Following the data entry to SPSS, data screening processes such as identifying missing out items (incomplete responses), unengaged responses (responses out of the scale ranges), and outliers (unusually large or small values relative to the data) using a frequency table were made for each variable related to all cases. Box plots and Mahalanobis d^2 values relative to all other cases were examined to detect outliers.

3.8.1.2 Assessing normality

Assessing the normality of continuous variable data is an important early step in almost every multivariate analysis including SEM analysis, particularly when inference is a goal (Tabachnick & Fidell, 2013). If the sample data violates the assumption of multivariate normality, then the Chi-square statistic for overall model fit will be exaggerated and the standard errors used to test the significance of the individual parameter estimates will be deflated (Byrne, 2016; Hair et al., 2014; Tabachnik & Fidell, 2012). The normality of continuous variable data was evaluated using two popular indicators – skewness (symmetry of the distribution) and kurtosis (peakedness of the distribution of the data) (Hair et al., 2014; Kline, 2016; Tabachnick & Fidell, 2013).

Based on either SPSS or Analysis of Moment Structure (AMOS) run outputs, a skewness (lack of symmetry) level with absolute values greater than three were regarded as extreme and a kurtosis (peakedness) level with absolute values greater than 10 suggested a problem and greater than 20 indicated a more serious or severe problem. When the acceptable level of skewness (3) and that of kurtosis (10) is violated, it suggested a problem that should be addressed prior to accomplishing any inferential statistical analysis (Byrne, 2016; Kline, 2016; Tabachnick & Fidell, 2013).

3.8.1.3 Confirmatory factor analysis (CFA)

Confirmatory factor analysis or evaluation of the measurement model was conducted as a prerequisite step for testing the structural relation among constructs in structural equation modelling (SEM). Evaluation of the hypothesized measurement model or confirmatory factor analysis (CFA) was done through SEM analysis using AMOS - version 22 software package, with Maximum Likelihood (ML) estimation. Structural equation modelling was preferred because it is a quite sophisticated technique that allows confirmation or testing various measurement models. It allowed us to evaluate the importance of each of the variables in the model and to test the overall fit of the model to the data (Pallant, 2016; Tabachnick & Fidell, 2013). Confirmation was done by evaluating the strength of the paths between indicator variables and latent constructs (loadings), the relationship between latent constructs (covariances), and the measurement model fitness to the data. Several fitness indices such as absolute fit indices, incremental fit indices, and parsimonious fit indices were used to assess the fit of the measurement model to the data. The above specific techniques applied during CFA are described in the following sub-sections.

3.8.1.3.1 Maximum Likelihood (ML) estimation method

Although structural equation modelling (SEM) has different estimation techniques, the Maximum Likelihood (ML) estimation was preferred due to the following practical considerations. As explained in the preliminary data analysis section the outcome variables of the study consisted of non-normal data. As noted by Bollen and Stine (1993) and Kline (2016), the presence of excessive skewness ($\geq$ 3) and kurtosis ($\geq$ 21) is troublesome in SEM analyses.

74

Researchers suggested that non-normal distribution of data can be dealt with either through the use of fairly large sample size, data transformation/normalizing scores, bootstrapping, or alternative estimation techniques (Brown, 2015; Hair et al., 2014; Schumacker & Lomax, 2016; Tabachnick & Fidell, 2013).

Although Tabachnick and Fidell (2013) and Hair et al. (2014) recommended the use of data transformations as a principal means of correcting non-normality, Kline (2016) suggested that before applying a normalizing transformation, one should think about the variables of interest and whether the expectation of normality is reasonable. Some variables were expected to have non-normal distributions, such as reports of alcohol or drug use and certain personality characteristics. If so, then transforming an inherently non-normal variable to force a normal distribution might fundamentally change it (the target variable was not actually studied). In this case, it would have been better to use a different estimation method for continuous outcomes in SEM, one that does not assume normality, such as robust maximum likelihood (MLR) or asymptotic distribution-free (ADF) estimation rather than the default maximum likelihood (ML) estimation (Hair, et al., 2014; Kline, 2016, Tabachnick & Fidell, 2013). Unfortunately, MLR was not available in the AMOS program. Thus, the ADF estimation technique or bootstrapping with the default ML estimations were considered as the two alternative solutions in AMOS software.

However, ADF estimation in AMOS gave singular covariance matrices and negative variances or inadmissible solutions during AMOS run while attempting to evaluate the CFA models. Although the AMOS user's guide (Arbuckle, 2012) suggested different alternative solutions to get admissible solutions, the problem also continued during the invariance test between genders. AMOS using ADF estimation was also unable to find a solution for bootstrap samples during the estimation of standard errors using bootstrap samples in testing the direct and indirect effects of the structural relations. Thus, the default ML estimation was preferred as an appropriate estimation method for this study. To address the issue of non-normality, the use of bootstrap samples was applied. During analysis, 500 bootstrapped samples and Bollen-Stine's (1993) approach was used to test for the stability of goodness-of-fit indices relative to the model. Bootstrapping with a 95% confidence interval was employed to assess the stability of parameter

estimates and thereby report their values with a greater degree of accuracy (Bollen & Stine, 1993; Byrne, 2016; Kline, 2016).

3.8.1.3.2 Bootstrapping

One approach to handle the presence of multivariate non-normal data is to use a method known as *the bootstrap* (Byrne, 2016; Nevitt & Hancock, 2001). The basic assumption underlying the bootstrap technique is that it permits the researcher to draw many subsamples from an original sample database and enables for comparison of parametric values over repeated subsamples that have been drawn (with replacement) from the original sample. Within the conventional inferential statistical procedure, on the other hand, the comparison is made based on an infinite number of samples selected theoretically from the target group of interest (Byrne, 2016; Hair et al., 2014; Kline, 2016).

The ultimate purpose of bootstrapping, therefore, is that it gives an opportunity to the investigator to evaluate the consistency of parameter values and by this means report their parameter estimates with a better level of precision. The Bollen–Stine bootstrap (Bollen & Stine, 1993) generates adjusted *p*-values for model test statistics (Kline, 2016). Thus, parameter estimation and significance level in this study were calculated using 500 bootstrap samples drawn from 2610 original samples with 95% bias-corrected confidence interval. Bollen-Stine's (1993) approach was employed to generate adjusted *p*-values.

Before evaluating the structural (i.e., regressive) relationships among the latent variables, a well-fitting measurement model was important. Thus, making Confirmatory Factor Analysis (CFA) was an essential precondition to structural equation modelling (Rossellini & Brown, 2011). Thus, the overall measurement model fitness to the data (CFA) was tested using different goodness of fit indices. SEMfurther allowed for the testing of dependence relationships among both latent and manifest/indicator variables (Byrne, 2016; Pallant, 2016; Robins, Fraley, & Krueger, 2009; Tabachnick & Fidell, 2013). Thus, the overall structural mode fitness to the data was evaluated using varied goodness of fit indices.

3.8.1.3.3 Model fit measures

Assessment of model fit was done to determine if the measurement model was fit to the data. It involved examining the difference between the sample variance and covariance and the implied variance-covariance derived from the parameter values. If the difference is small then the model was judged as "good". Several fitness indices were examined to assess the fit of the measurement model and the overall structural model. These indices were classified into three groups namely Absolute Fit Index, Incremental Fit Indices, and Parsimonious Fit Indices which are described in the next sub-sections.

Absolute fit indices

Absolute fit indices were useful to directly evaluate the degree to which the hypothesised or theorized model fit to the gathered survey data. Absolute fit indices involve Goodness of Fit Index (GFI), Average Goodness of Fit Index (AGFI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA). The GFI described the extent to which the hypothesised model contains variance and covariance implied in the sample covariance matrix (Byrne, 2016; Hoyle, 2012). The value of GFI might vary from 0 (indicating a poor fit) to 1 (indicating a good fit). In general, Goodness of Fit Index (GFI) and Adjusted GFI (AGFI) value greater than .90 reflected a good fit (Byrne, 2016; Hair et al., 2014).

Root Mean Square Error of Approximation (RMSEA) is also another popular measure of the fit index especially for large sample data (Arbuckle, 2012; Byrne, 2016; Hair et al., 2014). Employing this fit index in evaluating the fit of a model is essential since it counterbalances the rejection of the model due to inflation of Chi-square values with a large data set since χ^2 is very sensitive in large datasets. In general, a RMSEA value lower than 0.05 is desirable, though a value between 0.05 and 0.08 can also be a good sign of model fitness.

Another absolute fit index is the Standardized Root Mean Square Residual (SRMR) which is the square root of the average values of the squared residual. This measure is based on the errors in measuring the indicator variables, which is essential as these errors are sensitive to the type and the appropriateness of the measurement items. The lower the value of SRMR indicates the better

the fit of the model to the survey data gathered. This study accepted a maximum threshold value of SRMR = 0.08. The study also applied the other component of the parsimonious fit index - the ratio of Chi-square to the degree of freedom (CMIN/DF). The minimum threshold value for CMIN/DF was less than 0.5 (Arbuckle, 2012; Byrne, 2016; Finch, French, & Immekus, 2016; Hair et al., 2014; Schumacker & Lomax, 2016).

Incremental fit indices

An independent model is a null model which is believed as a baseline model used as the basis for the comparison. Baseline comparison or an incremental model fit indices measure the fit between the proposed hypothetical model and alternative baseline models. The most commonly used incremental fit indices are the Comparative Fit Index (CFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI) and Incremental Fit Index (IFI). Researchers advise a minimum threshold value for CFI > 0.95, NFI > 0.90, TLI > 0.95 and IFI > 0.90 (Arbuckle, 2012; Byrne, 2016; Finch, French, & Immekus, 2016; Hair et al., 2014; Meyeres, Gamst, & Guarino, 2006; Schumacker & Lomax, 2016).

Parsimonious fit indices

Parsimonious Normed Fit Index (PNFI) and Parsimonious Comparative Fit Index (PCFI) are other indices used to measure goodness-of-fit. Parsimony adjusted measures take into account the number of degrees of freedom for testing both the model being evaluated and the baseline model. The value of these fit indices may range from zero (reflecting poor fit) to one (indicating close fit). As a rule, the adequate values for these indices are above 0.50 (Arbuckle, 2012; Byrne, 2016; Finch, French, & Immekus, 2016; Hair et al., 2014; Kline, 2016; Schumacker & Lomax, 2016).

With regard to which indices and threshold levels should be reported, it is not necessary or advisable to report every index included in the program's output. Given the overabundance of fit indices, it is tempting to choose those fit indices that indicate the best fit. Hu and Bentler (1999) suggested including the SRMR with the NNFI (TLI), RMSEA or the CFI. Byrne (2016), Hair et al. (2014), and Kline (2016) advocated the use of multiple fit indices such as the Chi-square test,

the RMSEA, the CFI and the SRMR (i.e., at least one incremental index and one absolute index, in addition to the Chi-square value and the associated degrees of freedom). Hair et al. (2014) further suggested considering index cut-off values based on model characteristics (i.e., sample size, number of parameter estimates, number of variables, nature of data, etc.).

3.8.1.4 Reliability and validity analysis

The reliability (internal consistency) and validity of the scales used in the current study were evaluated before conducting further analyses on the structural relations.

Reliability: According to Ho (2006), internal consistency refers to the extent to which the items that make up the scale are all measuring the same underlying construct. Items that measure the same construct should reasonably cling/hang mutually in some reliable manner. Although there are different kinds of measuring internal consistency, the most common measure of scale reliability – Cronbach's alpha (α) was preferred in this study. This study considered the indicator variables to be reliable when the obtained value of the Cronbach's alpha was equal or exceeded 0.7 (Field, 2013; Kline, 2016; Nunnally, 1978; Pallant, 2016).

Validity: As in other kinds of statistical methods, SEM requires the analysis of scores with good evidence for validity. Without good evidence for validity, the accuracy of the interpretation of the results is doubtful (Kline, 2016). Construct validity measures the extent to which a set of measured items actually reflects the latent theoretical construct those items are designed to measure (Hair et al., 2014). Thus, the following two basic construct validity tests were made to evaluate the validity of instruments. The items that were indicators of a specific construct should converge or share a high proportion of variance in common, known as *convergent validity.* Analysis of *convergent validity* was made based on the magnitude, direction and significance of factor loadings and by comparing the constructs' composite reliability (CR), and Average Variance Extracted (AVE) or communality values of multitrait-multimethod (MTMM) matrix. Concerning the magnitude (regression weights) of factor loadings, Hair et al. (2014), recommended that the standardized regression weights should be 0.5 or higher, ideally 0.7 or higher and at a minimum statistically significant. Other most important indices of convergent validity are CR and AVE values. While some researchers consider CR values $\geq$ .7 as a sufficient

condition for convergent validity, some others suggest that AVE value greater or equal to .5 is acceptable (Hair et al., 2014).

Discriminant validity is also an important validity requirement. According to Brown (2015), discriminant validity refers to the degree to which measures of different constructs/traits are unrelated. The factors are said to demonstrate sufficient discriminant validity if the correlation matrix among constructs shows no extremely large values (usually greater than 0.8) and if there are no problematic cross-loadings (i.e., indicators should not be correlated more strongly with the other constructs than with its own construct) (Byrne 2016; Finch, French, & Immekus, 2016; Hair et al., 2014). The presence of discriminate validity was also achieved when the maximum shared variances (MSV) between constructs are lower than the average variance extracted between the construct and its respective observed variable. Thus, the presence of lower MSV values than AVE values was also used as a criterion for discriminant validity. All results of the preliminary data analysis are presented in Chapter 4.

3.8.2 Main analyses

The main analysis of the data included statistics such as descriptive statistics, Chi-square test of independence, multivariate analysis of variance, bivariate correlation, and analysis of the structural relation using SEM which were aimed at answering the research questions. The following sub-sections explained each of the analysis techniques in relation to the research questions they intended to answer.

3.8.2.1 Descriptive statistics

Descriptive statistics such as frequencies, percentage, means, and standard deviations were used to describe the study population and the prevalence of substance use and risky sexual behaviours (Hypotheses 1 & 2). In addition to descriptive statistics, Chi-square test of independence, multivariate analysis of variance (MANOVA), and bivariate correlation were also utilised to address the first two hypotheses and details are presented in the following subsections.

3.8.2.2 Chi-square test of independence

Cross-tabulation (Pearson's Chi-square test of independence) was done to determine the association between the dependent variables (substance use behaviours) and the demographic variables (gender, respondents' universities and respondents' year of study). For 2×2 contingency tables, the tests were conducted at $\alpha = .05$. For a Chi-square test result with more than one degree of freedom (i.e., larger than a 2×2 contingency table), the Bonferroni-adjusted p-values (i.e., the conventional alpha level .05 divided by the number of cells or tests) were used as a reference to test for significance. The Bonferroni-adjusted p-values were taken as a reference instead of the usual reference $\alpha = .05$ to avoid Type I error (Field, 2013; Hair et al., 2014; Sharpe, 2015; Tabachnick & Fidell, 2013). The significance of the difference between groups was determined based on the comparison of the overall *p*-value with the Bonferroni adjusted *p*-values. The Chi-square test was considered significant when the overall *p*-value was less than the Bonferroni-adjusted *p*-values.

Following the test of significance of overall group difference, when a Chi-square test of independence result is significant, a post hoc test was performed to determine the sources of statistically significant results or to determine in exactly between which specific groups the differences lie. The posthoc test was conducted by comparing the corresponding *p*-value of each cell against the Bonferroni adjusted *p*-values. The test was considered significant when the corresponding *p*-values of a cell are less than the Bonferroni-adjusted *p*-values.

Furthermore, effect size measure (the strength or the size of an observed effect of the variable, relative to the background error) was determined based on Cramér's "*V*" coefficient values. The effect size for a contingency table with either the dependent or independent variable having two categories, Cramér's "*V*" of 0.01 = small effect, 0.30 = medium effect, and 0.50 = large effect (Cohen, 1988; Field, 2013; Pallant, 2016; Sun, Pan, & Wang, 2010). In addition to Cramér's "*V*", the odds ratio or the relative risk of using substances for gender was reported (only for 2×2 contingency tables) to explain the strength of relationships.

3.8.2.3 Multivariate analysis of variance (MANOVA)

MANOVA was utilized to determine how the linear combination of dependent variables (risky sexual behaviour variables) can discriminate between demographic variables (gender, university and years of study groups). MANOVA was the appropriate statistical test to use here because there were five continuous dependent variables. The MANOVA procedure generated several test statistics to evaluate group differences in the combined dependent variables (DVs). If the assumption of equal variances was violated based on Box's M test, Pillai's Trace test statistics was utilized when interpreting the significance of the results (Howitt & Cramer, 2011; Mertler & Reinhart, 2017; Tabachnick & Fidell, 2013). Although there are several post hoc tests or multiple comparison procedures that have been specially designed for situations in which homogeneity of variance-covariance is violated (i.e., based on Levene's Test of Equality of Error Variance) and when sample sizes are unequal, the Games-Howell procedure was preferred for its most powerful and accurate performance (Field, 2013; Howitt & Cramer, 2011).

For MANOVA, partial eta squared (η^2) was used as a measure of effect size or the magnitude of the relationship between the independent and dependent variables and was interpreted as the proportion of variance in the dependent variable explained by the independent variable(s) in the sample (Field, 2013; Hair et al., 2014; Mertler & Reinhart, 2017; Pallant, 2016; Sun et al., 2010). Based on Cohen's (1988) effect size general interpretive guidelines, interpretations of small = .01, medium = .06, and large = .14 for η^2 (Cohen, 1988; Kotrlik, 2011; Pallant, 2016).

3.8.2.4 Bivariate correlation

Intercorrelation among selected substance use and risky sexual behaviour variables was conducted using Spearman's rho. The Spearman rho was preferred to other methods due to the non-parametric nature of the data (Field 2013; Pallant, 2016). The significance of association among variables was tested at α = .05. However, a test result that is statistically significant as judged by the *p*-value alone may not have necessarily a practical significance as judged by the effect size (Cohen, 1988). Thus, reporting effect size to complement *p*-value is extremely suggested by researchers, journal editors, and academic associations (Sun et al., 2010). Accordingly, based on Cohen's (1988) guide, the interpretation of correlation coefficients was

reported to indicate the size of the effect and the nature of their relationship. According to Cohen (1988), the standards for interpreting the correlation coefficient effect size are small $r = .10$, medium $r = .30$, and large $r = .5$ (Cohen, 1988; Pallant, 2016; Sun et al., 2010; Volker, 2006).

3.8.2.5 Analysing the structural model

Four objectives of the study (reflected in H3, H4, H5, and H6) were analysed mainly through SEM analysis using Analysis of Moment Structure (AMOS) version 22. SEM was deemed more appropriate than other methods because the hypothesized model included multiple outcome variables, a mix of latent and measured/observed variables and complex relationships among the variables (i.e., direct, indirect/mediated and moderated relationships). As a prerequisite step during preliminary data analysis, confirmatory factor analysis (CFA) was done to evaluate the measurement model. After confirmation of the measurement model, the hypothesized structural model goodness-of-fit was tested. In evaluating the structural model, first, the test of the overall structural model (SM) fitness to the data was done. Following the test of the overall structural model fitness to the data, a test of significance of a number of structural paths was conducted.

During the test of hypothesized structural paths, both direct effect, indirect effect (mediation) and the moderation effect of gender in the relationship among personality traits, substance use, and risky sexual behaviour were evaluated. In examining the structural model, the direct effects of personality traits on substance use behaviour (H3), the direct effect of personality traits on risky sexual behaviour (H4), the mediating effects of substance use behaviour on the relationship between personality traits and risky sexual behaviours (H5), and the moderating effects of gender on the relationship among these variables (H6) were tested.

As the bootstrap method is a highly recommended approach for handling multivariate non-normal and to test the direct and indirect (mediation) effects in SEM, it was employed for hypothesis testing (Blunch, 2012; Byrne, 2016; Hayes, 2018; Hayes & Preacher, 2014). Bollen-Stine's bootstrapping with 500 samples from 2610 original samples was used to generate standardized coefficient estimates (β) for the direct and indirect effects. The p-values $< .05$ and 95% bias-corrected confidence intervals (BCCI) for the parameter values were inspected for

significance. The effects were considered statistically significant when the confidence intervals did not contain zero (Hayes & Preacher 2014).

Finally, to test gender differences (moderation) in the causal relationship between and among personality traits, substance use behaviour and risky sexual behaviour, invariance test or multiple groups analysis were examined through comparing standardized regression weights using the Chi-square test ($\chi2$) for each causal path. All results of the main analysis are presented in Chapter 5.

3.9 Ethical considerations

Ethics are essential in psychological researches that involve human behaviour. Ethical practices in research necessitate respect for institutions and individual participants (Plano Clark & Creswell, 2015). According to American Psychological Association (2002), the key ethical principles and code of conduct that the researcher should consider include fidelity and responsibility, integrity (practising honesty in all aspects of research), beneficence and non-maleficence of participants, justice (fairness in the treatment of all research participants), and respect for people's rights and dignity. Based on the above principles, the following ethical considerations were important during the current study:

3.9.1 Informed consent and voluntary participation

Plano Clark and Creswell (2015) explained that obtaining informed consent entails giving human participants full information about the research, as well as their roles in the research before they can volunteer to participate. This is a crucial step as it allows research participants to make decisions, based on the information provided. Thus, for the current study, the researcher provided all participants with relevant information about the study and the purpose of the study. This was done in order for participants to make an informed decision on whether to participate or not – the researcher and other data collectors had a verbal discussion with the participants about the study, and also provided such information in a cover letter given to the participants before the study commenced. The researcher also explained to the participants that the study was being conducted as a requirement for his doctoral degree at the University of South Africa (UNISA).

Informed consent was consequently obtained from all research participants in written form. All individuals who were approached to take part in the study were informed that participation was voluntary. As a result, data were collected only from individuals who volunteered to take part (see Appendix C). Further Plano Clark and Creswell (2015) advised researchers to obtain permission to collect data from concerned bodies including institutions in which the data collection is undertaken. Based on this principle, the researcher first obtained ethical clearance from the University of South Africa (UNISA). Furthermore, the letter of support from UNISA to the target universities for cooperation in accessing the data sources was obtained (see Appendix A & B).

3.9.2 Confidentiality

The privacy and confidentiality of respondents should be kept at all times. According to Polit and Beck (2012), anonymity is the most secure means of protecting confidentiality. The nature of the current study required private issues or personal data related to participants' substance use and sexual experiences. Thus, the investigator collected the data through an anonymous questionnaire. No identity of any respondent was connected to the questionnaire he or she completed. Further, the researcher and data collectors ensured that all information provided was handled with strict confidentiality.

3.9.3 Nonmaleficence and beneficence

According to Plano Clark and Creswell (2015), researchers must protect participants from physical, emotional, economic, and social discomforts. They point out that respondents should leave the study in a state that is no worse than when the study began. In this study, emotional distress and social discomforts associated with answering certain questions can be taken as temporary discomfort. To minimize such discomforts, the researcher provided envelopes with the questionnaires so that respondents could return the completed questionnaires by putting in and closing the envelope so that they become confident that their responses are kept private.

Another most related ethical imperative is benefit-sharing. The philosophical principle behind benefit sharing is that those who contribute to scientific research ought to share in its benefits

(Arnason & Schroeder, 2013). The potential benefit to the participants must outweigh the potential risks (Grove et al., 2013; Polit & Beck, 2012). In this regard, the consent form states that the outcome of the study is crucial for the prevention of risky health behaviours among students (see Appendix C). Accordingly, feedback sessions will be arranged in the universities where the data were collected to present the findings to the participants and other students who are interested in the findings. The final copy of the dissertation will also be provided to the universities where the study was conducted. Furthermore, the comprehensive intervention programme intended for managing health-related behavioural problems will be implemented in the universities to benefit students. These actions could help to ensure that the students and society at large benefits.

3.9.4 Fair treatment or justice

Fair treatment means that participant selection should be based on the requirements of the study and not on a group's vulnerability (Grove, Burns, & Gray 2013). The principle of justice also enforces duties to neither ignore nor show favouritism against individuals or groups who may benefit from research (Grove et al., 2013). In this study, the selection of the respondents through a multi-stage random sampling method gave an equal chance of being selected to each respondent.

3.10 Chapter summary

This chapter has explained the main points with regard to the research methodology and strategies employed in the study. The research aims, approach, instruments, participants, data collection and analysis methods were outlined. The research employed a quantitative design in which self-report data were collected using a questionnaire at one point in time from undergraduate regular program students of five selected universities in Ethiopia.

The method of the statistical analysis section has preliminary and main analysis sections. The preliminary data analysis included data purification process, multivariate normality test, confirmation of measurement model and validation procedures which were aimed at evaluating the measurement model. The main statistical analysis techniques included descriptive statistics,

Chi-square test, analysis of variance, correlation, and analysis of the structural relation which were aimed at answering the research questions. The limitations of the study and ethical considerations employed by the researcher are also discussed.

The preceding chapters and this chapter have emphasised on giving an explanation on the background of the research, the theoretical basis and previous findings related to the research, questions, hypotheses and methodology. The following two chapters (Chapter 4 and Chapter 5) will present the results of the study and examine each of the research questions and hypotheses respectively.

CHAPTER FOUR

PRELIMINARY DATA ANALYSIS

4.1 Introduction

This chapter is aimed at providing results of the preliminary stages of data analysis (the analysis performed on the measurement models). The results are presented in four sections and proceeds as follows. First, in Section 4.2, the results of data screening are presented. Section 4.3 exhibits the results of the assessment of normality which is a basic step in multivariate data analysis (including SEM). In Section 4.4, the results of the confirmatory factor analysis (CFA) intended to evaluate the measurement model are presented. Section 4.5 reports the results of reliability and validity tests. The next chapter (Chapter 5) presents the results of hypotheses testing**.**

4.2 Data screening and cleaning

Once the data has been collected from 2620 participants through a self-administered questionnaire, the data was entered into the SPSS statistical data program. Data screening processes such as identifying missing items (incomplete responses), unengaged responses (responses out of the scale ranges), and outliers (unusually large or small values relative to the data) were made before running any statistical analysis. Each variable had code values or ranges in line with the scales used in the questionnaire to avoid unengaged responses. In this regard, a frequency table was regarded as an appropriate way to summarize the minimum and maximum values for each factor associated with all respondents (see Appendix E1). The genuineness of the dataset has been checked by referring to the original questionnaire and unusually high data values associated with the specific variable were corrected.

Responses of seven respondents were rejected due to missing items (incomplete responses) on personality trait scales. As suggested by Arbuckle (2012) and Pallant (2016), there are three scenarios to handle the missing data values. These include data imputation (replacing missed variable data with means), case listwise deletion and case pairwise data deletion. In this study,

the case listwise deletion strategy was applied to incompletely filled-out questionnaires and thus, removed from the data set.

Three other cases whose scores substantially deviate from all the others in a particular set of data were identified as multivariate outliers and excluded from further analysis. The judgement on the three cases as outliers was made based on their wide gap in Mahalanobis d^2 values relative to all other cases (Byrne, 2016; Kline, 2016). Therefore, although the total number of respondents who completed the questionnaire was 2620, ten cases were excluded from further analysis during the data screening and cleaning process and further analysis have been made on responses obtained from 2610 subjects of which 1558 were males and 1052 were females.

4.3 Assessment of normality

Following the data cleaning, the data file was inspected to explore the nature of variables and determine the appropriate statistical techniques to be employed to address the research questions. According to Kline (2016), skewness values with absolute values larger than 3 are considered as excessive and a kurtosis value with absolute values greater than 10 indicates a problem and larger than 20 suggests a more serious or severe problem. When the tolerable values of skewness (3) and that of kurtosis (10) is disobeyed, it suggests a problem that should be managed before employing any inferential statistical procedure.

Based on the above guidelines, the normality (skewness and kurtosis) level of the data was evaluated. Although the distribution of the scores of the majority (50) measured variables of this study was within the acceptable level of skewness (less than 3) and kurtosis (less than 10), the skewness values of the four indicators of the outcome variables (i.e., number of days for marijuana use, for smoking cigarette, khat use, and for smoking shisha) were > 3. The kurtosis values of these four variables were also > 10 which indicated that the distribution for these variables violated normality assumptions or reflected non-normality (see Appendix E1).

4.4 Confirmatory factor analysis (CFA) for the measurement model

Evaluation of the measurement model or CFA is a prerequisite step for testing hypothesis pertaining to the structural relationships in structural equation modelling (SEM). Initially, the

current study's hypothesized measurement model was formulated using 54 indicator variables and seven latent constructs. The latent constructs included the five personality trait variables (extraversion, agreeableness, conscientiousness, neuroticism, and openness), substance use behaviour, and risky sexual behaviour. While the five personality traits (constructs) have 44 indicators (eight indicators for extraversion, nine for agreeableness, nine for conscientiousness, eight for neuroticism, and 10 for openness), substance use behaviour had five indicators, and risky sexual behaviours also had five indicators. Figure 4.1 depicts the seven latent constructs with their 54 indicators of the hypothesized measurement model.
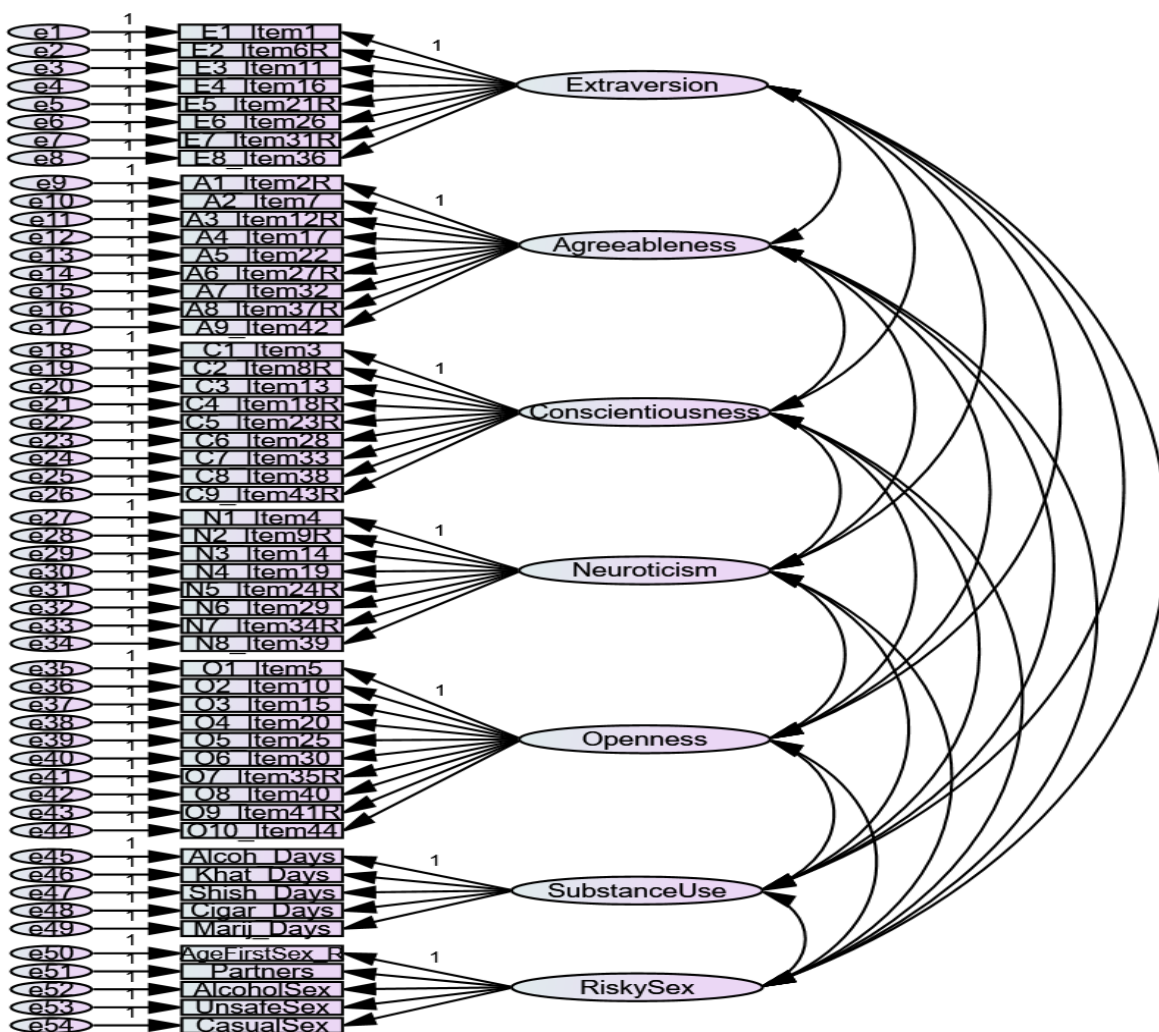
Figure 4.1. The hypothesized measurement model for the five personality traits, substance use behaviour and risky sexual behaviour scales

As indicated in Figure 4.1, the hypothesized or initial measurement model had 54 indicators with seven latent constructs. CFA or evaluation of the hypothesized measurement model was done using the AMOS software package, version 22 with Maximum Likelihood (ML) estimation. During the evaluation, the strength of the paths between indicator variables and latent constructs (loadings), the direct relationship between latent constructs (covariances), and the measurement model fitness to the data were assessed.

Accordingly, outputs of the AMOS run using ML estimation suggested that the unstandardized estimates of all 54 indicators of the hypothesized measurement model had significant loadings on to their respective latent factors (see Appendix E2, Table E2.1). Only three indicators had standardized loadings between .5 and .7, and the rest of the indicators had standardized loadings $\geq$ .7 which indicated that they could validly explain their respective latent constructs (see Appendix E2, Table E2.2). Moreover, all covariances among the latent constructs were $\leq$ .62, which were acceptable or not extremely high. However, some model fit indices of the hypothesized CFA model (such as CMIN/DF = 3.827, GFI = .928, AGFI = .921) were suggesting the need for improvement/modification of the model. Consequently, by considering the relatively higher values of standard errors of estimates in modification indices (MIs) and the standardized residual covariance values, ten indicators (two indicators from extraversion, one indicator from agreeableness, one indicator from conscientiousness, one indicator from neuroticism, two indicators from openness, one indicator from substance use behaviour, and two indicators from risky sexual behaviour)were deleted from the measurement model. Finally, seven latent constructs with 44 indicators were taken for further SEM analysis.

As suggested by Hair et al. (2014) and Soto and John (2009), during model modification/re-specification up to 20% of the indicators in the model can be deleted without a new data set. In other words, minor changes like dropping one, two or three items from a large battery of items for a construct is less consequential and the confirmatory test may not be jeopardized, which can be performed without a new data set. Accordingly, depending on the rule of thumb suggested by Hair et al. (2014), only one item at a time was deleted, followed by the validity test until the required result was attained. Figure 4.2 demonstrates the number of latent variables with their

respective indicators, the standardized loadings of indicators onto their latent factors and the covariance structure among the latent constructs of the improved/modified measurement model.
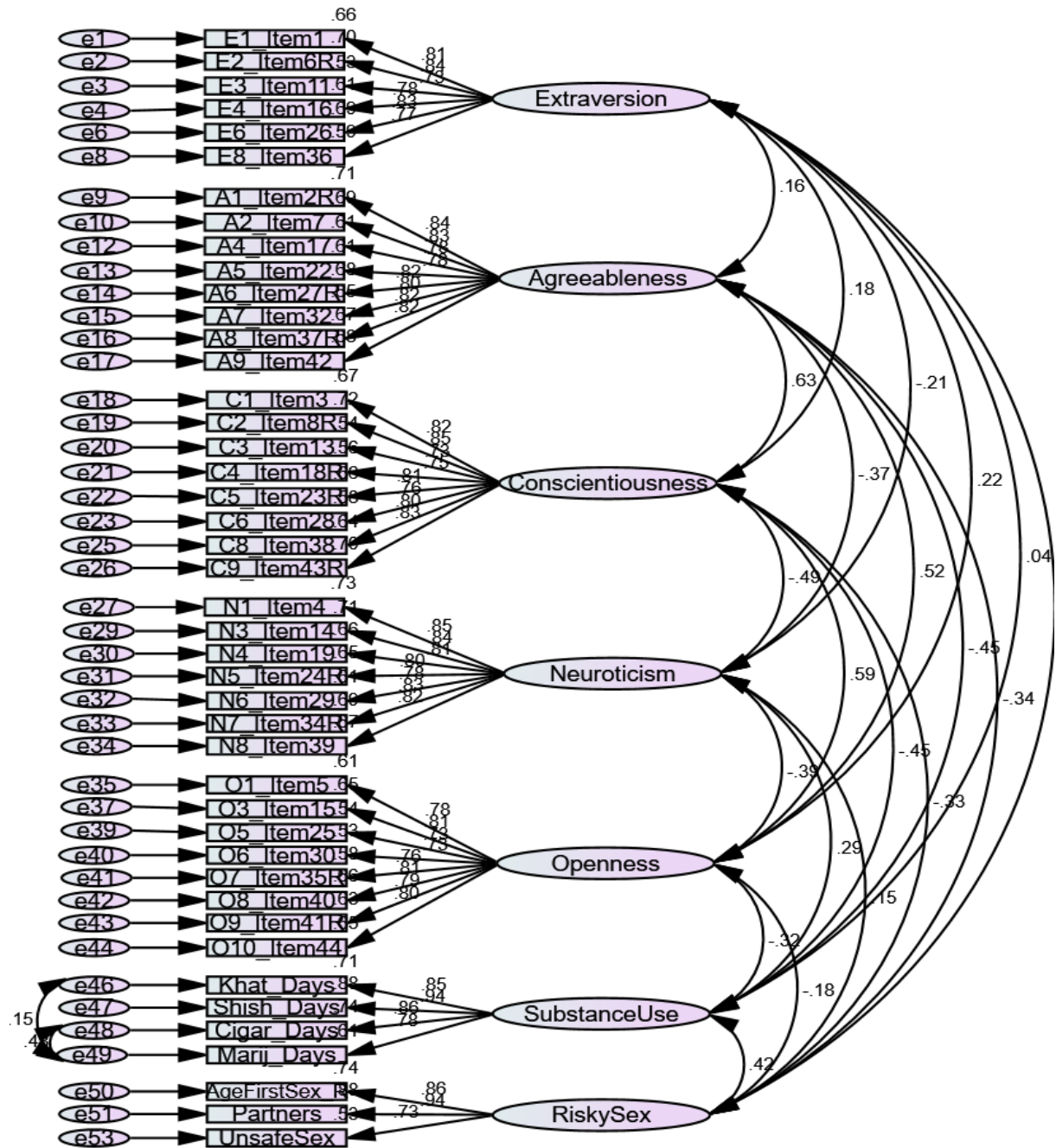
Figure 4.2. Revised CFA model for the five personality traits, substance use behaviour and risky sexual behaviour scales (standardized estimates)

As can be seen in Figure 4.2, the revised measurement model was presented using the standardized regression weights. However, in addition to the standardized regression weights, evaluation of the measurement model has also considered the unstandardized regression weights and the overall model-fit indices. The unstandardized regression weights were examined to evaluate the significance of individual parameter estimates. Standardized regression weights were considered to assess the validity or representativeness of indicator variables to measure the latent construct. And the overall model fit indices were considered for testing the fitness of the theorized model to the data. The specific results associated with unstandardized regression weights, the standardized regression and the overall model-fit indices are presented in the following subsections.

4.4.1 Unstandardized regression weights

In evaluating the measurement model, the unstandardized regression weights of indicator variables onto their own latent construct were examined to evaluate the significance and strengths of parameter estimates found in the relationship between indicators and their respective latent factors. Table 4.1illustrates the unstandardized regression weights of the revised measurement model.

Table 4.1 *Unstandardized Regression Weights of the Revised Model*

			Estimate	S.E.	C.R.	P	Label
E1_Item1	<---	Extraversion	1.000				
E2_Item6R	<---	Extraversion	.954	.019	49.104	***	par_1
E3_Item11	<---	Extraversion	.681	.017	40.513	***	par_2
E4_Item16	<---	Extraversion	.737	.016	44.753	***	par_3
E6_Item26	<---	Extraversion	.838	.017	48.793	***	par_4
E8_Item36	<---	Extraversion	.815	.019	43.862	***	par_5
A1_Item2R	<---	Agreeableness	1.000				
A2_Item7	<---	Agreeableness	1.009	.019	53.079	***	par_6
A4_Item17	<---	Agreeableness	.950	.020	47.914	***	par_7
A5_Item22	<---	Agreeableness	.966	.020	48.367	***	par_8
A6_Item27R	<---	Agreeableness	1.039	.020	52.475	***	par_9
A7_Item32	<---	Agreeableness	.974	.019	50.357	***	par_10
A8_Item37R	<---	Agreeableness	.973	.019	51.868	***	par_11
A9_Item42	<---	Agreeableness	.952	.018	52.536	***	par_32

			Estimate	S.E.	C.R.	P	Label
C1_Item3	<---	Conscientiousness	1.000				
C2_Item8R	<---	Conscientiousness	1.095	.021	51.773	***	par_12
C3_Item13	<---	Conscientiousness	.913	.022	42.140	***	par_13
C4_Item18R	<---	Conscientiousness	.995	.023	43.268	***	par_14
C5_Item23R	<---	Conscientiousness	1.063	.022	48.773	***	par_15
C6_Item28	<---	Conscientiousness	1.008	.023	44.512	***	par_16
C8_Item38	<---	Conscientiousness	1.072	.023	47.591	***	par_17
C9_Item43R	<---	Conscientiousness	1.013	.020	50.564	***	par_33
N1_Item4	<---	Neuroticism	1.000				
N3_Item14	<---	Neuroticism	1.006	.018	54.601	***	par_18
N4_Item19	<---	Neuroticism	.956	.018	51.802	***	par_19
N5_Item24R	<---	Neuroticism	.899	.018	50.806	***	par_20
N6_Item29	<---	Neuroticism	.936	.019	48.242	***	par_21
N7_Item34R	<---	Neuroticism	.948	.018	53.721	***	par_22
N8_Item39	<---	Neuroticism	1.005	.019	52.499	***	par_23
O1_Item5	<---	Openness	1.000				
O3_Item15	<---	Openness	.937	.021	45.064	***	par_24
O5_Item25	<---	Openness	.948	.024	40.027	***	par_25
O6_Item30	<---	Openness	.876	.022	39.540	***	par_26
O7_Item35R	<---	Openness	.885	.021	41.794	***	par_27
O8_Item40	<---	Openness	1.030	.023	45.367	***	par_28
O9_Item41R	<---	Openness	1.057	.024	44.079	***	par_34
O10_Item44	<---	Openness	1.042	.023	44.888	***	par_35
Khat_Days	<---	SubstanceUse	1.000				
Shish_Days	<---	SubstanceUse	.890	.014	61.874	***	par_29
Cigar_Days	<---	SubstanceUse	.613	.011	55.738	***	par_30
Marij_Days	<---	SubstanceUse	.494	.011	43.922	***	par_31
AgeFirstSex_R	<---	RiskySex	1.000				
Partners	<---	RiskySex	1.324	.024	55.733	***	par_36
UnsafeSex	<---	RiskySex	.870	.020	42.946	***	par_37

Note. 1.000 = Constrained parameter estimates; *** = *p* < .001

As presented in Table 4.1, the unstandardized path coefficient alpha values for all paths between latent constructs and indicator variables were significant at $p < 0.001$ (two-tailed). The ML estimation was made on the bootstrap samples to ensure the stability of the above parameter estimates and to report their values with an enhanced degree of precision.

Another most important measure – bias-corrected confidence interval – was examined to evaluate the significances of the loadings. The bias-corrected confidence interval was assessed and the result indicated that all 44 parameter estimates between indicator variables and latent constructs (loadings) lie between the lower and upper boundaries and the ranges do not include zero which indicated that there was no factor loading equal to zero in the population. Furthermore, the *p*-values (all $p < .01$) implied that the confidence interval was at the 99% level before the lower bound value would be zero (see Appendix E2, Table E2.3).

As suggested by Nevitt and Hancock (2001), bootstrap-estimated standard errors are less biased than unadjusted ML estimates under non-normality. Accordingly, to ensure the stability of the above parameter estimates and thereby reporting their values with a greater degree of accuracy, estimation of standard errors (SE) was also made on the bootstrap samples. Then the difference between the estimate of SE with the original sample and the mean of SE of estimates across the bootstrap samples ("Bias") was examined.

Based on the comparison of the estimates of standard error, 15 positive values (biases) were found showing that standard errors for bootstrapped samples were greater than the standard error of estimate of the original samples. These values indicated that the distribution of the parameter estimates appeared to be greater than the expected under normal theory assumptions (in the original samples). While the four negative values of 'bias' indicated the opposite, the rest (25 values) were zero which suggested no difference between the parameter estimates of the original sample and bootstrapped sample. In general, the result suggested that the SE estimates across bootstrapped samples were relatively higher than the original ML estimations at least in 15 cases, and there were no differences for 25 parameters. This result suggested that the parameter estimates in the measurement model were accurate or stable (see Appendix E2, Table E2.4).

4.4.2 Standardized regression weights

Concerning standardized regression weight as measured by beta weight (β), Byrne (2016) recommended that the standardized regression weight value should be greater than 0.5 and a value of 0.7 or more is preferable. Table 4.2 highlighted the standardized regression weights or the loading of indicators on to their respective latent constructs.

Table 4.2 *Standardized Factor Loadings of the Revised Model*

			Estimate
E1_Item1	<---	Extraversion	.813
E2_Item6R	<---	Extraversion	.837
E3_Item11	<---	Extraversion	.726
E4_Item16	<---	Extraversion	.782
E6_Item26	<---	Extraversion	.833
E8_Item36	<---	Extraversion	.771
A1_Item2R	<---	Agreeableness	.844
A2_Item7	<---	Agreeableness	.830
A4_Item17	<---	Agreeableness	.778
A5_Item22	<---	Agreeableness	.783
A6_Item27R	<---	Agreeableness	.824
A7_Item32	<---	Agreeableness	.803
A8_Item37R	<---	Agreeableness	.818
A9_Item42	<---	Agreeableness	.825
C1_Item3	<---	Conscientiousness	.817
C2_Item8R	<---	Conscientiousness	.847
C3_Item13	<---	Conscientiousness	.733
C4_Item18R	<---	Conscientiousness	.747
C5_Item23R	<---	Conscientiousness	.814
C6_Item28	<---	Conscientiousness	.763
C8_Item38	<---	Conscientiousness	.800
C9_Item43R	<---	Conscientiousness	.834
N1_Item4	<---	Neuroticism	.852
N3_Item14	<---	Neuroticism	.840
N4_Item19	<---	Neuroticism	.814
N5_Item24R	<---	Neuroticism	.804
N6_Item29	<---	Neuroticism	.779
N7_Item34R	<---	Neuroticism	.832
N8_Item39	<---	Neuroticism	.821
O1_Item5	<---	Openness	.783
O3_Item15	<---	Openness	.807
O5_Item25	<---	Openness	.734
O6_Item30	<---	Openness	.726
O7_Item35R	<---	Openness	.760
O8_Item40	<---	Openness	.811
O9_Item41R	<---	Openness	.793
O10_Item44	<---	Openness	.804
Khat_Days	<---	SubstanceUse	.845

			Estimate
Shish_Days	<---	SubstanceUse	.940
Cigar_Days	<---	SubstanceUse	.861
Marij_Days	<---	SubstanceUse	.779
AgeFirstSex_R	<---	RiskySex	.857
Partners	<---	RiskySex	.940
UnsafeSex	<---	RiskySex	.726

As depicted in Table 4.2 all indicators had a standardized loading greater than 0.7, indicating that all the indicator variables adequately measured the respective latent variables.

4.4.3 The revised measurement model fitness to the data

Several fitness indices were considered to assess the fit of the revised measurement model. These indices are categorised into three groups and all of them are described in the following sections.

Absolute fit indices: Involved Goodness of Fit Index (GFI) and Average Goodness of Fit Index (AGFI) > .90, Standardized Root Mean Square Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA) value lower than 0.08, the ratio of Chi-square to the degree of freedom CMIN/DF less than 0.5 were taken as criteria to judge the model as a good fit (Arbuckle, 2012; Byrne, 2016; Finch, French, & Immekus, 2016; Hair et al., 2014; Kline, 2016; Schumacker & Lomax, 2016). Further, the Bollen–Stine's (1993) bootstrap adjusted *p*-values > .05 were considered as criteria for acceptance of the overall model fit (Kline, 2016).

Incremental fit indices: Included Comparative Fit Index (CFI), Normed Fit Index (NFI), Turcker Lewis Index (TLI) and Incremental Fit Index (IFI). Scholars recommend a minimum threshold value for CFI > 0.95, NFI > 0.90, TLI > 0.95 and IFI > 0.90 (Arbuckle, 2012; Byrne, 2016; Finch, French, & Immekus, 2016; Hair et al., 2014; Meyeres, Gamst, & Guarino, 2006; Schumacker & Lomax, 2016).

Parsimonious fit indices: Involved the Normed Fit Index (PNFI) and Parsimonious Comparative Fit Index (PCFI). The acceptable values for both indices are above 0.50 (Arbuckle, 2012; Byrne, 2016; Finch, French, & Immekus, 2016; Hair et al., 2014; Kline, 2016; Schumacker & Lomax, 2016). Using the aforementioned fit indices the confirmation of the

measurement model was made and prepared for testing the hypothesized structural model. Table 4.3 illustrated the model fit indices.

Table 4.3 *Summary of Model Fit Criteria with their Recommended Acceptable Levels and Observed Fit Indices of the Revised Measurement Model*

Type of model fit measures	Model-fit criterion (Metric)	Obtained values	Recommended acceptable level and interpretation	Model evaluation
Absolute Fit Indices	Chi-square ($\chi2$) or CMIN	$p = .000$, Bollen-Stine $p = .002$	Original p value > .05 or Bollen-Stine p value > .05	Acceptable
	Normed Chi-square(CMIN/DF)	2.909	A value of < 2.0 is considered very good and between 2 and 5 are acceptable	Acceptable
	Goodness-of-fit index (GFI)	0.957	0 (no fit) to 1 (perfect fit). A value greater than .90 or .95 reflects a good fit	Good fit
	Adjusted GFI (AGFI)	0.951	0 (no fit) to 1 (perfect fit). An AGFI value $\geq$ .90 or .95 refer a good fit	Good fit
	Root-mean-square error of approxi-mation (RMSEA)	0.027	A RMSEA values < .1 to > .06 are moderate/close fit, .06 or less are good fit.	Good fit
	Standardized root mean square residuals (SRMR)	0.025	A value less than .08 indicates a good model fit, 0 indicates a perfect fit.	Good fit
Incremental Fit Indices/baseline comparisons	Tucker–Lewis Index (TLI)	0.978	0 (no fit) to ≥ 1 (perfect fit). A value close to .90 or .95 reflects a good mode fit.	Good fit
	Incremental Fit Index (IFI)	0.980	0 (no fit) to ≥ 1 (perfect fit). A value greater than .90 or .95 reflects a good model fit.	Good fit
	Comparative Fit Index (CFI)	0.980	0 (no fit) to ≥ 1 (perfect fit). A value > .90 or .95 reflects a good fit.	Good fit
	Normed fit index (NFI)	0.970	0 (no fit) to 1 (perfect fit). A value > .90 or .95 reflects a good fit.	Good fit
	Relative fit index (RFI)	0.968	Range from zero to 1. Values close to .95 indicating superior fit.	Good fit
Parsimony Fit Indices	Parsimony normed fit index (PNFI)	0.901	Relatively high values represent a better fit. A value larger than 0.60 is generally considered satisfying.	Good fit
	Parsimonious Comparative Fit Indices (PCFI)	0.911	Relatively high values represent a better fit. Values larger than .60 are generally considered satisfying.	Good fit

As depicted in Table 4.3, findings from the AMOS run using ML estimation on 500 bootstrapped samples to test the measurement model fit to the data disclosed the following fit indices: $\chi^2/df = 2.909$; GFI = 0.957; SRMR = 0.025; RMSEA = 0.027, CFI = 0.980; TLI = .978; IFI = .980; NFI = .970; RFI = .968; PNFI = .901 and PCFI = 0.911 suggested that the theoretical measurement model fit well to the data. Although the inflated value of Chi-square $\chi^2(879) = 2556.803$ and both original p-value (.000) and bootstrapped Bollen-Stine p values (.002) were less than the threshold value < .05 imply the misfit (badness of fit), Hu and Bentler (1999) suggested to rely more on the standardized root mean square residuals (SRMR) and Root-mean-square error of approximation (RMSEA) values than other indices for they were found to be the most insensitive to sample size, model misspecification and parameter estimates. As the SRMR is calculated based upon the scales of each indicator, if a questionnaire contains items with varying scales, SRMR is much more meaningful to interpret (Hu & Bentler, 1999). Whereas the Chi-square statistic is sensitive to sample size and assumes multivariate normality, it always rejects the model when large samples are used and/or when there is a severe deviation from normality (Byrne, 2016; Hooper et al., 2008; McIntosh, 2006; Tabachnick & Fidell, 2013).

Further, the output of the AMOS run using bootstrap samples stated that the model fit better in 500 bootstrap samples and worse in 0 bootstrap samples with a reported Bollen–Stine p-value of .002. When bootstrapping was used in addressing the issue of multivariate non-normal data, this p-value was in a place of the original model ML p-value = .000. The bootstrap-adjusted p-value .002 was < .05 which suggested a rejection of the model. However, it is well known in the SEM literature that the Chi-square values always reject the model when large samples are used and when there is a severe deviation from normality (Hooper et al., 2008; McIntosh, 2006; Tabachnick & Fidell, 2013). In general, the Bollen–Stine p-value of .002 compared with the initial ML p-value = .000 represented at least some improvement in this respect and represented that the model was a marginally well-fitting model at best (Byrne, 2016). Once the hypothesized measurement model fitness to the empirical data was confirmed, the next step was to assess the degree of validity and reliability of the constructs aimed at checking the adequacy of measurement model psychometric properties.

4.5 Reliability and validity test report

The reliability and validity of the proposed constructs were evaluated before conducting structural analyses. Assessing the reliability and validity of the constructs help to arrive at a valid interpretation and conclusion of the measurement model (Hair et al., 2014).

4.5.1 Reliability test

According to Ho (2006), internal consistency refers to the extent to which the items that make up the scale are all measuring the same underlying construct. Assessing the internal reliability of the test enables the researcher to decide which items are consistent or not consistent with the test in measuring the variable under investigation. The objective is to modify or remove the less reliable items and improve the reliability or internal consistency of the test.

Although there are different kinds of measuring internal consistency, Cronbach's alpha (α) is the most popular measure of scale reliability (Field, 2013). This study considered the indicator variables to be internally consistent or reliable when the obtained value of the Cronbach's alpha was equal or exceeded 0.7 (Field, 2013; Kline, 2016; Nunnally, 1978; Pallant, 2016). Table 4.4 reports the findings from the reliability test of the observed variables in the study.

Table 4.4 *Reliability Test (Cronbach's α Values) Summaries*

S. No	Scales	No of items in the original scale	No of items deleted during CFA	No of items included in the refined model	Cronbach's α values of the scales
1	Extraversion	8	2	6	.909
2	Agreeableness	9	1	8	.940
3	Conscientiousness	9	1	8	.931
4	Neuroticism	8	1	7	.935
5	Openness	10	2	8	.924
6	Substance use	5	1	4	.899
7	Risky sex	5	2	3	.875

In this study, there were seven subscales (five personality traits and two risky health behaviour measurement scales). As depicted in Table 4.4, the internal consistency (reliability) of the five personality traits scales – extraversion, agreeableness, conscientiousness, neuroticism and

openness – was .909, .940, .931, .935, and .924 respectively. Substance use behaviour and risky sexual behaviour scales had the reliability of Cronbach's α values .899 and .875 respectively. The results indicated that the translated scales items which were included in the refined model had a high level of internal consistency. Further, as indicated in Table 4.4 all constructs had composite reliability (CR) values above the minimum threshold of 0.70, indicating that the factors had an acceptable level of reliability.

4.5.2 Validity of the scales

As in other kinds of statistical methods, SEM requires the analysis of scores with good evidence for validity. Although the reliability score is generally required for validity, it does not guarantee it. The requirement includes a good score of validity, too. Otherwise, the accuracy of the interpretation of the results is doubtful. So, using SEM does not free researchers from thinking about measurement, instead, the opposite is true (Kline, 2016). Thus, some basic validity tests were made to evaluate the instruments:

Convergent validity: Analysis of convergent validity was made based on the magnitude, direction and significance of factor loadings, construct reliability (CR), and Average Variance Extracted (AVE) values. Concerning the magnitude (regression weights) of factor loadings, Hair et al. (2014), recommended that the standardized regression weights should be 0.5 or higher, ideally 0.7 or higher and at a minimum statistically significant. Other most important indices of convergent validity are CR and AVE values. AVE is considered as a strict measure of convergent validity. While some researchers consider CR values $\geq$ .7 as a sufficient condition for convergent validity, some others suggest that AVE value greater or equal to .5 is the acceptable level of convergent validity (see Table 4.5 for details).

Table 4.5 *Construct Validity and Reliability Measures*

	CR	AVE	MSV	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness	SubstanceUse	RiskySex
Extraversion	0.911	0.631	0.048	**0.795**						
Agreeableness	0.940	0.662	0.393	0.162	**0.813**					
Conscientiousness	0.932	0.633	0.393	0.179	0.627	**0.795**				
Neuroticism	0.935	0.673	0.237	-0.209	-0.372	-0.487	**0.821**			
Openness	0.924	0.605	0.342	0.220	0.521	0.585	-0.391	**0.778**		
SubstanceUse	0.918	0.736	0.205	0.042	-0.452	-0.453	0.287	-0.317	**0.858**	
RiskySex	0.882	0.715	0.176	0.419	0.042	-0.343	-0.333	0.151	-0.180	**0.846**

Note. CR = Construct Reliability; AVE = Average Variance Extracted; MSV= Maximum Shared Variance; and the square root of the AVE in the diagonal.

In this study, as indicated in Figure 4.2 and Table 4.2 all 44 indicators of the refined measurement model had a standardized loading greater than 0.7 and as indicated in Table 4.5 all seven constructs had the Average Variance Extracted (AVE) values above the cut-off point of 0.5, which showed the scales had an acceptable level of convergent validity (Hair et al., 2014).

Discriminant validity of constructs: According to Brown (2015), discriminant validity refers to the degree to which measures of different constructs/traits are unrelated. The factors are said to demonstrate sufficient discriminant validity if the correlation matrix among constructs shows no extremely large values (usually greater than 0.8) and if there are no problematic cross-loadings (i.e., indicators should not be correlated more strongly with the other constructs than with its own construct) (Finch, French, & Immekus, 2016).

As Table 4.5 illustrates the discriminant validity of the constructs are satisfying because the bolder diagonal values (0.795, 0.813, 0.795, 0.821, 0.778, 0.858, and 0.846) which are the square root of Average Variance Extracted (AVE) values of a construct were greater than its value on the respective column. The presence of discriminate validity was also achieved when the maximum shared variances (MSV) between constructs are lower than the average variance extracted between the construct and its respective observed variable (Hair et al., 2014). The

value of maximum shared variance (MSV) for all constructs, included in Table 4.5, was lower than the Average Variance Extracted (AVE) values which confirmed the discriminate validity of the constructs.

Another evidence of discriminant validity was determined by examining the factor correlation matrices. As discriminant validity is the extent to which a construct is truly different from other constructs, conceptually correlations among traits should be negligible in order to fulfil the evidence of discriminant validity (Byrne, 2016; Hair et al., 2014). The results of factor correlations are presented in Table 4.6.

Table 4.6 *Factor Correlation Matrixes*

	Extra-version	Agreeab-leness	Conscien-tiousness	Neuro-ticism	Open-ness	Substance Use	Risky Sex
Extraversion	1.00						
Agreeableness	.125	1.00					
Conscientiousness	.137	.458	1.00				
Neuroticism	-.195	-.331	-.428	1.00			
Openness	.169	.384	.426	-.347	1.00		
Substance Use	.030	-.313	-.310	.239	-.219	1.00	
Risky Sex	.033	-.255	-.244	.135	-.133	.292	1.00

As shown in Table 4.6, the correlation between latent constructs ranged from 0.03 to 0.458, which were not extremely large (< 0.8) suggested that the items designed to measure the latent constructs did not overlap, demonstrating sufficient discriminant validity.

4.6 Chapter summary

This chapter aimed at providing the brief statistics of preliminary stages of data analysis concerning the results of data screening, assessment of normality, and Confirmatory Factor Analysis (CFA) or evaluation of the measurement model. Based on the results it can be concluded that although the total number of respondents who completed the questionnaire was 2620, ten cases were excluded from further analysis during data screening and further analysis has been made on responses obtained from 2610 subjects. The distribution of the continuous

variables data was non-normal or violated the assumptions of multivariate and univariate normality.

CFA was conducted to evaluate the measurement model using AMOS software with an ML estimation technique. Although the initial measurement model had seven latent constructs with 54 indicators, the revised measurement model included seven latent variables with only 44 indicator variables. To assess the fit of the revised measurement model, unstandardized regression weights, the standardized regression weights and several model-fit indices were considered. All indicators have a significant loading and standardized loading greater than 0.7, implying that all the indicator variables sufficiently measured the respective latent constructs. The Absolute Fit Indices, Incremental Fit Indices, and Parsimony Fit Indices attested that the theoretical measurement model fits well with the empirical data.

The reliability and validity of the constructs were evaluated. All scales or constructs had internal consistency reliability or Cronbach's α values greater than 0.87 and constructed reliability (CR) values above the minimum threshold of 0.70 indicating that the factors had an acceptable level of reliability. The convergent and discriminant validity of the constructs was also satisfying. Thus, it can be concluded that personality traits, substance use behaviour and risky sexual behaviour instruments were reliable and valid. The data obtained through these instruments can be used for subsequent data analysis to test the research questions and theoretical model hypothesized in this study. Accordingly, the structural model was tested in the next section (Chapter 5).

CHAPTER FIVE

RESULTS

5.1 Introduction

Chapter 5 presents results pertaining to the research questions that mainly focused on the prevalence of substance use and risky sexual behaviour and the predictive relationship among personality traits, substance use and risky sexual behaviours among university students in Ethiopia. The results are presented in three main sections, namely (1) demographic characteristics of the respondents; (2) the prevalence of substance use and risky sexual behaviours among the respondents; and (3) the structural relationships among personality traits, substance use behaviours and risky sexual behaviours.

5.2 Demographic characteristics of the respondents

The biographic information of the respondents included their gender, age, marital status, university, college, and year of study. As illustrated in Table 5.1, the study sample included 1558 (59.7%) males and 1052 (40.3%) females. This gender proportion was consistent with the gender composition report of the five universities' registrars from which respondents were selected in the academic year of 2017/2018.

The overall age of the sample ranged from 18 to 40 years. The majority (97.4%) of the respondents were between 18 to 26 years with the mean age of 21.67 years. This may indicate that almost all respondents were at the same developmental stage that lies between adolescence and adulthood or at emerging adulthood. Considering the marital statuses of the respondents, the majority (93.9%) were unmarried and only 5.6% were married. Table 5.1 presents the number of respondents selected from five Ethiopian public universities by their sex, age, year of study, the field of study and marital status.

Table 5.1 *Demographic Characteristics of the Respondents (N = 2610)*

Background Variables	Labels/categories	Frequency (n)	Percent (%)
Gender	Female	1052	40.3
	Male	1558	59.7
Age ranges in years	20 years old or less	871	33.4
	21-23 years old	1420	54.4
	24-26 years old	250	9.6
	27-29 years old	41	1.6
	30 years old or more	28	1.1
University	Bahir Dar University	822	31.5
	Dilla University	513	19.7
	Dire Dawa University	358	13.7
	Debre Berhan University	424	16.2
	Wollo University	493	18.9
Colleges	Social Science	434	16.6
	Business and Economics	294	11.3
	Natural Science	258	9.9
	Engineering and Computing	973	37.3
	Health and Medicine	190	7.3
	Agriculture	169	6.5
	Law	110	4.2
	Education and Behavioural Science	182	7.0
Year of study	First Year	642	24.6
	Second Year	882	33.8
	Third Year	692	26.5
	Fourth Year	232	8.9
	Fifth Year	162	6.2
Marital status	Married	147	5.6
	Single	2450	93.9
	Divorced	13	0.5

As shown in Table 5.1, based on the respondents' respective universities, 31.5% of respondents were selected from Bahir Dar University, 19.7% from Dilla university, 16.2% from Debre Berhan University, 18.9% from Wollo University, and 13.7% from Dire Dawa University. Based on the year of study, 24.6% of the respondents were selected from first year students, 33.8% from second year students, and 26.5% from third year students. Fourth and fifth year students constituted only 15.1% of the respondents.

5.3 Prevalence of substance use behaviour

The first objective of this study was to determine the prevalence of substance use behaviour among university students in Ethiopia. Under this objective, both lifetime use of the substance (at least once in the lifetime) and current use of the substance (recent past 30 days before the survey) were assessed and are presented in the following two subsections.

5.3.1 Lifetime prevalence of substance use behaviour

The prevalence of lifetime substance use behaviour was assessed using questions like "Have you ever drunk alcohol?" and "Have you ever chewed khat"? Table 5.2 presents the lifetime prevalence of substance use behaviours among respondents.

Table 5.2 *Lifetime Prevalence of Substance Use Behaviours*

	At least one substance	Alcohol	Khat	Shisha	Cigarettes	Marijuana
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Yes	1884 (72.18)	1803 (69.1)	674 (25.8)	349 (13.4)	363 (13.9)	234 (9.0)
No	726 (27.82)	807 (30.9)	1936 (74.2)	2261 (86.6)	2247 (86.1)	2376 (91.0)
Total	2610 (100)	2610 (100)	2610 (100)	2610 (100)	2610 (100)	2610 (100)

As Table 5.2 portrayed, out of the total of 2610 participants, a proportionally higher number of students (72.18%) reported having used at least one of the substances (i.e., alcohol, khat, shisha, cigarette, or marijuana) in their lifetime. About 69.1% had ever drunk alcohol, 25.8% chewed khat, 13.4% smoked shisha, 13.9% smoked cigarettes or tobacco, and 9.0% used marijuana at least once in their lifetime. The most commonly used substance was alcohol followed by khat, cigarettes, shisha and marijuana in their decreasing order. Unlike users of other substances, the number of students who took alcohol (69.1%) is proportionally larger than the number of students who never drunk (30.9%) in their lifetime. This result suggested that drinking alcohol is the most problematic behaviour among university students in Ethiopia.

5.3.2 Current prevalence of substance use behaviour

The current prevalence of substance use behaviour was measured through the past 30 days of substance use experience of the respondents before the survey. Approximately half of the study participants, 1312 (50.27%), had consumed at least one of the substances (i.e., alcohol, khat, shisha, cigarette, or marijuana) during the 30 days before the survey took place. The prevalence of specific substance use behaviours among respondents is indicated in Table 5.3.

Table 5.3 *Current Prevalence of Substance Use Behaviours*

	At least one substance	Alcohol	Khat	Shisha	Cigarettes	Marijuana
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Yes	1312 (50.27)	1208 (46.3)	421 (16.1)	258 (9.9)	178 (6.8)	130 (5.0)
No	1298 (49.73)	1402 (53.7)	2189 (83.9)	2352 (90.1)	2432 (93.2)	2480 (95.0)
Total	2610 (100)	2610 (100)	2610 (100)	2610 (100)	2610 (100)	2610 (100)

As portrayed in Table 5.3, the overall prevalence (30 days before the survey took place) of substance use behaviours were 46.3% for drinking alcohol, 16.1% for chewing khat, 9.9% for smoking shisha, 6.8% for smoking cigarettes, and 5.0% for marijuana use. The result revealed that the most prevalent form of current substance use behaviour was drinking alcohol (46.3%) followed by chewing khat (16.1%) and smoking shisha (9.9%). Currently, smoking cigarettes and marijuana use were relatively the less practised substance use behaviours among the research participants.

5.3.3 Differences between groups in the prevalence of current substance use behaviours

The pattern of students' substance use behaviour in the recent past 30 days before the survey took place was examined in terms of their demographic characteristics. The Chi-square tests of independence results pointed out that there were significant differences in the current prevalence of substance use behaviour among the respondents based on their demographic characteristics such as gender, university, and year of study. The following sections present the results of

current substance use behaviours variations in terms of respondents' gender, university, and year of study.

5.3.3.1 Substance use behaviour differences based on respondents' gender

Five Chi-square tests were conducted using cross-tabulation to investigate gender differences in drinking alcohol, chewing khat, smoking shisha, smoking cigarettes and the use of marijuana. Significant differences were observed between males and females in the prevalence of substance use. Table 5.4 presents the results concerning gender differences in substance use behaviours.

Table 5.4 *Prevalence of Substance Use Behaviours Difference by Gender*

Variables	Gender	Responses			Pearson's Chi-square test with 95% confidence intervals			Cramer's V
		Yes n (%)	No n (%)	Total n (%)	χ^2	df	p	
Drunk alcohol in the past 30 days	Male	854 (54.8)	704 (45.2)	1558 (100)	113.133	1	.000	.208
	Female	354 (33.7)	698 (66.3)	1052 (100)				
Chewed khat in the past 30 days	Male	344 (22.1)	1214 (77.9)	1558 (100)	101.130	1	.000	.197
	Female	77 (7.3)	975 (92.7)	1052 (100)				
Smoked shisha in the past 30 days	Male	214 (13.7)	1344 (86.3)	1558 (100)	64.335	1	.000	.157
	Female	44 (4.2)	1008 (95.8)	1052 (100)				
Smoked cigarette in the past 30 days	Male	156 (10.0)	1402 (90.0)	1558 (100)	62.010	1	.000	.154
	Female	22 (2.1)	1030 (97.9)	1052 (100)				
Used marijuana in the past 30 days	Males	113 (7.3)	1445 (92.7)	1558 (100)	42.161	1	.000	.127
	Females	17 (1.6)	1035 (98.4)	1052 (100)				

As Table 5.4 portrayed, proportionally a higher number of males were found to use the five kinds of substances (alcohol, khat, shisha, cigarettes, and marijuana) than females in the past 30 days before the survey. The proportions of male substance users and female substance users respectively were 54.8% and 33.7% for drinking alcohol, 22.1% and 7.3%, for chewing khat, 13.7% and 4.2% for smoking shisha, 10% and 2.1% for smoking cigarettes, and 7.3% and 1.6%

for use of marijuana. The Chi-square test results for gender differences was, $\chi2(1, N = 2610) = 113.13$, $p = .000$, Cramer's $V = .208$ for drinking alcohol; $\chi2(1, N = 2610) = 101.130$, $p = .000$, Cramer's $V = .197$ for chewing khat; $\chi2(1, N = 2610) = 64.335$, $p = .000$, Cramer's $V = .157$ for smoking shisha; $\chi2(1, N = 2610) = 62.010$, $p = .000$, Cramer's $V = .154$ for smoking cigarette; and $\chi2(1, N = 2610) = 42.161$, $p = .000$, Cramer's $V = .127$ for using marijuana. All of the results are statistically significant at $p < .001$. See more details in Table 4.4. However, based on Cohen's (1988) general guidelines, Cramér's "V" values for all tests were between .10 and .30 suggesting that the strength of association between gender and the five kinds of substance use behaviours were small.

Based on another measure of effect size (risk estimate or odds ratio) for a 2x2 contingency table, the odds of drinking alcohol were 2.39 times higher among males than females. Similarly, males were 3.58 times more likely to chew khat; 3.65 times more likely to smoke shisha; 5.21 times more likely to smoke cigarettes; and 4.76 times more likely to use marijuana than female counterparts. Based on these results it is possible to conclude that substance use behaviour is a more prevalent problem among male students than among female students.

5.3.3.2 Substance use behaviour differences based on respondents'universities

Chi-square tests of independence were conducted to examine whether differences exist in the current prevalence of substance use behaviours among students of the five universities. As the Chi-square tests were made using a contingency table larger than a 2×2, the Bonferroni-adjusted p-values $= .005$ were used as a reference to test for significance and Cramér's "V" was employed as a measure of effect size. Some significant differences between respondents' universities in the prevalence of substance use behaviours were observed. Table 5.5 illustrates the current prevalence of substance use behaviour by universities.

Table 5.5 *Prevalence of Substance Use Behaviours Difference by Universities (Cross Tabs)*

| Variables | University | Responses | | | Pearson's χ^2 test with 95 % confidence intervals | | | Cramer's V |
		Yes n (%)	No n (%)	Total n (%)	χ^2	df	p	
Drunk alcohol in the past 30 days	Bahir Dar	377 (45.9)	445 (54.1)	822 (100)	10.792	4	.029	.064
	Dilla	226 (44.1)	287 (55.9)	513 (100)				
	Dire Dawa	180 (50.3)	178 (49.7)	358 (100)				
	DebreBerhan	217 (51.2)	207 (48.8)	424 (100)				
	Wollo	208 (42.2)	285 (57.8)	493 (100)				
Chewed khat in the past 30 days	Bahir Dar	79(9.6)	743 (90.4)	822 (100)	76.143	4	.000	.171
	Dilla	106 (20.7)	407 (79.3)	513 (100)				
	Dire Dawa	102 (28.5)	256 (71.5)	358 (100)				
	DebreBerhan	66 (15.6)	358 (84.4)	424 (100)				
	Wollo	68 (13.8)	425 (86.2)	493 (100)				
Smoked shisha in the past 30 days	Bahir Dar	54 (6.6)	768 (93.4)	822 (100)	58.595	4	.000	.150
	Dilla	46 (9.0)	467 (91.0)	513 (100)				
	Dire Dawa	71 (19.8)	287 (80.2)	358 (100)				
	DebreBerhan	53 (12.5)	371 (87.5)	424 (100)				
	Wollo	34 (6.9)	459 (93.1)	493 (100)				
Smoked cigarette in the past 30 days	Bahir Dar	28 (3.4)	794 (96.6)	822 (100)	31.195	4	.000	.109
	Dilla	49 (9.6)	464 (90.4)	513 (100)				
	Dire Dawa	35 (9.8)	323 (90.2)	358 (100)				
	DebreBerhan	39 (9.2)	385 (90.8)	424 (100)				
	Wollo	27 (5.5)	466 (94.5)	493 (100)				
Used marijuana in the past 30 days	Bahir Dar	23 (2.8)	799 (97.2)	822 (100)	17.068	4	.002	.081
	Dilla	31 (6.0)	482 (94.0)	513 (100)				
	Dire Dawa	28 (7.8)	330 (92.2)	358 (100)				
	Debre Berhan	26 (6.1)	398 (93.9)	424 (100)				
	Wollo	22 (4.5)	471 (95.5)	493 (100)				

As can be seen by the frequencies cross-tabulated in Table 5.5, the prevalence of drinking alcohol behaviour was higher among Debre Berhan University respondents (51.2%) followed by Dilla University respondents (50.3%), Bahir Dar University respondents (45.9%), Wollo University respondents (42.2%), and Dilla University respondents (41.1%). The Chi-square test result of the difference in the prevalence of drinking alcohol among the respondents of the five universities was not statistically significant, χ^2(4, N = 2610) = 10.792, *p* = .029, Cramer's *V* =

.064. The overall p-value = .029 was greater than the Bonferroni-adjusted p-values .005, which indicated that there was no significant association between the prevalence of drinking alcohol and respondents' universities. Based on Cohen's 1988 guideline, Cramer's V = .064 also indicates that the association between drinking alcohol behaviour and respondents' universities was negligible (see Table 5.5 and Appendix E3, Table E3.1).

Khat chewing was highly prevalent among Dire Dawa University respondents (28.5%) followed by Dilla University (20.7%), Debre Berhan University (15.6%), Wollo University (13.8%), and Bahir Dar University (9.6%). The Chi-square test result indicated that there were statistically significant differences ($p < .005$) in the prevalence of chewing khat across universities, $\chi^2(4, N = 2610) = 76.143$, $p = .000$, Cramer's $V = .171$. The post hoc test indicated that a significantly higher proportion of khat chewers were found among Dire Dawa University and Dilla University respondents and a significantly lower proportion of khat chewers were found among Bahir Dar University respondents. The corresponding p-values for the tests of the above three universities were less than the Bonferroni-adjusted p-value .005. However, the strength of the association between chewing khat and respondents' universities (Cramer's $V = .171$) was small (see Table 5.5 and Appendix E3, Table E3.1).

Like in the case of chewing khat, smoking shisha was highly prevalent among Dire Dawa University respondents (19.8%) followed by Debre Berhan University respondents (12.5%), DillaUniversity respondents (9.0%), Wollo University respondents (6.9%), and Bahir Dar University respondents (6.6%) and their difference was statistically significant, $\chi^2(4, N = 2610) = 58.595$, $p = .000$, Cramer's $V = .150$. The post hoc test indicated that a significantly higher proportion of shisha smokers were found among Dire DawaUniversity and a significantly lower proportion of khat chewers were found among Bahir Dar University respondents. The corresponding p-values for the tests of the above three universities were less than the Bonferroni-adjusted p-value .005. However, the strength of the association between smoking shisha and respondents' universities (Cramer's = .150) was found to be small (see Table 5.5 and Appendix E3, Table E3.1).

Smoking cigarettes was also highly prevalent among Dire Dawa University respondents (9.8%) followed by Dilla University respondents (9.6%), Debre Berhan University respondents (9.2%), Wollo University respondents (5.5%), and Bahir Dar University respondents (3.4%) and their difference was statistically significant, $\chi^2(4, N = 2610) = 31.195$, $p = .000$, Cramer's $V = .109$. According to the post hoc test result, a significantly lower proportion of cigarette smokers were found among Bahir Dar University respondents. But, the strength of the association between smoking cigarettes and respondents' universities (Cramer's $V = .109$) was small (see Table 5.5 and Appendix E3, Table E3.1).

Marijuana use was also highly prevalent among Dire Dawa University respondents (7.8%) followed by Debre Berhan University respondents (6.1%), Dilla University respondents (6%), Wollo University respondents (4.5%), and Bahir Dar University respondents (2.8%) and their difference was significant, $\chi^2(4, N = 2610) = 17.068$, $p = .002$, Cramer's $V = .081$. The overall p-value of the Chi-square test (.002) was slightly less than the Bonferroni-adjusted p-values (.005) imply that there are statistically significant associations between marijuana use and respondents' universities. The post hoc test also indicated that a significantly lower proportion of marijuana use was observed among Bahir Dar university respondents. However, the associated value of Cramer's $V = .081$ indicated that the strength of the association between marijuana use and respondents' universities is negligible (see Table 5.5 and Appendix E3, Table E3.1 for details).

5.3.3.3 Substance use behaviours differences based on respondents' year of study

Chi-square tests of independence were conducted to examine whether differences in the prevalence of students' substance use behaviour exist across respondents' years of study. Respondents were divided into 5 groups based on their year of study from first year to fifth year. Accordingly, a 5×2 cross-tabulation was computed and the Bonferroni-adjusted p-values = .005 were used as a reference to test for significance. The result showed that there are significance batch differences in the prevalence of all (the five) types of substance use behaviours. Table 5.6 presented the prevalence of respondents' current substance use behaviour by year of study.

Table 5.6 *Prevalence of Substance Use Behaviour Differences by Respondents' Year of Study*

	Year of Study	Responses			Pearson's χ^2 test with 95% confidence intervals			Cramer's V
		No n (%)	Yes n (%)	Total n (%)	Value	df	Sig.	
Drunk alcohol in the past 30 days	First Year	383 (59.7)	259 (40.3)	642 (100)	41.809	4	.000	.127
	Second Year	511 (57.9)	371 (42.1)	882 (100)				
	Third Year	326 (47.1)	366 (52.9)	692 (100)				
	Fourth Year	96 (41.4)	136 (58.6)	232 (100)				
	Fifth Year	86 (53.1)	76 (46.9)	162 (100)				
Chewed khat in the past 30 days	First Year	633 (98.6)	9 (1.4)	642 (100)	207.950	4	.000	.282
	Second Year	753 (85.4)	129 (14.6)	882 (100)				
	Third Year	483 (69.8)	209 (30.2)	692 (100)				
	Fourth Year	190 (81.9)	42 (18.1)	232 (100)				
	Fifth Year	130 (80.2)	32 (19.8)	162 (100)				
Smoked shisha in the past 30 days	First Year	137 (96.0)	25 (4)	642 (100)	79.441	4	.000	.174
	Second Year	822 (93.2)	60 (6.8)	882 (100)				
	Third Year	576 (83.2)	116 (16.8)	692 (100)				
	Fourth Year	201 (86.6)	31 (13.4)	232 (100)				
	Fifth Year	616 (84.6)	26 (15.4)	162 (100)				
Smoked cigarette in the past 30 days	First Year	629 (98.0)	13 (2.0)	642 (100)	62.834	4	.000	.155
	Second Year	838 (95.0)	44 (5.0)	882 (100)				
	Third Year	617 (89.2)	75 (10.8)	692 (100)				
	Fourth Year	209 (90.1)	23 (9.9)	232 (100)				
	Fifth Year	139 (85.8)	23 (14.2)	162 (100)				
Used marijuana in the past 30 days	First Year	630 (98.1)	12 (1.9)	642 (100)	52.614	4	.000	.142
	Second Year	850 (96.4)	32 (3.6)	882 (100)				
	Third Year	643 (92.9)	49 (7.1)	692 (100)				
	Fourth Year	218 (94.0)	14 (6.0)	232 (100)				
	Fifth Year	139 (85.8)	23 (14.2)	162 (100)				

As portrayed by the frequencies cross-tabulated in Table 5.6, the prevalence of the five kinds of substance use behaviours increased with an increase in years of study for the first three years of study groups (batches). However, this pattern of increase in the prevalence of substance use changed between third year and fourth year respondents. This pattern of increase in the

prevalence of substance use behaviours (except for drinking alcohol) was also observed when fifth year respondents were compared with fourth year respondents.

The prevalence of drinking alcohol was higher among fourth year respondents (58.6%) followed by third year respondents (52.9%), fifth year respondents (46.9%), second year respondents (42.1%), and first year respondents (40.3%). The result of the Chi-square test of independence in the prevalence of drinking alcohol among the respondents of the five batches was significant, χ^2(4, N = 2610) = 41.809, p = .000, Cramer's V = .127. As the overall p-value = .000 was less than the Bonferroni-adjusted p-values .005, the result indicated that there were significant differences in drinking alcohol behaviour among respondents of different study year batches. As the post hoc test result indicated, a significantly higher proportion of alcohol drinkers were found among fourth year and third year respondents, a significantly lower proportion of respondents were found among first year and second year respondents. However, based on Cohen's (1988) guidelines, Cramer's V = .127 indicated that the association between drinking alcohol and respondents' year of study was small (see Table 5.6 and Appendix E3, Table E3.2).

Chewing khat was highly prevalent among third year respondents (30.2%) followed by fifth year respondents (19.8%), fourth year respondents (18.1%), second year respondents (14.6%), and first year respondents (1.4%). The Chi-square test of independence results indicated that there were significant differences in chewing khat among respondents of different batches, χ^2(4, N = 2610) = 207.950, p = .000, Cramer's V = .282. The post hoc test result attested that a significantly higher proportion of khat chewers were found among third year respondents and a significantly lower proportion of respondents were found among first year respondents. Based on Cohen's (1988) guidelines, Cramer's V = .282 indicated that the association between khat chewing behaviour and respondents' year of study was small (see Table 5.6 and Appendix E3, Table E3.2).

The prevalence of smoking shisha was higher among third year respondents (16.8%) followed by fifth year respondents (15.4%), fourth year respondents (13.4%), second year respondents (6.8%), and first year respondents (4.0%). The Chi-square test of independence results indicated that there were significant differences in smoking shisha behaviour among respondents from

different study year batches, χ^2(4, N = 2610) = 79.441, p = .000, Cramer's V = .174. The post hoc test result attested that a significantly higher proportion of smoking shisha was found among third year respondents and a significantly lower proportion of shisha smoker respondents were found among first year respondents. Based on Cohen's 1988 guideline, Cramer's V = .174 indicated that the association between shisha smoking behaviour and respondents' year of study was small (see Table 5.6 and Appendix E3, Table E3.2).

Smoking cigarettes was highly prevalent among fifth year respondents (14.2%) followed by third year respondents (10.8%), fourth year respondents (9.9%), second year respondents (5.0%), and first year respondents (2.0%). The Chi-square test of independence results pointed out that there were significant differences in cigarette smoking behaviour among respondents from different years of study batches, χ^2(4, N = 2610) = 62.834, p = .000, Cramer's V = .155. The post hoc test result confirmed that a significantly higher proportion of cigarette smokers were found among third and fifth year respondents and a significantly lower proportion of cigarette smoker respondents were found among first year respondents. Based on Cohen's (1988) guidelines, Cramer's V = .155 indicated that the association between cigarette smoking behaviour and respondents' year of study was small (see Table 5.6 and Appendix E3, Table E3.2).

The prevalence of using marijuana was higher among fifth year respondents (14.2%) followed by third year respondents (7.1%), fourth year respondents (6.0%), second year respondents (3.6%), and first year respondents (1.9%). The Chi-square test of independence results indicated that there were significant differences in the behaviour of using marijuana among respondents of the different year of study, χ^2(4, N = 2610) = 52.614, p = .000, Cramer's V = .142. The post hoc test result confirmed that a significantly higher proportion of marijuana users were found among fifth year and third year respondents and a significantly lower proportion of marijuana user respondents were found among first year respondents. Though, based on Cohen's (1988) guidelines, Cramer's V = .142 indicated that the association between marijuana use behaviour and respondents' year of study was small (see Table 5.6 and Appendix E3, Table E3.2).

In sum, the results proved that a substantial number of students consumed one or more types of substances in their lifetime. The most commonly ever used substance was alcohol followed by

khat, cigarettes, shisha and marijuana in their decreasing order. The most prevalent form of a current (recent past 30 days) substance use behaviour was drinking alcohol followed by chewing khat, smoking shisha, smoking cigarette, and marijuana. Both lifetime and current prevalence of substance use behaviours suggested that while drinking alcohol and chewing khat were the most prevalent problem behaviours, marijuana use was the least practised health risk behaviour.

The Chi-square test of independence results pointed out that there were significant differences in the current prevalence of substance use behaviour among the respondents based on their gender, university, and year of study. A significantly higher proportion of males was found to use the five kinds of substances (alcohol, khat, shisha, cigarette, and marijuana) than females. Significant differences between respondents' universities were also observed in the prevalence of chewing khat, smoking shisha, smoking cigarettes and marijuana use behaviours. The post hoc tests attested that significantly higher proportion of khat chewers and shisha smokers were found among respondents of Dire Dawa University and a significantly lower percentage of khat chewers, shisha smokers, cigarette smokers, and marijuana users were found among Bahir Dar university respondents.

Differences in the prevalence of students' substance use behaviour were also observed across respondents' year of study. The prevalence of the five kinds of substance use behaviours increased with an increase in years of study for the first three years (batches). Although this pattern of increase in the prevalence of substance use has changed between third year and fourth year respondents for most (four) kinds of substance use behaviours, the pattern of the increase was also observed between fourth year and fifth year respondents for all kinds of substances use behaviours other than drinking alcohol. The post hoc tests also confirmed that significantly higher proportions of substance users were found among third year, fourth year and fifth year respondents and significantly lower proportion of substance users were first year respondents for almost all kinds of substances. Following the assessment of the prevalence of substance use behaviours and risky sexual behaviours, their interrelationship was examined and the results are presented in the next section.

5.4 Prevalence of risky sexual behaviour

The second objective of this study was to determine the proportion of university students engaged in risky sexual behaviours. Both lifetime and current (the recent past three months) sexual experiences of the respondents were assessed and the results are presented in the following sections.

5.4.1 Lifetime and current sexual experience of the respondents

The lifetime sexual experience of the respondents was assessed through a question "Have you ever had sexual intercourse in your lifetime?" and the current (past three months) sexual experience was assessed through a question "Have you ever had sexual intercourse in the past three months?" Responses were organised and presented in Table 5.7 as follows.

Table 5.7 *Lifetime and Current Sexual Experience of Students*

	Yes		No		Total	
	n	%	n	%	n	%
Ever had sex	1050	40.2	1560	59.8	2610	100
Sex in the recent past 3 months	669	25.6	1941	74.4	2610	100

As shown in Table 5.7, out of the total of 2610 respondents, about 1050 (40.2%) have had sexual intercourse at least once in their lifetime. With regard to current sexual intercourse practice, respondents were asked whether they have had sexual intercourse in the recent past three months. Based on their response, out of 2610 respondents, only 669 (25.6%) were sexually active or had sexual intercourse in the past three months. Out of 669 sexually active respondents, 447 (66.82%) were males and 222 (33.18%) were females. The next sections present the prevalence of risky sexual behaviours among sexually active respondents.

5.4.2 Prevalence of risky sexual behaviour among sexually active respondents

The prevalence of risky sexual behaviours among sexually active (i.e., 669 respondents) who practised sexual intercourse in the past three months was measured using the five indicators of risky sexual behaviours which included age of first sexual intercourse, number of sexual

partners, the incidence of alcohol or drug-induced sex, incidence of unsafe sex and sexual intercourse with a casual sex partner. Table 5.8 presented the sexual practices/experiences of sexually active respondents.

Table 5.8 *Sexual Practices of Sexually Active Respondents*

Risky sexual behaviour indicator items	Labels/responses	Female n (%)	Male n (%)	Total N (%)
How old were you when you had sexual intercourse for the first time?	At ≤14years old	1 (0.5)	28 (6.3)	29 (4.3)
	At 15 years old	6 (2.7)	29 (6.5)	35 (5.2)
	At 16 years old	14 (6.3)	41 (9.2)	55 (8.2)
	At 17 years old	39 (17.6)	77 (17.2)	116(17.3)
	At ≥18 years old	162 (73.0)	272 (60.9)	434 (64.9)
	Total	222 (33.18)	447 (66.82)	669 (100)
During your lifetime, how many partners have you had sexual intercourse with?	With 1 person	125 (56.3)	114 (25.5)	239 (35.7)
	With 2 persons	50 (22.5)	109 (24.4)	159 (23.8)
	With 3 persons	40 (18.0)	101 (22.6)	141 (21.1)
	With ≥4 persons	7 (3.2)	123 (27.5)	130 (19.4)
	Total	222 (33.18)	447 (66.82)	669 (100)
How often do you drink alcohol or use drugs before you had sexual intercourse?	Never	118 (53.2)	196 (43.8)	314 (46.9)
	Rarely	52 (23.4)	151 (33.8)	203 (30.3)
	Sometimes	28 (12.6)	56 (12.5)	84 (12.6)
	Mostly	23 (10.4)	30 (6.7)	53 (7.9)
	Always	1 (0.5)	14 (3.1)	15 (2.2)
	Total	222 (33.18)	447 (66.82)	669 (100)
How often did you have sex without a condom?	Never	66 (29.7)	106 (23.7)	172 (25.7)
	Rarely	54 (24.3)	117 (26.2)	171 (25.6)
	Sometimes	58 (26.1)	89 (19.9)	147 (22.0)
	Mostly	32 (14.4)	89 (19.9)	121 (18.1)
	Always	12 (5.4)	46 (10.3)	58 (8.7)
	Total	222 (33.18)	447 (66.82)	669 (100)
How often do you have sex with a casual partner whose health status is unknown?	Never	147 (66.2)	219 (49.0)	366 (54.7)
	Rarely	21 (9.5)	88 (19.7)	109 (16.3)
	Sometimes	27 (12.2)	82 (18.3)	109 (16.3)
	Mostly	22 (9.9)	48 (10.7)	70 (10.5)
	Always	5 (2.3)	10 (2.2)	15 (2.2)
	Total	222 (33.18)	447 (66.82)	669 (100)

As Table 5.8 portrayed, the five forms of risky sexual behaviours were highly prevalent among sexually active respondents. The most prevalent form of risky sexual behaviour had multiple (two or more) sexual partners (64.3%), followed by practising unsafe sex (rarely, sometimes,

mostly, or always) (62.03%), alcohol or drug-induced sex (rarely, sometimes, mostly, or always) (53.1%), casual sex at least once (45.3%), and early sexual debut or sexual intercourse before the age of 18 years (35.1%). The following subsections presented the prevalence of the five forms of risky sexual behaviours separately.

Early sexual debut: The majority (64.9%) of sexually active respondents started sexual intercourse at the age of 18 years or older and about 17.3% began sexual intercourse at the age of 17 years old. The rest 8.2% started sexual intercourse at the age of 16 years old, 5.2% began sexual intercourse at the age of 15, and 4.3% began at the age of 14 or younger years old. In sum, about 17.7% of respondents started sexual intercourse at the age of 16 years or younger (at the stage of young adolescents) when adolescents were dominated by emotion than thinking and reasoning in which sexual activities are more likely to be unsafe and unplanned causing psychosocial and health problems.

The number of sex partners: Only 35.7% of the sexually active participants reported having only one sexual partner. About 23.8% have two sexual partners, 21.1% have three sexual partners, and the rest 19.4% have 4 or more sexual partners. In this study, sexual intercourse with two or more sexual partners (at a time or in the form of serial monogamy) was considered as a risky sexual practice. Thus, out of sexually active respondents, about 64.3% have two or more sexual partners and they can be labelled as practising risky sexual activities.

Alcohol or drug-induced sex: Out of the total of sexually active respondents only 46.9% did not drink alcohol or use the drug before or during sexual intercourse. The rest majority (53.1%) of respondents reported that they had used a drug or drunk alcohol either sometimes or regularly before or during sexual intercourse.

Sexual intercourse without a condom or unsafe sex: Out of the total of 669 sexually active population, about 498 (74.3%) have had sexual intercourse without a condom (either rarely, sometimes, most of the time or always) in the past three months. Out of these 498 respondents who had sexual intercourse without a condom, only 83 (16.67%) respondents were married or in a relationship, the rest 415 (83.3%) respondents were single or unmarried. Hence, about 62.03%

of unmarried sexually active respondents practised unsafe sex. This might indicate that there is a high prevalence of unsafe sex among the sexually active unmarried respondents.

Casual sex: Out of sexually active respondents, about 45.3% of respondents had casual sex with someone whose health status is unknown at least once or at most always in the past three months during their sexual intercourse encounters. Based on the above indicators it is possible to say that there was a high prevalence of risky sexual behaviours among sexually active respondents.

5.4.3 Differences between groups in the prevalence of risky sexual behaviours

The disparity in the prevalence of risky sexual behaviour among sexually active respondents in terms of their demographic characteristics was examined through MANOVA. The result pointed out that there were significant mean differences in risky sexual behaviour among the respondents based on their demographic characteristics. The following sections presented the results of mean differences in risky sexual behaviours among gender, university, and year of study groups.

5.4.3.1 Differences in the prevalence of risky sexual behaviours between gender groups

A one-way multivariate analysis of variance (MANOVA) was conducted to determine gender differences in risky sexual behaviours. The risky sexual behaviour variables were the age of sexual debut, the number of sex partners, incidence of alcohol or drug-induced sex, incidence of unsafe sex and incidence of casual sex. The results of MANOVA revealed that there are significant differences among the gender categories on the combined dependent variables or risky sexual behaviours [Pillai's Trace = .140, $F(5, 663) = 21.605$, $p = .000$, multivariate $\eta^2 = .140$]. This may indicate that 14% of the variance in risky sexual behaviours can be attributed to gender differences (**s**ee Appendix E4, Table E4.1for details).

Given the significance of the overall test, the univariate analysis of variance (ANOVA) was conducted on each dependent variable as a follow-up test to MANOVA. Significant gender differences were obtained in the mean age of first sexual intercourse [$F(1, 667) = 19.972$, $p < .001$, partial $\eta^2 = .029$]; number of sex partners [$F(1, 667) = 95.975$, $p < .001$, partial $\eta^2 = .126$]; incidence of unsafe sex [$F(1, 667) = 6.358$, $p < .05$, partial $\eta^2 = .009$; and incidence of casual sex

$[F(1, 667) = 7.996, p < .01$, partial $\eta^2 = .012$. However, the difference in the average number of incidence of alcohol or drug induced sex between males and females was not significant $[F(1, 667) = 1.339, p = .248$, partial $\eta^2 = .002]$ (see Appendix E4, Table E4.1 for details). Table 5.9 also presents mean values for risky sexual behavioursby age category.

Table 5.9 *Means and Standard Deviations for Age at First Sexual Intercourse, Number of sex Partners, Incidences of Alcohol or Drug-Induced Sex, Unsafe Sex and Casual Sex by Gender*

Gender	Age at first sex		Number of Partners		Incidence of Alcohol or Drug-Induced Sex		Incidence of Unsafe Sex		Incidence of Casual Sex		N
	M	SD	M	SD	M	SD	M	SD	M	SD	
Female	4.60	.765	2.67	.860	1.82	1.041	2.41	1.195	1.71	1.121	222
Male	4.20	1.219	3.52	1.146	1.91	1.053	2.67	1.310	1.98	1.143	447

As presented in Table 5.9, male respondents have younger mean age for sexual debut ($M = 4.20$, $SD = 1.219$) than females ($M = 4.60$, $SD = .765$). Males have higher average number of sex partners ($M = 3.52$, $SD = 1.146$) compared to females ($M = 2.64$, $SD = .860$). The incidence of unsafe sex is also slightly higher for males ($M = 2.67$, $SD = 1.310$) than females ($M = 2.41$, $SD = 1.195$). Males have also higher average number of incidence of casual sex ($M = 1.98$, $SD = 1.143$) than females ($M = 1.71$, $SD = 1.121$). However, based on Cohen's (1988) effect size general interpretive guidelines, η^2 of $.01 =$ small, $.06 =$ medium, and $.14 =$ large, the univariate effect sizes for gender differences on age at first sexual intercourse, incidence of unsafe sex, and number of sex partners were very small (see Appendix E4, Table E4.1 for details).

5.4.3.2 Differences in the prevalence of risky sexual behaviours among respondents' universities

A one-way multivariate analysis of variance (MANOVA) was conducted to determine differences among the five university respondents in risky sexual behaviours. The risky sexual behaviour variables were the age of sexual debut, the number of sex partners, incidence of alcohol or drug-induced sex, incidence of unsafe sex and incidence of casual sex. MANOVA results revealed that there are significant differences among the respondents of the five universities on the combined risky sexual behaviours [Pillai's Trace = .105, $F(20, 2652) = 3.562$,

$p = .000$, multivariate $\eta^2 = .026$]. This may refer that about 2.6% of the variance in risky sexual behaviours can be attributed to university differences. See Table 5.9 and Appendix E4, Table E4.2 for details.

Given the significance of the overall test, the univariate analysis of variance (ANOVA) was carried out on each dependent variable as a follow-up test to MANOVA. Significant differences among respondents' universities were obtained on the age of first sexual intercourse [$F(4, 664) = 4.146$, $p < .01$, partial $\eta^2 = .024$]; number of sex partners [$F(4, 664) = 5.083$, $p < .001$, partial $\eta^2 = .030$]; incidence of alcohol or drug induced sex [$F(4, 664) = 8.303$, $p < .001$, partial $\eta^2 = .048$; and incidence of unsafe sex [$F(4, 664) = 3.430$, $p < .01$, partial $\eta^2 = .020$. However, difference in the incidence of casual sex was not significant [$F(4, 664) = .781$, $p = .538$, partial $\eta^2 = .005$] (see Appendix E4, Table E4.2 for details). Table 5.10 presents mean values for risky sexual behavioursbyrespondents' universities.

Table 5.10 *Means and Standard Deviations for Age of sexual debut, Number of Sex Partners, Incidences of Alcohol or Drug-Induced Sex, Unsafe Sex and Casual Sex by Respondents' University*

University	Age of Sexual Debut		Number of Partners		Incidence of Alcohol or Drug-Induced Sex		Incidence of Unsafe Sex		Incidence of Casual Sex		N
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	
Bahir Dar Univ	4.31	1.042	3.27	1.127	1.78	.979	2.30	1.247	1.77	1.080	171
DillaUniv	4.45	.972	3.07	1.074	1.86	.924	2.62	1.276	1.89	1.134	159
Dire DawaUniv	4.06	1.291	3.64	1.079	2.40	1.187	2.83	1.250	2.01	1.119	104
DebreBerhanUniv	4.58	.952	3.07	1.118	1.74	.987	2.72	1.275	1.90	1.238	119
WolloUniv	4.19	1.264	3.22	1.200	1.73	1.114	2.57	1.300	1.93	1.163	116

Note. Univ = University

The mean values of risky sexual behaviours presented in Table 5.10 were compared through multiple mean comparison procedure using the Games-Howell test. The Games-Howell post hoc analysis result revealed that a significant difference in the mean age of sexual debut or age of

first sexual intercourse was observed only between respondents of Dire Dawa University and Debre Berhan University. Sexual debut or age of first sexual intercourse was significantly at a younger age among Dire Dawa University respondents (M = 4.06, SD = 1.291) compared against Debre Berhan University respondents (M = 4.58, SD = 0.952). Number of sexual partners was also significantly higher among Dire Dawa University respondents (M = 3.64, SD = 1.079) compared against Dilla University (M = 3.07, SD = 1.074), Debre Berhan University (M = 3.07, SD = 1.118), and Bahir Dar University respondents (M = 3.27, SD = 1.127).

Incidence of alcohol and drug-induced sex was also significantly higher among respondents of Dire Dawa University respondents (M = 2.40, SD = 1.187) compared against the four universities - Dilla University respondents (M = 1.86, SD = 0.924), Debre Berhan University respondents (M = 1.74, SD = 0.987), Bahir Dar University respondents (M = 1.78, SD = 0.979), and Wollo University respondents (M = 1.73, SD = 1.114). The incidence of unsafe sex was also significantly higher among Dire Dawa University respondents (M = 2.83, SD = 1.250) compared with Bahir Dar University respondents (M = 2.30, SD = 1.247). Although, there was significantly higher incidence of unsafe sex among Debre Berhan University respondents (M = 2.72, SD = 1.275) compared with Bahir Dar University respondents (M = 2.30, SD = 1.247), the level of significance (p = .046) was poor (see Table 5.10 and Appendix E4, Table E4.2 for details).

5.4.3.3 Differences in the prevalence of risky sexual behaviours among respondents' years of study

A one-way multivariate analysis of variance (MANOVA) was conducted to determine differences among respondents of different years of study in risky sexual behaviours. The risky sexual behaviour variables were the age of sexual debut, the number of sex partners, incidence of alcohol or drug-induced sex, incidence of unsafe sex and incidence of casual sex. The results of MANOVA revealed that there are significant differences among the respondents of different years of study on the combined risky sexual behaviours [Pillai's Trace = .083, F(20, 2652) = 2.798, p = .000, multivariate η^2 = .021]. This may indicate that 2.1% of the variance in risky sexual behaviours can be due to differences in years of study (see Appendix E4, Table E4.3 for details).

Given the significance of the overall test, the univariate analysis of variance (ANOVA) was employed on each dependent variable as a follow-up test to MANOVA. Significant differences among respondents' year of studies were obtained for age at first sexual intercourse [$F(4, 664) =$ 3.604, $p < .01$, partial $\eta^2 = .021$] and incidence of unsafe sex [$F(4, 664) = 4.241$, $p < .01$, partial $\eta^2 = .025$. However, the difference in the number of sexual partners, the incidence of alcohol or drug-induced sex, and the incidence of casual sex among respondents of different years of study were not significant (see Appendix E4, Table E4.3 for details). Table 5.11 also presents the mean values of risky sexual behaviours by respondents' years of studies.

Table 5.11 *Means and Standard Deviations for Age of Sexual Debut, Number of Sex Partner, Incidence of Alcohol or Drug-Induced Sex, Incidence of Unsafe Sex and Incidence of Casual Sex by Respondents' Year of study*

Year of Study	Age at First Sex		Number of Sex Partners		Incidence of Alcohol or Drug -Induced Sex		Incidence of Unsafe Sex		Incidence of Casual Sex		N
	M	SD	M	SD	M	SD	M	SD	M	SD	
First Year	4.20	1.292	3.21	1.086	1.60	.834	2.30	1.234	1.80	1.073	94
Second Year	4.17	1.127	3.25	1.119	1.92	1.098	2.74	1.324	1.91	1.187	238
Third Year	4.43	1.021	3.27	1.156	1.95	.984	2.40	1.237	1.96	1.147	212
Fourth Year	4.53	1.126	3.29	1.092	1.89	1.152	2.77	1.200	1.85	1.113	66
Fifth Year	4.61	.831	3.02	1.225	1.93	1.216	2.83	1.248	1.73	1.080	59

The mean values presented in Table 5.11were compared through Games-Howell multiple mean comparison procedure. The Games-Howell post hoc analysis revealed that a significant difference in sexual debut or age of first sexual intercourse was observed only between fifth year and second year respondents. Second year respondents begin sexual intercourse at early/younger age ($M = 4.17$, $SD = 1.127$) compared against fifth year respondents ($M = 4.61$, $SD = 0.831$). Incidence of unsafe sex was also significantly higher among second year respondents ($M = 2.74$, $SD = 1.324$) compared against third year ($M = 2.40$, $SD = 1.237$) and first year ($M = 2.30$, $SD = 1.234$) respondents (see Appendix E4, Table E4.3 for details).

125

In sum, the results proved that about 40.2% of respondents had had sexual intercourse at least once in their lifetime and about 25.6% were sexually active or have had sexual intercourse in the past three months before the study period. The prevalence of risky sexual behaviours among sexually active respondents was measured through the five indicators of risky sexual behaviours which included the age of sexual debut, the number of sexual partners, incidence of alcohol or drug-induced sex, incidence of unsafe sex and incidence of sex with a casual partner. Risky sexual behaviours were highly prevalent among sexually active respondents. The most prevalent form of risky sexual behaviour had multiple sexual partners, followed by practising unsafe sex, alcohol or drug-induced sex, casual sex and early sexual debut.

Significant differences were observed between gender, university and year of study groups in the prevalence of risky sexual behaviours. Males were found to begin sexual intercourse at significantly younger mean age. They have also a significantly larger number of sexual partners, larger incidence of unsafe sex and incidence of casual sex. Dire Dawa University respondents were found to begin sexual intercourse at a significantly younger age and have a significantly higher number of sexual partners, incidence of alcohol and drug-induced sex, and incidence of unsafe sex. Second year respondents were found to begin sexual intercourse at a significantly younger age and practice unsafe sex.

5.5 Intercorrelation between and among substance use behaviours and risky sexual behaviours

In the previous sections, the prevalence of substance use behaviours and the prevalence of risky sexual behaviours were assessed separately. In this section, the interrelationships between and among the incidences of substance use behaviours (as measured by the number of days used in the past 30 days) and incidences of risky sexual behaviours were examined. This assessment of interrelationship among the incidences of substance use variables and risky sexual behaviour variables within the same population enables us to determine the magnitude and direction of the relationship among these variables which will help to estimate the prevalence of one or some variables based on the prevalence of other variables. It also enables to judge about the presence of multiple substance use and multiple sexual risk behaviours. Accordingly, intercorrelation among selected variables was conducted using Spearman's rho (r_s), and effect sizes were

126

evaluated against Cohen's 1988 standards for interpreting the correlation coefficient small $r =$ .10, medium $r = .30$, and large $r = .5$. The Spearman rho is preferred to other methods due to the non-parametric nature of the data (Pallant, 2016). Table 5.12 presents the results of interrelationships among all substance use and risky sexual behaviour variables.

Table 5.12 *Summary of Bivariate Correlations, Means, and Standard Deviations for Scores on Substance Use and Risky Sexual Behaviour Variables (Spearman's rho), N = 2610*

	M	SD	1	2	3	4	5	6	7	8	9	10
1. Alcohol days	1.79	1.106	1.000									
2. Khat days	1.35	.953	.420**	1.000								
3. Shisha days	1.22	.763	.427**	.636**	1.000							
4. Cigarette days	1.13	.573	.338**	.607**	.689**	1.000						
5. Marijuana days	1.10	.511	.293**	.437**	.586**	.623**	1.000					
6. Age at first sex	5.35	1.008	-.355**	-.318**	-.338**	-.290**	-.256**	1.000				
7. Number of sex partner	1.84	1.217	.382**	.356**	.367**	.316**	.268**	-.957**	1.000			
8. Sex after alcohol/drug	1.29	.703	.399**	.333**	.393**	.290**	.290**	-.591**	.622**	1.000		
9. Unsafe sex days	1.55	1.035	.301**	.317**	.339**	.308**	.216**	-.745**	.768**	.551**	1.000	
10. Casual sex days	1.29	.769	.261**	.230**	.298**	.228**	.213**	-.556**	.591**	.500**	.542**	1.000

** Correlation is significant at $p < .01$ level (2-tailed).

As illustrated in Table 5.12, there were moderate to strong associations between and among incidences of substance use behaviours and incidences of risky sexual behaviour variables. The results of the associations are presented in the following three sub-sections.

5.5.1 Relationships among incidences of substance use behaviours

The results of the bivariate correlation, illustrated in Table 4.12, revealed that there were moderate to strong positive associations among incidences of the five substance use behaviours. The incidences of drinking alcohol were moderately and positively linked with chewing khat ($r_s = .420**$, $p < .01$); smoking shisha ($r_s = .427**$, $p < .01$); smoking cigarettes ($r_s = 338**$, $p < .01$); and marijuana use ($r_s = .293**$, $p < .01$). The incidence of khat chewing was strongly and positively related with shisha smoking ($r_s = .636**$, $p < .01$) and cigarettes smoking ($r_s = .607**$, $p < .01$) and moderately associated with incidence of marijuana use ($r_s = .437**$, $p < .01$). Strong

positive associations were also observed between incidence of smoking shisha and smoking cigarette ($r_s = .689^{**}$, $p < .01$); between smoking shisha and marijuana use ($r_s = .586^{**}$, $p < .01$); and between cigarette smoking and marijuana use ($r_s = .623^{**}$, $p < .01$). The above results may practically signify that users of one type of substances are more likely to use another kind of substance or most of the respondents were multiple substance users.

5.5.2 Relationships among risky sexual behaviours

The bivariate correlation results illustrated in Table 5.12, disclosed that there were strong associations among the five risky sexual behaviours. The age of first sexual intercourse was strongly and negatively linked with number of sexual partners ($r_s = -.957^{**}$, $p < .01$); with alcohol or drug-induced sex ($r_s = -.591^{**}$, $p < .01$); with unsafe sex ($r_s = -.745^{**}$, $p < .01$); and with casual sex ($r_s = -.556^{**}$, $p < .01$), which may suggest that increase in the age of first sexual intercourse is related with decrease in other risky sexual behaviours. Number of sexual partners was strongly and positively associated with incidences of alcohol or drug-induced sex ($r_s = .622^{**}$, $p < .01$); with incidences of unsafe sex ($r_s = .768^{**}$, $p < .01$); and with incidences of casual sex ($r_s = .591^{**}$, $p < .01$). There was also a strong positive association between incidences of alcohol or drug-induced sex and unsafe sex ($r_s = .551^{**}$, $p < .01$); between incidences of alcohol or drug-induced sex and casual sex ($r_s = .500^{**}$, $p < .01$); and between incidence of unsafe sex and casual sex ($r_s = .542^{**}$, $p < .01$). The above results may robustly signify that respondents who practice one type of risky sexual behaviour are more likely to practice another kind of risky sexual behaviour or most of the respondents were practising multiple risky sexual behaviours.

5.5.3 Relationships between incidences of substance use and risky sexual behaviours

As presented in Table 5.12, there were small to moderate associations between incidences of the five substance use behaviours and the five risky sexual behaviours. The incidence of drinking alcohol had moderate negative association with age of first sexual intercourse ($r_s = -.355^{**}$, $p < .01$); moderate positive association with number of sexual partners ($r_s = .382^{**}$, $p < .01$), with incidence of alcohol or drug-induced sex ($r_s = .399^{**}$, $p < .01$), and with incidence of unsafe sex ($r_s = .301^{**}$, $p < .01$); and small positive association with incidence of casual sex ($r_s = .261^{**}$, $p < .01$). The incidence of chewing khat had also moderate negative associations with age of first sex

128

(r_s = -.318[**], $p < .01$); moderate positive association with number of sexual partners (r_s = .356[**], $p < .01$), with incidence of alcohol or drug-induced sex (r_s = .333[**], $p < .01$), and with unsafe sex (r_s = .317[**], $p < .01$); and small positive association with casual sex (r_s = .230[**], $p < .01$).

Similarly, the incidence of smoking shisha had moderate negative associations with age of first sex (r_s = -.338[**], $p < .01$); moderate positive association with number of sexual partners (r_s = .367[**], $p < .01$), incidence of alcohol or drug induced sex (r_s = .393[**], $p < .01$), and unsafe sex (r_s = .339[**], $p < .01$); and small positive association with casual sex (r_s = .298[**], $p < .01$). The incidence smoking cigarettes had also almost moderate negative associations with age of first sex (r_s = -.290[**], $p < .01$); moderate positive association with number of sexual partners (r_s = .316[**], $p < .01$), incidence of alcohol or drug induced sex (r_s = .290[**], $p < .01$), and unsafe sex (r_s = .308[**], $p < .01$); and small positive association with casual sex (r_s = .228[**], $p < .01$). The incidence of marijuana use however had a small negative association with age of first sex (r_s = -.256[**], $p < .01$) and small positive association with number of sexual partners (r_s = .268[**], $p < .01$), alcohol or drug induced sex (r_s = .290[**], $p < .01$), unsafe sex (r_s = .216[**], $p < .01$), and casual sex (r_s = .213[**], $p < .01$).

To sum up, there were moderate to strong positive associations among incidences of the five substance use behaviours (i.e., the incidence of drinking alcohol, chewing khat, smoking shisha, smoking cigarettes, and marijuana use). The results may signify that users of one type of substance were more likely to use another kind of substance or most of the respondents were multiple substance users.

All relationships among the five risky sexual behaviours (age of first sexual intercourse, number of sexual partners, incidences of alcohol or drug-induced sex, unsafe sex, and casual sex) were strong. Age of first sexual intercourse had a strong negative association with other types of risky sexual behaviours, which may clearly show that when the age of first sexual intercourse of respondents increases the probability of practising all other risky sexual behaviours decrease. Associations among the remaining four types of risky sexual behaviours were strong and positive, which may indicate that respondents who practice one type of risky sexual behaviour

are more likely to practice the remaining three kinds of risky sexual behaviours or most of the respondents practice multiple risky sexual behaviours.

There were small to moderate associations between incidences of the five substance use behaviours and the five risky sexual behaviours. The incidences of the four substance use behaviours other than marijuana use have a moderate negative association with age of first sexual intercourse; moderate positive associations with the number of sexual partners, incidence of alcohol or drug-induced sex, and unsafe sex; and small positive associations with incidence of casual sex. The incidence of marijuana use had a small negative association with the age of first sexual intercourse and small positive associations with incidences of the remaining sexual behaviours. The age of first sexual intercourse was negatively associated with all types of substance use behaviour, which may clearly prove that substance users were more likely to start sexual intercourse at a younger age than non-users. All other positive associations between the incidence of substance use and risky sexual behaviour may indicate that substance users were more likely to practice risky sexual activities within the study population. The next chapter investigated how and to what extent do respondents' personality traits predict their substance use and risky sexual behaviours.

5.6 Structural model overall fitness test

The main objectives of this study involved testing the causal relationships among personality traits, substance use behaviour and risky sexual behaviour of Ethiopian university students. The full structural model was developed and presented in Figure 5.1 with standardized parameter estimates to visualize the causal relations.
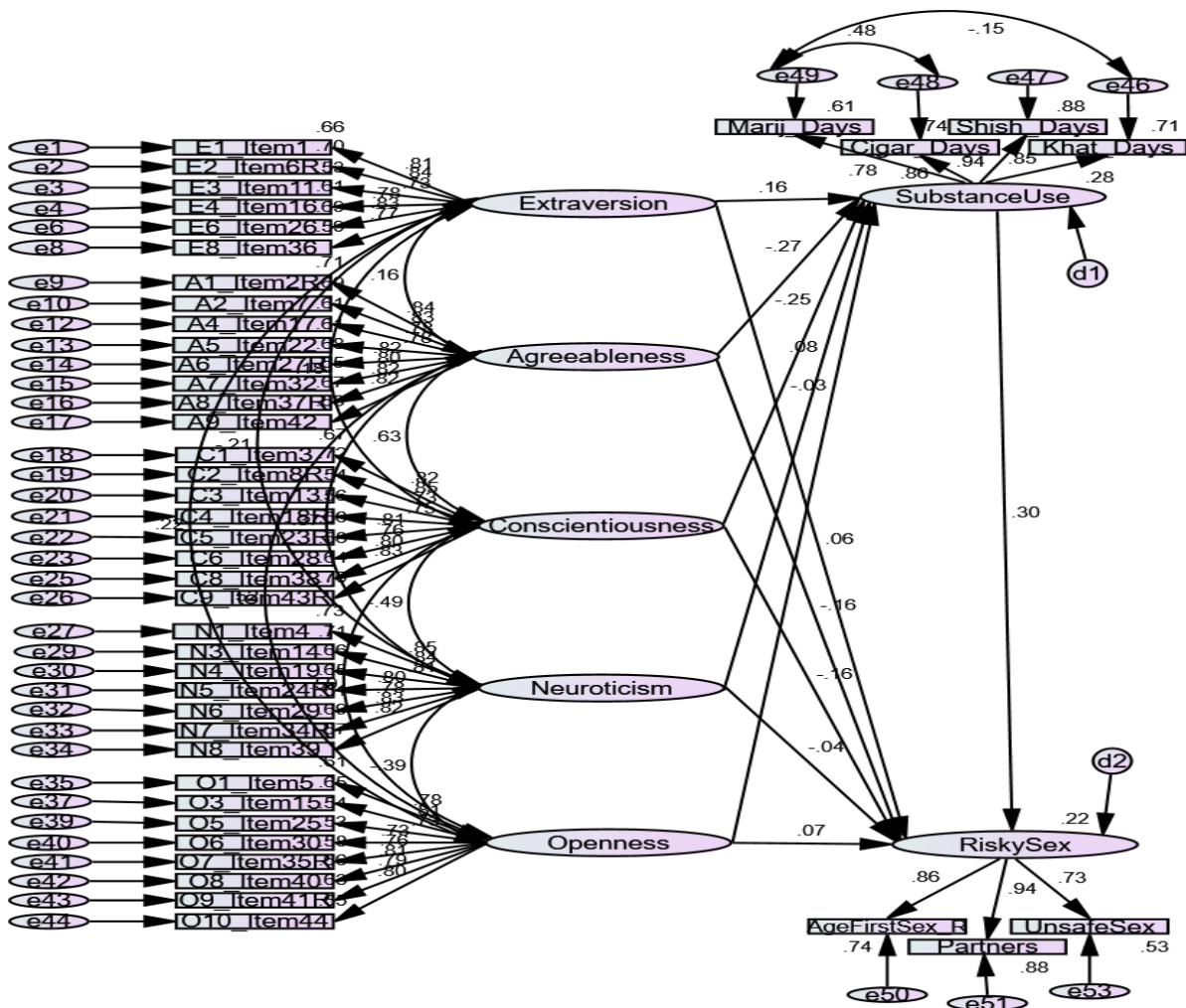
Figure 5.1. Amos Graphics Output of the full structural equation model (standardized estimates)

As represented in Figure 5.1, the structural model of this study proposed a causal relationship among the five personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness) substance use behaviour and risky sexual behaviours. Before examining the causal relationship among the latent factors, the overall fitness of the structural model to the empirical data was tested. Several fit indices were considered for assessing the overall fit of the structural model to the empirical data. The fit indices used in the measurement model evaluation were also applied to test the structure model fitness to the data. Table 5.13 depicts the results of different model fit indices.

Table 5.13 *Summary of the Structural Model Fit Indices*

Types of model fit measures	Model-fit criterion (Metric)	Suggested acceptable values	Obtained values	Model evaluation
Absolute Fit Indices	χ^2 or CMIN	$p > .05$	Original $p = .000$ Bootstrapped $p = .002$	Acceptable
	CMIN/DF	< 0.50	2.909	Acceptable
	GFI	> 0.90	0.957	Good fit
	AGFI	> 0.90	0.951	Good fit
	RMSEA	< 0.08	0.027	Good fit
	SRMR	< 0.08	0.025	Good fit
Incremental Fit Indices/baseline comparisons	TLI	> 0.90	0.978	Good fit
	IFI	> 0.90	0.980	Good fit
	CFI	> 0.95	0.980	Good fit
	NFI	> 0.90	0.970	Good fit
	RFI	> 0.90	0.968	Good fit
Parsimony Fit Indices	PNFI	> 0.60	0.901	Good fit
	PCFI	> 0.60	0.911	Good fit

As depicted in Table 5.13, the structural model fitness to the data was evaluated using absolute fit indices, incremental/relative or comparative fit indices and parsimonious fit indices. The following sections presented an evaluation of the statistical results generated from AMOS.

Absolute fit indices: Although the Chi-square value $\chi^2(879) = 2.909$, $p < .001$ suggests misfit between the structural model, Bollen-Stine's p-value $= .002$ on 500 bootstrap samples submitted the close fit between the proposed model and the data. The value of GFI $= 0.957$ and, the AGFI value of 0.951 were greater than the acceptable threshold value of 0.90 and implying a good fit between the empirical data and the hypothesised model and the proposed model was less complex and highly parsimonious. The value of RMSEA $= 0.027$ and SRMR $= 0.0252$ also confirms a good fit of the proposed model to the empirical data. Thus, based on the stated criteria, there is a good fit of the hypothesized structural model to the empirical data.

Incremental/Relative fit indices: Based on relative/baseline fit indices, the statistical result of CFI, NFI, IFI, TLI and RFI were 0.980, 0.970, 0.980, 0.978 and 0.968 respectively, which reflects a good fit of the implied model to the empirical data gathered.

Parsimonious fit indices: The value 0.901 and 0.911 for PNFI and PCFI respectively reflected the presence of a good fit between the structural model and empirical data. Because these obtained values are greater than the minimum acceptable threshold value.

From the goodness of fit index measures, it is possible to infer that the structural path model was accepted to fit the survey data. Thus, it is possible to conduct causal relation, mediation and moderation analysis to test the proposed hypotheses.

5.7 Hypotheses testing for the proposed causal relationships in the structural model

After testing the hypothetical overall model fit to the empirical data, examining the hypothesized specific relationships of the proposed research model were necessary. Figure 5.2 presented the hypothesized structural model paths.
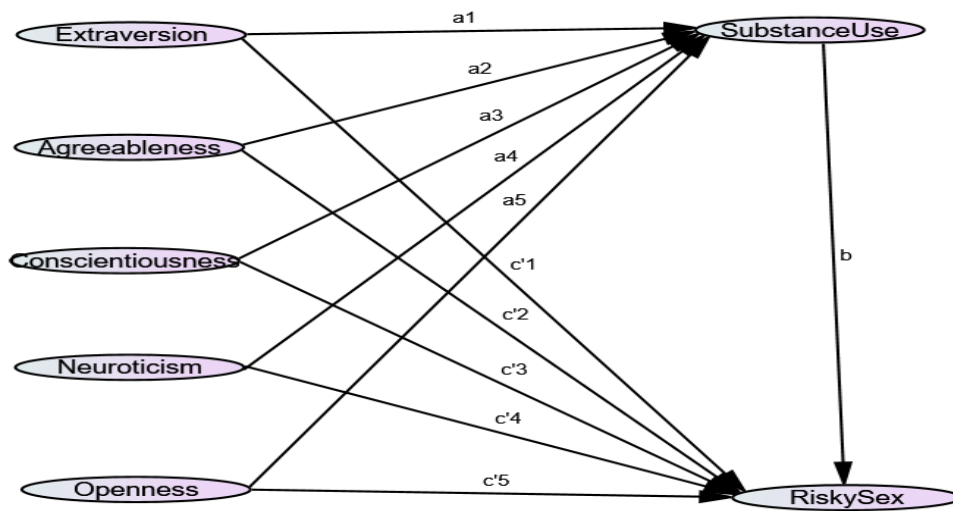
Figure 5.2. The proposed structural model for the causal relationship among personality traits, substance use and risky sexual behaviour variables

As Figure 5.2 illustrated, the five personality traits were hypothesized to have a direct effect on substance use behaviour and risky sexual behaviour. The five personality traits were also hypothesized to have an indirect effect on risky sexual behaviour through substance use behaviour. The hypothesized direct, indirect (mediated) and moderated effects were analysed and the results are presented in the following sections.

5.7.1 Direct effect of personality traits on substance use behaviour

One of the objectives of this study was to determine the direct effect of personality traits on substance use behaviour (H3). In order to assess the direct effect of the five personality traits on substance use behaviours, standardized regression weights were used because it assumes a variable unit in a standardized manner and helps to compare the effect of each variable on other variables. Table 5.14 presents the results of relative standardized regression weights and level of significances concerning the effect of personality traits on substance use behaviour.

Table 5.14 *Results of Direct Effect of Personality Traits on Substance Use Behaviour (SUB)*

Hypothesis	Hypothesized relationship	Standardized Path coefficient	SE	95% BC CI		p
				Lower bounds	Upper bounds	
H3a	Extraversion (E) → SUB	.155**	.021	.100	.183	.009
H3b	Agreeableness (A) → SUB	-.273**	.030	-.319	-.201	.005
H3c	Conscientiousness (C) → SUB	-.253**	.030	-.302	-.188	.004
H3d	Neuroticism (N) → SUB	.083**	.015	.037	.096	.003
H3e	Openness (O) → SUB	-.028	.020	-.064	.009	.160

Note: SUB = Substance use behaviour; BC CI = bias-corrected confidence intervals; ** $p < 0.01$.

The findings as indicated in Table 5.14, revealed that four personality traits (extraversion, agreeableness, conscientiousness and neuroticism) had significant effects on substance use behaviours. The 95% bias-corrected confidence intervals for the four parameter estimates did not contain zero, suggesting that the effects are statistically significant. While agreeableness and conscientiousness have significant negative effects ($p < .01$), extraversion and neuroticism have

134

positive effects ($p < .01$) on substance use behaviour. Agreeableness trait ($\beta = -.273$, $p < .01$) was found to be a relatively strongest negative predictor of substance use behaviour followed by conscientiousness trait ($\beta = -.253$, $p < .01$). Although both extraversion and neuroticism were positive predictors of substance use behaviour, extraversion trait ($\beta = .155$, $p < .01$) was found to be the relatively stronger positive predictor than neuroticism ($\beta = .083$, $p < .01$). This means that extraversion, agreeableness, conscientiousness and neuroticism personality traits predict substance use behaviour, accepting H3. However, openness had negative but week (insignificant) effect on substance use behaviour ($\beta = -.028$, $p = .160$).

5.7.2 Direct effect of personality traits on risky sexual behaviour

The fourth objective of this study was to determine the direct effect of personality traits on risky sexual behaviours (H4). In order to assess the direct effect of the five personality traits on risky sexual behaviours, standardized regression weights were considered. Table 5.15 presents the details of the effect of personality traits on risky sexual behaviour.

Table 5.15 *Results of Direct Effect of Personality Traits on Risky Sexual Behaviour (RSB)*

| Hypothesis | Hypothesized relationship | Standardized Coefficient (β) | SE | 95% BC CI | | p |
				Lower bounds	Upper bounds	
H4a	Extraversion (E) → RSB	.062**	.019	.023	.097	.009
H4b	Agreeableness (A) → RSB	-.165**	.030	-.221	-.099	.005
H4c	Conscientiousness (C) → RSB	-.162**	.030	-.215	-.099	.005
H4d	Neuroticism (N) → RSB	-.036	.024	-.087	.010	.144
H4e	Openness (O) → RSB	.068*	.027	.017	.123	.019
	Substance use behaviour → RSB	.301**	.031	.243	.365	.002

Note. RSB = risky sexual behaviour; BC CI = Bias-corrected confidence intervals; **$p < 0.01$; *$p < 0.05$.

As indicated in Table 5.15, the findings illustrated that four personality traits (extraversion, agreeableness, conscientiousness and openness) have significant effects on risky sexual

behaviours. While agreeableness and conscientiousness have significant negative effects, extraversion and openness have positive effects on risky sexual behaviour. Agreeableness trait (β = -.165, $p < .01$) was found to be a relatively strong negative predictor of risky sexual behaviour followed by conscientiousness trait (β = -.162, $p < .01$). Although both extraversion and openness were positive predictors of risky sexual behaviour, extraversion trait (β = .062, $p < .01$) was found to be the relatively stronger positive predictor than openness (β = .068, $p < .05$). This means that agreeableness, conscientiousness, extraversion, and openness personality traits predict risky sexual behaviours, accepting H4. However, neuroticism trait had insignificant effect on risky sexual behaviour (β = -.036, $p = .144$).

In addition to the direct effect of personality traits on risky sexual behaviours, the direct effect of substance use behaviour on risky sexual behaviour was examined using standardized regression weights. Substance use behaviour had significant positive effect (β = .301, $p < .001$) on risky sexual behaviour. Further, the direct effect of SUB was found to be stronger than the direct effects of personality traits on risky sexual behaviour (see Table 5.15).

Furthermore, the indirect relationship among personality traits and risky sexual behaviour through substance use behaviour (mediations) was examined to see how the effect of personality traits on risky sexual behaviours can be influenced by substance use behaviour. Thus, the next sub-section presents the analysis and results of the indirect effect of personality traits on risky sexual behaviours.

5.7.3 Indirect (mediated) effect of personality traits on risky sexual behaviour

Another objective of this study was to determine the mediating role of substance use behaviour in the relationship between personality traits and risky sexual behaviour (H5). A mediator or intervening variable is one that is thought to wholly or partially explain the relationship between a predictor and an outcome variable (Hayes, 2018; Keith, 2019). In the model of this study, illustrated in Figure 5.2, substance use behaviour was proposed as a mediator variable influencing the association between personality traits and risky sexual behaviour. According to Baron and Kenny (1986) and Hayes (2018) a variable is confirmed as a mediator if (1) there is a

significant association between the independent variable (IV) and the dependent variable (DV), (2) there is a significant association between the IV and the mediator (M), (3) the mediator still predicts the DV after controlling for the effect of the IV, and (4) the magnitude of the association between the IV and the DV is decreased when the mediator is in the equation.

Accordingly, the relative indirect effect of the five personality traits on risky sexual behaviour through substance use behaviour was estimated by multiplying each of the five coefficients (a_1, a_2, a_3, a_4, & a_5) representing the direct causal relationship between personality traits with substance use behaviours with 'b' indicating the direct causal relationship between substance use behaviour and risky sexual behaviour (see Figure 5.2). That is the relative indirect effects of personality traits on risky sexual behaviours were a_1b, a_2b, a_3b, a_4b, and a_5b for extraversion, agreeableness, conscientiousness, neuroticism, and openness respectively. Table 5.16 presents the results of the indirect effects of personality traits on risky sexual behaviour through substance use behaviour.

Table 5.16 *Results of Indirect (mediated) Effect of Personality Traits on Risky Sexual Behaviour (RSB) Through Substance Use Behaviour (SUB)*

Hypothesis	Hypothesized relationship	Standardized Coefficient (β)	SE	95% BC CI		p
				Lower bounds	Upper bounds	
H4a	Extraversion (E) → SUB →RSB	.047**	.008	.033	.065	.002
H4b	Agreeableness (A) → SUB → RSB	-.082**	.012	-.110	-.061	.002
H4c	Conscientiousness (C) → SUB → RSB	-.076**	.011	-.101	-.057	.002
H4d	Neuroticism (N) → SUB → RSB	.025**	.006	.013	.038	.002
H4e	Openness (O) → SUB → RSB	-.008	.007	-.023	.003	.154

Note: BC CI = bias-corrected confidence intervals; **$p < 0.01$.

From Table 5.16, it can be concluded that agreeableness (β = -.082, $p < .01$) and conscientiousness (β = -.076, $p < .01$) had significant negative indirect effects on risky sexual behaviour. A 95% bias-corrected bootstrap CI for these relative indirect effects were from -0.110 to -0.061 for agreeableness and from -0.101 to -0.057 for conscientiousness, both ranges were

statistically different from zero accepting the accuracy of standardized path coefficient and the hypothesized causal relation. The result also revealed that agreeableness trait has a slightly stronger negative indirect predictor of risky sexual behaviour through substance use behaviour than conscientiousness trait.

In contrast, extraversion (β = .047, p < .01) and neuroticism (β = .025, p < .01) have significant positive indirect effect on risky sexual behaviour through substance use behaviour. The 95% bias-corrected bootstraps CI for these relative indirect effects were from 0. 033 to 0 .065 for extraversion and from 0.006 to 0.013 for neuroticism, both ranges were statistically different from zero accepting the hypothesized indirect causal relation. The result also revealed that extraversion trait has a relatively stronger positive indirect predictor of risky sexual behaviour through substance use behaviour than neuroticism trait.

However, the indirect effect of openness (β = -0.008, p > .05) on risky sexual behaviour was insignificant (weaker). A 95% bias-corrected bootstrap CI for this relative indirect effect straddles zero (from – 0.023 to 0.003). Thus, the evidence is not sufficiently strong to claim an indirect effect of openness on risky sexual behaviour.

Therefore, four personality traits, namely agreeableness, conscientiousness, extraversion, and neuroticism traits were found to affect risky sexual behaviours through substance use behaviour indirectly. Although this causal relation did not apply to openness, it is pertinent at least in the case of the four traits. The results confirmed the assumption that substance use behaviour is a mediator variable that mediates the relationship between personality traits and risky sexual behaviour. Thus, hypothesis 5 was supported. Although the presence of the indirect effect of personality traits on risky sexual behaviour through substance use behaviour is a necessary step to assume mediation, it does not clearly explain the mediation type (partial mediation or full mediation) observed. Thus, in the next sub-section, the total effects of personality traits on risky sexual behaviour and the type of mediation that substance use behaviours have in the effects of personality traits on risky sexual behaviour are evaluated.

5.7.4 Total effects of personality traits on risky sexual behaviour and the type of mediating role of substance use behaviours

Once the direct and indirect effects of personality traits on risky sexual behaviour were established, it was possible to determine the total effect of these exogenous variables on the outcome variable and the type of mediating role of substance use behaviour (i.e., whether the mediation is full or partial). The relative total effect of the five personality traits on the risky sexual behaviour was calculated as the sum of their relative direct (non-mediated) effects on risky sexual behaviour (c'_1, c'_2, c'_3, c'_4, & c'_5) for extraversion, agreeableness, conscientiousness, neuroticism, and openness respectively and their relative indirect (mediated) effects (a_1b, a_2b, a_3b, a_4b, & a_5b).

Thus, the relative total effects (c_1, c_2, c_3, c_4, & c_5) were calculated by adding the corresponding relative direct and indirect effects. That is $c_1 = c'_1 + a_1b$ for extraversion, $c_2 = c'_2 + a_2b$ for agreeableness, $c_3 = c'_3 + a_3b$ for conscientiousness, $c_4 = c'_4 + a_4b$ neuroticism, and $c_5 = c'_5 + a_5b$ for openness. Table 5.17 portrays the total effect (the sum of corresponding relative direct and indirect effects) of personality traits on risky sexual behaviour.

Table 5.17 *Standardized Total Effect of Personality Traits on Risky Sexual Behaviours and the Mediating Role of Substance Use Behaviours*

Hypot-hesis	Hypothesized relationship	Standardized (β)			SE for the total effect SE	95% BC CI for the total effect		p-value for the total effect	Nature of mediation
		Direct	Indirect	Total		Lower bounds	Upper bounds		
H4a	E → SUB →RSB	.062**	.047**	.109**	.020	.071	.148	.007	Partial
H4b	A → SUB → RSB	-.165**	-.082**	-.247**	.030	-.3049	-.182	.004	Partial
H4c	C → SUB → RSB	-.162**	-.076**	-.238**	.031	-.293	-.171	.005	Partial
H4d	N → SUB → RSB	-.036	.025**	-.011	.025	-.067	.037	.730	Fully mediated
H4e	O → SUB → RSB	.068*	-.008	.059*	.028	.008	.118	.027	Not mediated

139

Note. BC CI = bias corrected confidence interval; E = extraversion; A = agreeableness; C = conscientiousness; N = neuroticism; O = openness; SUB = substance use behaviour; RSB = risky sexual behaviour; **$p < .01$, *$p < .05$.

As shown in Table5.17, both agreeableness and conscientiousness traits have negative and significant direct, indirect and total effects. The total predictive value of agreeableness traits (β = -0.247, $p < .01$) was stronger than conscientiousness traits (β = -0.238, $p < .01$). Although both extraversion (β = 109, $p < .01$) and openness (β = 059, $p < .05$) had positive and significant total effects on risky sexual behaviour, the predictive value of openness was lower. A 95% bias-corrected bootstrap CI for these relative total effects of these four traits was statistically different from zero, accepting the accuracy of the standardized path coefficient and the hypothesized causal relation. However, the total effect of neuroticism trait on risky sexual behaviour (β = -.011, $p = .73$) was not statistically significant.

According to Baron and Kenny (1986), the causal-steps approach to mediation analysis results in one of the following three claims: (1) the mediator (*M*) may not mediate the effect of predictor (*X)* on the outcome variable (*Y)*, (2) it may partially mediates that effect, or (3) it may completely mediates it. Partial mediation refers that the mechanism through *M* does not entirely explain the association observed between *X* and *Y*, whereas in complete-mediation the association between *X* and *Y* is entirely explained by the indirect mechanism. The decision of whether to call the mediation is partial or complete depends on whether the direct effect of the predictor (*X*) on the outcome variable (*Y*) is statistically significant; if it is not statistically significant, the result may be interpreted as complete mediation; if it is statistically significant, then only partial mediation may be occurring (Baron & Kenny, 1986; Fritz & MacKinnon, 2007; Hayes, 2018; Preacher & Hayes, 2004*)*.

Accordingly, in this study, the effect of the neuroticism trait on risky sexual behaviour was fully mediated (only indirectly) through substance use behaviour, which suggested that the mechanism through which neuroticism was related to risky sexual behaviour was entirely indirectly through substance use behaviour. The causal relation between the three personality traits (extraversion, agreeableness and conscientiousness) and risky sexual behaviour were partially mediated by

substance use behaviour. This result suggests that substance use behaviour does not entirely account for the association observed between the three personality traits and risky sexual behaviour. In other words, the mechanism through which the three personality traits (extraversion, agreeableness and conscientiousness) are related to risky sexual behaviours was not explained entirely by substance use behaviour; instead, there are direct (non-mediated) associations and other mechanisms which were not specified in this model.

Further, the relative importance (magnitudes) of direct and indirect (mediated) effects of personality traits on substance use behaviours were also compared using standardized beta values. The direct effects of the four personality traits (agreeableness, conscientiousness, extraversion, and openness) on risky sexual behaviours were stronger than their indirect effect through substance use behaviours. Especially, the significant effect of openness trait on risky sexual behaviour was not mediated by substance use behaviour at all; it was only directly.

Therefore, substance use behaviour fully mediated the causal relation between the neuroticism trait and risky sexual behaviour; partially mediated the association between the three personality traits (agreeableness, conscientiousness, and extraversion) and risky sexual behaviour; and did not mediate the association between openness and risky sexual behaviour. This result also supported the fifth hypothesis – assuming that substance use mediates the association between personality traits and risky sexual behaviour. Following the mediation analysis, a moderation test was computed to test if the factor structure was the same for men and women.

5.7.5 Moderation analysis (invariance test)

The sixth objective of this study (H6) proposed gender disparity/moderation in the predictive relationship among personality traits, substance use and risky sexual behaviours. According to Hayes (2018), a moderator (*M*) is said to moderate the effect of *X* on some variable *Y* if size, sign, or strength of their relationship depends on or can be predicted by *M*. In that case, *M* is said to be a *moderator* of *X*'s effect on *Y*, or that *M* and *X interact* in their influence on *Y*.

In this study, gender was expected to moderate the relationships among the predictor variables (personality traits), substance use behaviour, and risky sexual behaviour. That is, models with

data from men were expected to provide a better fit than models with data from women. As stated in the analysis of previous sections, the moderation effect (invariant test) of gender in the causal relationship between personality traits, substance use behaviour, and risky sexual behaviour was analysed by comparing standardized coefficients (β) values of models with data from men and β values of models with data from females using Chi-square test conducted on 500 bootstrapped samples drawn from 2610 original samples.

The Chi-square difference test on the overall structural model level suggested that the two groups were different $\chi^2(48) = 471.521$, $p < .001$. Further, their differences at the path level were tested and the results are presented in Table 5.18.

Table 5.18 *Results of Moderation Analysis (Standardized Regression Weights (Unconstrained)*

Paths	Standardized coefficient (β)		CMIN (χ^2)	df	p-value	Invariant?
	Males	Females				
E $\to$ SUB (a_1)	.171	.073	26.582	1	.000	No
A $\to$ SUB (a_2)	-.245	-.195	13.503	1	.000	No
C $\to$ SUB (a_3)	-.298	-.122	31.224	1	.000	No
N $\to$ SUB (a_4)	.124	.045	11.849	1	.001	No
O $\to$ SUB (a_5)	-.075	-.002	4.141	1	.042	No
SUB $\to$ RSB (b)	.245	.167	0.062	1	.804	yes
E $\to$ RSB (c'_1)	.038	.150	3.182	1	.074	No
A $\to$ RSB (c'_2)	-.220	-.036	14.624	1	.000	No
C $\to$ RSB (c'_3)	-.174	-.151	1.519	1	.218	yes
N $\to$ RSB (c'_4)	.004	-.038	0.572	1	.449	yes
O $\to$ RSB (c'_5)	.062	-.021	2.901	1	.089	No

Note. E = extraversion; A = agreeableness; C = conscientiousness; N = neuroticism; O = openness; SUB = substance use behaviour; RSB = risky sexual behaviour.

As indicated in Table 5.18, out of eleven direct paths in the model, significant Chi-square differences were observed on eight causal paths (a_1, a_2, a_3, a_4, a_5, c'_1, c'_2, & c'_5) suggesting that the effects of personality traits on substance use and risky sexual behaviours were different for males

and females. As the standardized coefficient (β) values suggested, out of the eight causal paths effects, seven paths were stronger for males than for females. The causal relation was stronger on females only for the positive relation between extraversion and risky sexual behaviour (c'_1). Another most important gender difference was observed in the effect of openness traits on risky sexual behaviour (c'_1). While openness had a positive and strong effect on risky sexual behaviour for males; it had a weaker negative effect for the model with females' data. In sum, the results suggested that the models with data from males have a better fit than models with data from females.

5.8 Chapter summary

This chapter was mainly aimed at presenting the results pertaining to the research questions that mainly focus on the prevalence of substance use and risky sexual behaviour and the predictive relationship among personality traits, substance use and risky sexual behaviours. Data concerning the prevalence of substance use (RQ1) and risky sexual behaviour (RQ2) were analysed using descriptive statistics such as percentage, mean and standard deviation and differences among gender, university, and year of study groups in the prevalence of substance use and risky sexual behaviour which were tested through Chi-square test of independence and MANOVA.

The result revealed that large numbers of respondents are using at least one or some of the substances (i.e., alcohol, khat, shisha, cigarette, or marijuana) in their lifetime. There were significant differences in the proportion of substance use behaviour among gender, university, and year of study groups. Large numbers of students were sexually experienced and risky sexual behaviours such as having multiple sexual partners, practising unsafe sex, alcohol or during induced sex, casual sex and early sexual debut were highly prevalent among sexually active respondents. Significant differences were observed between gender, university and year of study groups in the prevalence of risky sexual behaviours. There were also moderate to strong positive associations among incidences of substance use behaviours and risky sexual behaviours.

Data regarding the predictive relationship among personality traits, substance use and risky sexual behaviours (RQ3, RQ4, RQ5, & RQ6) was analysed through SEM. The results attested

that conscientiousness and agreeableness traits negatively predict substance use and risky sexual behaviours. Extraversion trait positively predicts substance use and risky sexual behaviours. Neuroticism trait predicts risky sexual behaviour only indirectly through substance use behaviour. Openness trait has negligible effects on substance use and risky sexual behaviour. Substance use behaviour fully mediates the association between neuroticism trait and risky sexual behaviours and partially mediates the association between conscientiousness, agreeableness, and extraversion traits and risky sexual behaviours. Gender moderates the effect of personality traits or risky sexual behaviour. The next section (Chapter 6) presented a summary of the main findings, followed by the interpretation of these results in light of the literature review.

CHAPTER SIX

DISCUSSION, SUMMARY, CONCLUSION, AND RECOMMENDATIONS

6.1 Introduction

The study examined the prevalence of substance use and risky sexual behaviours of students at Ethiopian universities and how their personality traits may predict these behaviours. This chapter (Chapter 6) revisits the hypotheses that were set and identifies whether the hypotheses were supported by the research results. Thus, the chapter provides an overview of the main findings of the study, followed by the interpretation of these results in light of the literature review (theoretical perspectives and previous research findings) presented in Chapter 2. It also provides the conclusions based on the findings, implications regarding the issues raised by the study, as well as suggestions for future research.

6.2 Discussion of the findings

6.2.1 Prevalence of substance use behaviours

The first hypothesis of this study, "there is a high prevalence of substance use behaviours among a sample of Ethiopian university students" was supported by the results of the study. The results of the study demonstrated that a proportionally higher number of research participants (72.18%) reported having used at least one of the substances (i.e., alcohol, khat, shisha, cigarettes, or marijuana) in their lifetime. This result was consistent with the findings of previous studies that indicated the prevalence of consumption of at least one kind of substances in their lifetime in Bonga Public College at 72.7% (Agegnehu et al., 2015), and 69.8% among college students in Eldoret, Western Kenya (Atwoli, Mungla, Ndung, Kinoti, & Ogot, 2011). However, the prevalence of at least one of the substances in this study is more than two times higher than the overall prevalence of substance use (31%) among students of a private university in Khartoum State, Sudan (Osman et al., 2016).

About half of the research participants (50.27%) in this study had consumed at least one of the substances in the past 30 days before the survey. Results of both lifetime and current prevalence

of substance use confirmed that the most prevalent form of substance use behaviour was drinking alcohol. This result was consistent with most of the other previous research reports in this regard (Adeboye et al., 2016; Agegnehu et al., 2015; Andargachew et al., 2014; Andualem et al., 201; Gezahegn et al., 2014; Kann et al., 2018; Measho et al., 213; Tesfay et al., 2018). However, this finding was incongruent with the findings of some other studies. For instance, marijuana was the most commonly used drug among university students in the mid-Atlantic US (Arria et al., 2017) and smoking cigarettes was the widely prevalent form of substance use among university students in neighbouring Sudan (Osman et al., 2016). For this hypothesis, both the lifetime and current (past 30 days) prevalence of each of the five kinds of substance use behaviours were examined and the results are presented as in the next sections.

6.2.1.1 Prevalence of drinking alcohol

The result of the study revealed that about 69.1% of the study participants had drunk alcohol ever at least once in their lifetime. The prevalence of drinking alcohol at least once in the lifetime in this study was greater than the lifetime prevalence of drinking alcohol (46% for men and 35% for women) among the Ethiopian adult population aged 15-49 years (CSA [Ethiopia] & ICF, 2016). The result was also greater than the reports of previous studies conducted on the lifetime prevalence of drinking alcohol among students of different Ethiopian universities that ranged between 26.34% and 52% (Andargachew et al., 2014; Andualem, et al, 2014; Awoke, Bogale, & Hadgu, 2018; Ephrem et al 2018; Gezahegn et al., 2014; Measho et al., 2013; Tesfay et al., 2018). The lifetime prevalence of drinking alcohol among selected Ethiopian university students (69.1%) was also greater than the lifetime prevalence of drinking alcohol among the young population aged 15–24 years in East Africa (52%) and in the US (60.4%), but lower than the lifetime prevalence of drinking alcohol among East African university students (82%) (Francis, Grosskurth, Changalucha, Kapiga, & Weiss, 2014; Kann et al., 2018).

The findings of the current study disclosed that the current (past 30 days before the survey) prevalence of drinking alcohol among the selected university students was 46.3%. This prevalence status is comparable with the prevalence (40%) of alcohol drinking within 30 days of the study period among U.S. university understudies (Park et al., 2014), but greater than previous results of prevalence among young people in East-Africa (28%) (Francis et al., 2014), among

university students in nine ASEAN countries (18.8%) (Yi, Ngin, Peltzer, & Pengpid, 2017), and among students of different universities in Ethiopia such as Axum University, Hawassa University, Jimma University, and Haramaya University (17%-32%) (Gezahegn et al., 2014; Measho et al 2013; Tesfay et al, 2018; Wakgari & Aklilu 2011). The relatively higher prevalence of lifetime and current alcohol use among Ethiopian University students in this study compared to previous research results may imply that the rate of drinking alcohol among university students is increasing or drinking alcohol is becoming more prevalent among the young population than ever before. And the higher prevalence of alcohol drinking among East African university students compared to the prevalence of lifetime alcohol drinking among Ethiopian university students in this study may imply that drinking alcohol behaviour among university students is not a local/national problem; rather it is a regional, continental, or global problem.

6.2.1.2 Prevalence of chewing khat

The prevalence of lifetime khat use in this study (25.8%) was comparable to the use of khat among selected university students in Ethiopia (27.31%) (Getnet, Kalkidan, & Mebratu, 2019) and (24.8%) among Students of Higher Education in Jazan Region, Saudi Arabia (Alsanosy, Mahfouz, & Gaffar, 2013). However, this prevalence is higher than the report in the 2016 EDHS which showed a prevalence of 19% among boys and 9% among girls aged 15-25 years for chewing khat (CSA [Ethiopia] & ICF, 2016). The lifetime prevalence of khat chewing in this study was superior when compared to the prevalence of khat chewing among undergraduate students at some other universities in Ethiopia, for example, 20.3% at Hawassa University (Andargachew et al., 2014) and 10.9% at Debre Birhan University (Tesfay et al., 2018). The result of lifetime prevalence of chewing khat in the current study (25.8%) was quite near the prevalence in most other universities such as 23.22% for pooled prevalence of chewing khat among Ethiopian university students (Alemu et al 2018), 27.31% for the pooled prevalence of lifetime khat use among Ethiopian university students (Getnet et al, 2019), 24% at Bahir Dar University (Gebrehanna et al., 2014), 28.70% at Axum University (Measho et al., 2013), and 26.3% at Jimma University (Tilahun et al., 2017) but lower than the 41.0% prevalence at Haramaya University (Gezahegn et al., 2014).

The current study revealed that 16.1% of the respondents chewed khat in the recent past 30 days before the survey. The overall result of this study indicated that the prevalence of khat chewing

within 30 days of the study period (16.1%) is slightly less than the prevalence among students at Haramaya University (23.6%) (Gezahegn et al., 2014), among Jimma University (23.9%) (Tilahun et al., 2017), and among students of Higher Education in Jazan Region, Saudi Arabia (23.1%) (Alsanosy et al., 2013) but higher than the recent prevalence (5.7%) among students at Debre Berhan University (5.7%) (Tesfay et al, 2018), among students at Hawassa University (10.5%) (Ayalew et al., 2015), and among the pooled prevalence of Ethiopian universities (14.16%) (Getnet et al, 2019). This result agreed with previous findings which reported varied prevalence of khat chewing among different communities in Ethiopia; while the lowest prevalence of chat chewing was among Tigri and Amhara region, the higher prevalence of khat chewing was among the communities in eastern Ethiopia and Oromia region where Jimma University and Haramaya University are located (Alemu et al 2018; CSA [Ethiopia] & ICF, 2012, 2016).

A significantly higher proportion of khat chewers in this study were found among Dire Dawa University and Dilla University respondents and a significantly lower proportion of khat chewers were found among Bahir Dar university respondents. This may be attributed to the varied prevalence of khat chewing among different communities in Ethiopia; while the lowest prevalence of khat chewing is among Tigri and Amhara region (where Debre Berhan University and Wollo University are located), the higher prevalence of khat chewing is among the societies in eastern Ethiopia and Oromia region (where Dire Dawa University is located) in which the culture of the society is understood to be influenced by Arabian culture (Alemu et al., 2018; CSA [Ethiopia] & ICF, 2012, 2016; Reda, Moges, Yazew & Biadgilign, 2012). A potential explanation for this disparity could be the differences in the study area and setting with distinctions in socio-cultural values and norms as well as religious beliefs as it is supported by different studies (Alemu et al., 2018).

6.2.1.3 Prevalence of smoking cigarette

The result of this study shows that about 13.9% of the research participants smoked cigarettes at least once in their lifetime and 6.8% of the research participants smoked cigarettes in the recent past 30 days before the survey took place. The lifetime prevalence of smoking cigarettes in the current study was almost in agreement with the prevalence of the use of

cigarettes among Axum University, Shire campus students (16.8%) (Getnet et al., 2019). However, the result was extremely lower than the prevalence of smoking cigarettes among students of Haramaya University in Ethiopia (22%) (Gezahegn et al., 2014), among college students in Eldoret, Western Kenya (42.8%) (Atwoli et al., 2011), among university students in Sudan (27.8%) (Osman et al., 2016), among in-school youths in the US (28.9%) (Kann et al., 2018), and among university students in Saudi Arabia (28%) (Ansari et al., 2016). However, the lifetime prevalence of smoking cigarettes in this study (13.9%) was higher than the predominance of smoking cigarettes in the general public in Ethiopia (4%-7%) (CSA [Ethiopia] & ICF International, 2012, 2016). It was also higher than the prevalence of smoking cigarettes at Axum University (9.50%) (Measho et al., 2013), at Jimma University (5.9%) (Ephrem et al., 2018), at AAU College of Medicine (9%) (Wakgari & Aklilu, 2011), and at Debre Berhan University (7.4%) (Tesfay et al., 2018).

The prevalence of smoking cigarettes within 30 days of the study period (6.8%) is lower compared with the recent 30 days prevalence among students at Axum University (9.3%) (Measho et al., 2013), at Haramaya University (10.8%) (Gezahegn et al., 2014), but higher than the prevalence at Addis Ababa University, College of Medicine (1.8%) (Wakgari & Aklilu, 2011) and at Debre Berhan University (3.1%) (Tesfay et al., 2018). The discrepancy between the frequency of lifetime and recent past 30 days smoking of cigarettes in this study may support the implication proposed by CSA [Ethiopia] & ICF International (2012, 2016) which indicated that the percentages among Ethiopian adult population age 15-49 who smoke cigarettes decrease from time to time.

6.2.1.4 Prevalence of smoking shisha

The result of the current study showed that about 13.4% of the research participants smoked shisha at least once in their lifetime and about 9.9% of the research participants smoked shisha in the recent past 30 days before the survey took place. Although smoking shisha is less emphasized or ignored in other previous substance use/abuse behaviour studies (such as Andargachew et al., 2014; Andualem et al., 2014; Ephrem et al 2018; Gezahegn et al., 2014; Measho et al, 2013), the current study disclosed that the lifetime prevalence of smoking shisha among students (13.4%) is very close to the lifetime prevalence of smoking cigarettes (13.9%).

149

The current (past 30 days) prevalence of smoking shisha (9.9%) was slightly greater for the research participants than the current prevalence of smoking cigarettes (6.8%). The result of this study showed lower lifetime prevalence (13.4%) of smoking shisha among students of Ethiopian universities (13.4%) compared to the prevalence among university students in the US (30%) (Gathuru et al., 2015, among Iranian medical school students (48.60%) (Nasirian, Ziaaddini & Asadollahi, 2013) and among students in Harari, Eastern Ethiopia (29.90%) where the culture of the people is thought to be influenced by Arabian culture (Reda, Moges, Yazew & Biadgilign, 2012). However, the magnitude of prevalence was higher compared to the findings of some previous studies such as that of Tesfay et al. (2018), which reported a 4.2% prevalence of smoking shisha among Debre Berhan University students, and CSA [Ethiopia] (2016) which reported that the prevalence of smoking shisha including any type of tobacco among the adult population age 15-49 is rare – less than 1% for women and 4% for men. The overall result of this study supported the suggestion of some previous studies that indicated that there is growing popularity of shisha smoking or hookah use among youth and young adults worldwide, including among high school, college and university understudies in Ethiopia (Binyam, 2012; Brockman et al., 2012; Dawit, 2011; HAPCO, 2012).

6.2.1.5 Prevalence of marijuana use

The result of the current study showed that about 9.0% of the research participants used marijuana at least once in their lifetime and 5.0% of the research participants used marijuana in the recent past 30 days before the survey took place. The prevalence of lifetime marijuana use in this study (9%) is considerably lower when compared to the prevalence of lifetime marijuana use among university students in the US (48.9%) (Falls et al., 2011) and among Haramaya university students in Ethiopia (17.4%) (Gezahegn et al., 2014), but higher than the lifetime prevalence of marijuana and other drugs among Debre Berhan University students (4.5%) (Tesfay et al., 2018) and college students in Eldoret, Western Kenya (2%) (Atwoli et al., 2011).

The current prevalence of marijuana use in this study (5%) was lower than the prevalence of marijuana and other illicit drugs within 30 days of the survey period among Haramaya university students (7.4%) (Gezahegn et al., 2014) and among in-school youths in the US 19.8% (Kann et

al., 2018), but higher than marijuana use within 12 months among understudies at Hawassa University (0.9%) (Andargachew et al., 2014).

Although most previous substance use behaviour studies did not focus on marijuana use, based on the result of the current study, one can induce that marijuana use, like smoking shisha, is a rising behavioural problem for Ethiopian university students. As marijuana is the most produced, trafficked and used substance across the globe (Faubion, 2013), substance use behaviour studies in Ethiopia should no more ignore the issue of marijuana and other illicit drug use.

6.2.1.6 Gender differences in substance use behaviour

The results of the current study pointed out that there were significant differences in the current prevalence of substance use behaviour among the respondents based on their demographic characteristics such as gender, university, and year of study. Significant differences were observed between males and females in the prevalence of substance use behaviours. Substance use behaviour was a more prevalent problem among male students than female students. The odds of substance use behaviour among male students was 2.39 times higher for drinking alcohol; 3.58 times higher for chewing khat; 3.65 times higher for smoking shisha; 5.21 times higher for smoking cigarettes; and 4.76 times higher for marijuana use than female students.

The significant differences between gender groups in the prevalence of drinking alcohol in this study were consistent with the findings of most previous research conducted in Ethiopian universities (Agegnehu et al., 2015; Andargachew et al., 2014; Andualem et al, 2014; Francis, 2014; Gezahegn et al., 2014; National Alliance of State and Territorial AIDS Directors [NASTAD], 2013; Tesfay et al., 2018; Torres, 2006; Wakgari & Aklilu, 2011). Similarly, the gender differences in the prevalence of chewing khat in this study was consistent with the result of the national demographic health survey (CSA [Ethiopia] & ICF, 2012, 2016), the findings of a study on the students of higher education in Jazan Region, Saudi Arabia (Alsanosy et al., 2013), in Sudan (Osman et al., 2016), and in Ethiopia (Alemu et al., 2018; Ayalew et al., 2015; Getinet et al., 2019; Gezahegn et al., 2014; Tesfay et al., 2018; Tilahun et al., 2017).

Higher prevalence of smoking cigarettes and other tobacco including shisha among males was also reported by other previous studies (CSA [Ethiopia] & ICF, 2016; Gezahegn et al., 2014; Tesfay et al., 2018; Tilahun et al., 2017). Similar supporting results were reported by previous studies for gender differences showing that a significantly higher number of males than females were found to use marijuana (Andargachew et al., 2014; Gezahegn et al., 2014; Tesfay et al., 2018; Torres, 2006). This finding may indicate that male students are the most at risk of drinking alcohol, chewing khat, smoking shisha, smoking cigarettes, and using marijuana compared to female students. The gender disparity on substance use in this study calls for more intervention for male students in this regard.

6.2.1.7 Substance use behaviour difference across universities

The current results pointed out that except for drinking alcohol there were significant differences in the current prevalence of substance use behaviour among the respondents' universities. Although the difference is statistically insignificant, a proportionally higher prevalence of drinking alcohol was observed among students of Debre Berhan University. On the contrary, a higher proportion of khat chewers, shisha smokers, cigarette smokers and marijuana users were observed among Dire Dawa university students. This may imply that the tradition, culture, and customs of a community where individuals live affect their behaviour.

These disparities in the predominance of substance use among respondents based on their respective universities were consistent with the findings of the national survey conducted in Ethiopia. According to CSA [Ethiopia] & ICF (2016), while alcohol consumption was higher in the Tigri region and the Amhara region where Debre Berhan University is found, chewing khat and smoking cigarette were highly prevalent in Somali, Harari and Dire Dawa regions where Dire Dawa University is found. This finding may indicate that students in some universities (such as in Dire Dawa University and Debre Berhan University) are more at risk of using substances than students in other universities. The disparity among universities on substance use in this study calls for more intervention on the selected university students.

6.2.1.8 Substance use behaviour difference by respondents' year of study

The current results pointed out that there were significant differences in the current prevalence of substance use behaviour among the respondents' years of study. A significantly higher proportion of alcohol drinkers were found among the fourth year students followed by third year respondents. While chewing khat and smoking shisha was highly prevalent among third year respondents, the proportion of cigarette smokers and marijuana users was higher among fifth year respondents followed by third year students. For all kinds of substances, a lower proportion of substance users were found among first year students. This result agrees with the previous findings which reported that the prevalence of substance use behaviours is higher among third year students (Gezahegn et al., 2014), and generally increases with age (CSA [Ethiopia] & ICF, 2012, 2016).

This may imply that students' exposure to substances and substance use behaviours increased among students with an increase in the year of study or duration at the universities which exposes students for much more peer pressure and situations/events for substance use. The reason might also be the fact that students in the middle of their campus life (such as third year students) usually become desperate and get into hopelessness so that they may tend to use substances to get relieved from the depression mood (Gezahegn et al., 2014). The finding may indicate that third and fourth year students are more at risk of using substances than another year of study students. Thus, the disparity among students of the different years of study on substance use behaviour may suggest the need for taking intervention measures for third year and fourth year students and prevention measures for first year and second year students.

6.2.2 Sexual experiences of students and the prevalence of risky sexual behaviours

The results of this study supported the second hypothesis that there is a high prevalence of risky sexual behaviours among a sample of Ethiopian university students. Out of the total of 2610 respondents, about 1050 (40.2%) were sexually experienced or have had sexual intercourse at least once in their lifetime. This result of lifetime sexual experience was equivalent to the sexual experience of in-school youths in the US, where 39.5% of students aged 10–24 years had had sexual intercourse with at least one person (Kann et al., 2018) but lower compared to sexual

experiences among students attending the Medical and Social Welfare Center of the University of Maroua, Cameroon (80.8%) (Noubiap et al., 2015) and high school students in Eastern Cape, South Africa where 50.7% had been involved in sexual activities in the last 12 months before the survey (Adeboye et al., 2016). The result was also lower than the results for the lifetime sexual experiences of other universities in Ethiopia; 70.53% at Jigjiga University (Mavhandu-Mudzusi & Teka, 2016), 60% among Axum University students (Awoke et al., 2018), 52.6% in the pooled prevalence among Ethiopian universities (Yitayal et al., 2014), and 44.7% at Debre Markos University (Kassa et al., 2016); but higher at Haramaya University (33.5%) (Andualem, Assefa, & Chalachew, 2014), at Axum University (30.2%) (Hiwet, Wondwosen & Kidan, 2015), at Jimma University (26.9%) (Gurmesa, Fessahaye, & Sisay, 2012), at Arbaminch University (20.3%) (Worku & Binyam, 2011), at Gondar and Bahir Dar Universities jointly (16.5) (Belaynew, Beyene, & Bemnet, 2012), at Addis Ababa University (34.2%) (Nigatu & Seman, 2011), and at Debre Tabour and Haramaya University (28%) (Awoke, Mekonnen, Daniel, & Fantahun, 2016; Tariku, Lemessa, & Nega, 2012).

About 669 (25.6%) of the total respondents in the current study or 63.7% of the sexually experienced respondents were sexually active who had sexual intercourse in the past three months before the survey took place. The result was slightly lower than the sexual experience of students in the US, where nationwide 28.7% of students had had sexual intercourse with at least one person during the 3 months before the survey (Kann et al., 2018). But, this result was higher than the results of the previous studies conducted in different other universities of Ethiopia; 54.8% at Jigjiga University (Mavhandu-Mudzusi & Teka, 2016), 51% at Jimma University (Gurmesa, Fessahaye, & Sisay, 2012), 36.4% at Bahir Dar University (Wondemagegn, 2014), 44.7% at Debre Markos University (Kassa et al., 2016), 33.5% at Haramaya University (Andualem et al., 2014), and 23.8% at Addis Ababa University (Nigatu & Seman, 2011). This difference may be attributable to differences in time of the study and may indicate that students are practising more sexual intercourse than ever before.

Out of 669 sexually active respondents, the majority (66.82%) were males and the rest (33.18%) were females. The result of the study, therefore, attested that more males than females were sexually active. This finding regarding the sexual experience of male and female students was

consistent to the findings of some previous studies (Andualem et al., 2014; Awoke et al., 2016; Hirbo & Addisu, 2017; Kassa, Endeshaw, & Marta, 2016; Mavhandu-Mudzusi & Teka, 2016; Solomon, Negga, Solomon, & Hiwot, 2018; Tariku et al., 2012; Trhas, Zelalem, & Tigist, 2016; Zelalem, Melkamu, & Muluken, 2013). Gender variations might be due to the male ego and possibly socio-cultural practice that place males above females to convey sexuality. Male students may perceive themselves as exhibiting their masculinity and sociability by being sexually active as it is appreciated by the society (Hiwet, Lerebo, & Kidan, 2015).

6.2.2.1 Sexual debut (the age of first sexual intercourse)

The results of the current study indicated that about 65% of sexually active respondents started sexual intercourse at the age of 18 years or older and the rest (35%) began sexual intercourse before the age of 17 years. The result of this study showed that early sexual debut was less prevalent among Ethiopian university students compared to high school students in Eastern Cape, South Africa where more than half (55.2%) of female students had sex before they attain the age of 18 years (Adeboye et al., 2016). However, most previous studies in Ethiopia such as the EDHS reported that the median age at first sexual intercourse for women in the general population between the ages of 20-24 years was 18 years (CSA [Ethiopia] and ICF, 2012). Similarly, some previous studies conducted in universities also reported that the mean age of first sexual intercourse was 18 years and above (Alebel, Mesele, & Alemayehu, 2016; Andualem et al., 2014; Awoke et al., 2016; Belaynew, Yeshambel, Beyene, & Bemnet, 2012; CSA [Ethiopia] and ICF, 2017; Hiwet et al., 2015; Kassa et al., 2016; Worku & Binyam, 2014).

In contrast, some other studies pointed out that the mean age of sexual debut for sexually experienced students was below 18 years (Gurmesa, Fessahaye, & Sisay, 2012; Nigatu & Seman, 2011; Tariku et al., 2012). Further, the above studies attested that the majority of university students who ever had sexual intercourse started having sex before they join a university and while they were in primary and secondary schools (Gurmesa et al., 2012; Nigatu & Seman, 2011; Tariku et al., 2012). Although the discrepancies in the age of sexual initiation might be due to biological, socio-cultural and behavioural differences between study areas that influence human sexuality, the result may imply that most of the sexually active university students, had their first sexual intercourse during the stage of early and middle adolescence (before or during high school

155

years) when their behaviour was dominated by emotions rather than rational thinking in which sexual activities were more likely to be unsafe and unplanned causing psychosocial and health problems.

6.2.2.2 Number of sexual partners

The results of the current study revealed that out of the total of 669 sexually active respondents, about 64.3% had two or more sexual partners and they could be labelled as practising risky sexual activities. This result was in agreement with the findings of Awoke et al. (2018) who reported that 64.4% of sexually experienced Axum University students had multiple sexual partners. Mirroring other earlier studies conducted in Ethiopian universities, this prevalence was greater when compared to the 11.5% at Haramaya University (Andualem et al., 2014), 28.3% among Jimma University students (Gurmesa et al., 2012), 37.9% among Bahirdar and Gondar University students jointly (Belaynew et al., 2012), 44.5% at Debre Markos University (Kassa et al., 2016), 45.3% among Bahir Dar private colleges (Zelalem et al., 2013), and 40.6% for pooled prevalence among Ethiopian university students (Yitayal et al., 2014). These differences compared to the results of previous studies may indicate that there is a growing tendency of having multiple sexual partners across time among sexually active university students. Unlike some health risk behaviours such as smoking tobacco that seemed to decrease across time in Ethiopia (CSA [Ethiopia] and ICF, 2017), the tendency of having multiple sexual partners may be increasing from time to time. This may also imply that having multiple sexual partners among sexually active students is a growing problem that needs much more attention than ever before.

6.2.2.3 Substance-induced sex

The results of the current study indicated that out of the sexually active population, the majority of the respondents (53.1%) reported that they used a drug or drunk alcohol either sometimes or regularly before or during sexual intercourse. This magnitude was higher compared to the prevalence of substance-induced sex among sexually active in-school youths in the US (18.8%) (Kann et al., 2018), among Axum University students in Ethiopia (23%) (Hiwet et al., 2015), and among students of Addis Ababa high schools (26.4%) (Dawit & Teferi, 2013). This may imply that significant numbers of university understudies are engaged in substance-induced sexual

intercourse, which exposes them to risky sexual practices such as unsafe sex as substance use affects the thinking capacity regarding the use of precautionary measures such as using a condom when engaging in sexual practices.

6.2.2.4 Unsafe sex or sexual intercourse without a condom

Out of the total of the sexually active population, about 62.03% unmarried sexually active respondents were found to practise sexual intercourse without a condom or unsafe sex (either rarely, sometimes, most of the time or always) in the past three months before the survey took place. Although this result was closer to the pooled prevalence of inconsistent condom use/unsafe sex among Ethiopian university students (57.9%), it was extremely higher than the prevalence in Debre Markos University (48.8%) (Kassa et al., 2016), at Haramaya University (38.4%) (Andualem et al., 2014), at Jigjiga University (40.4%) (Mavhandu-Mudzusi & Teka, 2016), and among adolescents in the US (46.2%) (Kann et al., 2018). But this predominance of unsafe sex was lower compared to the prevalence of not using a condom during the first sexual intercourse among students in Eastern Cape, South Africa (72.8%) (Adeboye et al., 2016) and the result of a study conducted recently at Axum University in Ethiopia indicating that 83.5% of sexually experienced students were using condoms inconsistently during sexual intercourse with non-regular sexual partners (Awoke et al., 2018). This may imply that unsafe sex or inconsistent use of condoms is also a rising sexual behaviour problem among sexually active university students across time, which requires special attention.

6.2.2.5 Sex with casual partners

Out of the sexually active respondents, 45.3% of the respondents had casual sex with someone whose health status was unknown at least once in the past three months during their sexual intercourse encounters. By contrast, this result was higher when compared to the prevalence of sexually active students' sexual intercourse with a nonregular partner at Jigjiga University (30.14%) (Mavhandu-Mudzusi & Teka, 2016), at Bahir Dar and Gondar University (19.4%) (Belaynew et al., 2012), at Haromaya University (16.3%) (Andualem et al., 2014), and at Debre-Markos University (6.7%) (Kassa et al., 2016). The relatively higher prevalence of sexual intercourse with casual sex partners in this study may be due to variation in study time and study

population. The result may indicate that a significant segment of students has risky sexual behaviours which increase their vulnerability to acquiring HIV and AIDS. Unless appropriate age and targeted institutional interventions exist, certain behaviours can place these university students at greater risk of unintended pregnancies, HIV infection and sexually transmitted diseases.

6.2.2.6 Gender differences in sexual experience and risky sexual behaviours

The results of the current study revealed that a large proportion of sexually active respondents were males (66.82%) and only 33.18% of the sexually active respondents were females. Significant gender differences were obtained in the mean age of first sexual intercourse, the number of sex partners, and the incidence of casual sex. Sexually experienced male respondents seem to have a younger mean age at the first sexual encounter, a higher number of sex partners, and higher incidences of casual sex than females. These results agreed with some previous studies. More males than females were found to have sexual experiences (Gurmessa et al., 2012; Tariku et al., 2012); males were more likely than females to practice sexual intercourse at the early ages (Hiwet et al., 2015; NASTAD, 2013; Noubiap et al., 2015); males tend to have multiple sex partners (Hiwet et al., 2015; NASTAD, 2013; Noubiap et al., 2015; Yitayal et al., 2014; Zelalem et al., 2013); and males had casual sex with nonregular partners including commercial sex workers (Andualem et al., 2014; Kassa et al., 2016; Noubiap et al., 2015; Solomun et al., 2017, Tariku et al., 2012). Variation might be due to male ego and possibly cultural practices that put males above females to express their sexuality. Male students may see their sexual activity as manifesting their masculinity and sociability as it is supported by Ethiopian culture (Hiwet et al., 2015).

6.2.2.7 Differences in sexual experience and risky sexual behaviours across universities

Significant differences among respondents' universities were obtained regarding the age of first sexual intercourse, the number of sex partners, the incidence of substance-induced sex and the incidence of unsafe sex. Sexual debut or age of first sexual intercourse happened at a significantly younger age among Dire Dawa University respondents compared to Debre Berhan University respondents. The number of sexual partners and the incidence of substance-induced

sex were also significantly higher among Dire Dawa University respondents than Dilla, Deber Berhan, and Bahir Dar Universities. The incidence of unsafe sex was also higher among Dire Dawa University respondents compared to Bahir Dar University respondents.

These results were consistent with the results of some previous studies. For example, while Dawit, Zinabe, and Alemusa (2017) reported that the mean age at first sex was 16.6 years for males and 15.6 years for females among Dire Dawa University students, other studies attested that early sexual debut was positively associated with having multiple sex partners (Hiwet et al., 2015; Yitayal et al., 2014) and inconsistent condom use (Tariku et al., 2012; Yitayal et al., 2014). Furthermore, as the current study and some previous studies (such as Alemu et al., 2018; CSA [Ethiopia] & ICF, 2012, 2016) confirmed a higher prevalence of khat chewers, shisha smokers, and cigarette smokers were found among the communities in Eastern Ethiopia where Dire Dawa University is located. Such substance use behaviours seem to be strongly associated with risky sexual practices and may imply the prevalence of risky sexual behaviours (Andualem et al., 2014; Dawit, Zinabe, & Alemusa, 2017; Gurmesa et al., 2012; Hirbo & Addisu, 2017; Hiwet et al., 2015; Kassa et al., 2016; Zelalem et al., 2013).

As the aforementioned studies also pointed out, the variation or the high prevalence of risky sexual practices among Dire Dawa University students might be due to the predisposing factors (use of varied substances), which limits users' cognitive abilities to protect themselves from risky decisions and practices. The results also imply that these behaviours might contribute to the likelihood of acquiring HIV among the young population in Dire Dawa University. As the NASTAD (2013) revealed, young people aged 15-24 years in Dire Dawa, Ethiopia, have a higher risk of HIV infection when compared to other regions of the country. Unless appropriate institutional targeted interventions are made, certain behaviours can place the university students at higher risk of HIV infection and psychosocial crisis.

6.2.2.8 Differences in sexual experience and risky sexual behaviours by respondents' year of study

Significant differences among respondents of different years of study were obtained for age at first sexual intercourse and the incidence of unsafe sex. Second year respondents were found to

begin sexual intercourse at a significantly younger age than fifth year respondents and the incidence of unsafe sex was also significantly higher among second year respondents than first year and third year respondents. Some previous studies reported that there was an association among students' year of study and their sexual experience. For example, second year students at Jimma University in Ethiopia were about two times more likely to have sexual intercourse when compared to freshman students (Gurmessa et al., 2012). Second year students of some selected colleges and universities were more likely to have a higher number of multiple sexual partners compared to first year students (Yitayal et al., 2014; Zelalem et al., 2013). This might be due to the fact that most students' centre of attention is on their academic achievement during their freshman year and tend to engage in love and sexual practices after assuring their academic survival (Gurmessa et al., 2012). This may suggest that preventive actions such as life skill training need to be targeted and given for freshman students which enable themselves to protect themselves from risky sexual activities.

6.2.2.9 Relationships among substance use and risky sexual behaviours

The current study found that there were moderate to strong positive associations among incidences of the five substance use behaviours (i.e., the incidence of drinking alcohol, chewing khat, smoking shisha, smoking cigarettes, and marijuana use). The results may signify that users of one type of substance are more likely to use another kind of substance.

The results also indicated that there were strong positive relationships between the five risky sexual behaviours (early sexual debut, number of sexual partners, incidences of alcohol or drug-induced sex, unsafe sex, and casual sex). Age of first sexual intercourse had a strong negative association with other types of risky sexual behaviours – early sexual debut had a positive association with other types of risky sexual behaviours. Similarly, associations among the other four types of risky sexual behaviours were strong and positive, which may indicate that respondents who practised one type of risky sexual behaviour were more likely to practice the remaining three kinds of risky sexual behaviours or most of the respondents practised multiple risky sexual behaviours. This result is supported by some previous research findings. For example, the early sexual debut was reported to have positive associations with multiple sex partners (Hiwet et al., 2015; Yitayal et al., 2014) and with inconsistent condom use (Tariku et al,

160

2012; Yitayal et al., 2014). This could be attributed to the strong relationship between the sexual life of an individual and exposure of the individual to risky sexual behaviours, that is, as the sexual life of the individual lengthens so might the exposure, or as studies reported, the early initiators were less inclined to develop responsible behaviours in this regard than late initiators (Kassa et al., 2016). Unsafe sex and multiple sexual partners were also found to have a positive relation (Awoke et al., 2016). The results may imply that those who practice one type of risky sexual behaviour are more likely to practice another kind of risky sexual behaviour.

There were small to moderate associations between incidences of the five substance use behaviours and the five risky sexual behaviours. The incidences of the four substance use behaviours (i.e., the incidence of drinking alcohol, chewing khat, smoking shisha, and smoking cigarettes) had moderate negative associations with age of first sexual intercourse or positive association with early sexual debut; moderate positive associations with the number of sexual partners, incidence of alcohol or drug-induced sex, and unsafe sex; and a small positive association with incidence of casual sex. The incidence of marijuana use has a small positive association with all forms of risky sexual behaviours. The results agreed with the findings of most previous research studies. For instance, use of at least one substance (alcohol, khat, cigarettes and illicit drugs such as shisha and marijuana) was associated with unsafe sex (Andualem et al., 2014; Dawit et al., 2017; Gurmesa et al., 2012; Hirbo & Addisu, 2017; Hiwet et al., 2015; Kassa et al., 2016); with having multiple sexual partners (Gurmesa et al., 2012; Hirbo & Addisu, 2017; Hiwet et al., 2015); and casual sex (Andualem et al., 2014; Wondemagegn, Mulat, & Bayeh, 2014). This may be attributed to decrease in risk perception ability due to alcohol, khat and other illicit drugs use in which students may not be capable of making rational judgment during intoxication and they also may not be able to predict the serious consequences of their actions (Wondemagegn et al., 2014).

More specifically, drinking alcohol was found to have associations with risky sexual behaviours such as with unsafe sex (Awoke, Bogale, & Hadgu, 2018; Choudhry, Agardh, Stafström, & Östergren, 2014; Dawit & Teferi, 2013; Solomon, Negga, Solomon, & Hiwot, 2018; Yitayal et al., 2014; Zelalem, Melkamu, & Muluken, 2013); with having multiple sexual partners (Awoke et al., 2018; Choudhry et al., 2014; Hiwet et al., 2015; Solomon et al., 2018; Teshome & Gedif,

2013; Wondemagegn et al., 2014; Yitayal et al., 2014; Zelalem et al., 2013); and with alcohol-induced sex (Dawit & Teferi, 2013). This strong association between risky sexual behaviours and alcohol drinking might be due to the effects of alcohol in decreasing inhibitions, altering rational decision making, and increasing risk-taking behaviour (Kassa et al., 2016). The positive association between all types of substance use behaviour and risky sexual behaviour in this study may clearly prove, within the student population, that substance users were more likely to practice risky sexual activities. This may imply the necessity of strong and efficient measures that should be undertaken to handle such harmful behaviours so as to prevent and control HIV/AIDS and other STIs in this vulnerable population.

6.2.3 Personality traits as predictors of substance use behaviours

The third hypothesis of this study asserted that personality traits significantly predict substance use behaviour. The findings confirmed hypothesis three and showed that four personality traits were found to be significant predictors of substance use behaviours. While agreeableness and conscientiousness have significant negative direct effects on substance use behaviours, extraversion and neuroticism have significant positive direct effects on substance use behaviours. Furthermore, based on standardized regression weights agreeableness was found to be the strongest negative predictor of substance use behaviour followed by the conscientiousness trait. Although both extraversion and neuroticism were positive predictors of substance use behaviour, extraversion was found to be a relatively stronger positive predictor than neuroticism. However, openness has an insignificant effect on substance use behaviour.

The result of the current study was supported by the findings of most previous studies in which conscientiousness was found to represent a personality trait that has been most consistently linked to important health and functioning outcomes across the life span including less risky health behaviours. For example, the findings of cross-sectional studies on the relationship between personality traits and substance use behaviour reported that conscientiousness is negatively associated with smoking cigarettes (Bogg & Roberts 2013; Hampson et al., 2007; Hampson et al., 2013; Raynor & Levine, 2009; Turiano et al., 2012) and drinking alcohol (Bogg & Roberts, 2013; Hong & Paunonen, 2009; Raynor & Levine, 2009; Turiano et al., 2012). A

longitudinal study by Hong and Paunonen (2009) also proved that childhood conscientiousness was associated with less adulthood smoking.

Like conscientiousness, agreeableness was also found to be negatively associated with smoking cigarettes (Atherton, Robins, Rentfrow, & Lamb, 2014; Hampson et al., 2007; Hong & Paunonen, 2009; Maglica, 2011), and with drinking alcohol (Atherton et al., 2014; Raynor & Levine, 2009). The findings of the current study are also supported by the assertion of Torres (2006) which pointed out that males tended to be less agreeable than females, thus males tended to be involved in more violent acts, more tobacco, marijuana and illegal drug use in general.

The findings regarding the association between extraversion and substance use behaviours also corroborated with the findings of a number of previous studies that argued that extraversion is positively associated with cigarette smoking (Atherton et al., 2014; Hampson et al., 2007; Otonari et al., 2012; Raynor & Levine, 2009; Turiano et al., 2012), and with alcohol drinking (Atherton et al., 2014; Hampson et al., 2007; Hampson et al., 2013; Hong & Paunonen, 2009; Otonari et al., 2012; Raynor & Levine, 2009; Turiano et al., 2012). For example, the result of a large-scale survey conducted by Otonari et al. (2012) in Kyushu University (Japan) regarding the association between personality traits and lifestyle-related diseases revealed that extraversion was positively associated with both cigarette smoking and alcohol use. A cross sectional survey conducted on college students by Raynor and Levine (2009), also found that highly extraverted students were more likely to smoke cigarettes and consume alcohol.

Although there were some inconsistent findings reported regarding the association between neuroticism and substance use behaviour (e.g., Hong & Paunonen, 2009; Maglica, 2011; Otonari et al., 2012; Torres, 2006), many pieces of evidence supported that neuroticism is positively associated with cigarette smoking (Lahey, 2009; Mroczek, Spiro, & Turiano, 2009; Raynor & Levine, 2009; Turiano et al., 2012) and with alcohol drinking (Lahey, 2009; Mroczek et al., 2009; Turiano et al., 2012). Persons high in neuroticism are much more likely to engage in substance use behaviour, perhaps as a means to cope with aversive mood states or because of emotional impulsiveness (Lahey, 2009). Furthermore, based on his analysis of archival data, Lahey reported that there was a link between neuroticism and physical health and the link is

through behaviours that increase the risk for health problems such as smoking cigarettes, drinking alcohol, and use of other drugs.

As some studies indicated, openness to experience was related to academic and other intellectual achievements rather than health behaviours – thus there are no significant association between openness to experience and substance use behaviours (Hong & Paunonen, 2009; Maglica, 2011; Torres, 2006). Similarly, the current study confirmed that there were no positive predictive associations between openness and substance use behaviours.

The results of the causal relationship between personality traits and substance use behaviours may imply that agreeableness and conscientiousness traits are more likely to predict substance use behaviours. It may also imply that assisting students in developing behaviours underlying agreeableness and conscientiousness can help them prevent substance use behaviours.

6.2.4 Personality traits as predictors of risky sexual behaviours

The fourth hypothesis of this study claimed that personality traits significantly predict risky sexual behaviours. The findings of this study confirmed the fourth hypothesis and showed that four personality traits were found to be significant predictors of risky sexual behaviours. While agreeableness and conscientiousness have significant negative direct effects, extraversion and openness have significant positive direct effects on risky sexual behaviours. Furthermore, based on standardized regression weights both agreeableness and conscientiousness were found to be comparably strong negative predictors of risky sexual behaviours. Although both extraversion and neuroticism were positive predictors of risky sexual behaviours, extraversion was found to be a relatively stronger positive predictor than neuroticism. However, neuroticism has insignificant effects on risky sexual behaviours.

The results of the current study are supported by the findings of most previous studies in which conscientiousness was found to be negatively associated with risky sexual behaviours such as substance-induced sex (Miller et al., 2004), lower level of safer sex (Ingledew & Ferguson, 2007), relationship infidelity (Schmitt, 2004), and sex with individuals other than a regular partner (Schmitt & Shackelford (2008). Other researchers (such as Bogg & Roberts, 2004) also

164

found that conscientiousness is negatively related to all forms of risky health behaviours including risky sex.

Agreeableness was also found to be negatively associated with risky sexual behaviours (Ingledew & Ferguson, 2007; Miller et al., 2004; Raynor & Levine, 2009; Schmitt & Shackelford, 2008; Torres, 2006). The findings by Miller et al. (2004) pointed out that the broad dimension of agreeableness demonstrated relations with four of the risky sexual behaviours: Low in agreeableness or antagonism was related to having more sexual partners, substance-induced sex, having sex with a casual partner, and early sexual debut.

Several investigators found that extraversion is positively associated with risky sexual behaviours (Ingledew & Ferguson, 2007; Miller et al., 2004; Raynor & Levine, 2009; Schmitt & Shackelford, 2008). For example, a study by Miller et al. (2004) found that extraversion was positively related to three kinds of risky sexual behaviours (i.e., number of sexual partners, substance-induced sex, and early sexual debut). Raynor and Levine's (2009) study on college students also indicated that high extraversion was associated with having multiple sexual partners and being less likely to use condoms. The result of a study by Schmitt and Shackelford (2008) on college and community participants from 46 nations (including Ethiopia) showed that extraversion was positively correlated with interest in short-term mating with casual sex partners, having multiple sexual partners, and having engaged in short-term mate poaching attempts.

The small but significant positive association between openness and risky sexual behaviour in the current study has got limited support. For example, although a study by Schmitt and Shackelford (2008) found a positive association between openness and short-term mating with casual partner/s, the links were less consistent across sex and nations. Moreover, while some studies (such as Hong & Paunonen, 2009; Schmitt, 2004) found no significant association between openness to experience and risky health behaviours, some other studies (such as Miller et al., 2004); Ingledew & Ferguson, 2007), reported that openness to experience was inversely related to risky sexual behaviours such as unsafe sex and having sex at an early age for men only. Further, although openness had a significant association in the overall data of the current study, its effect had been negligible for models with data from males and data from females

during moderation or multi-group analysis presented in the next sections of this study. Thus, the significant association between openness and risky sexual behaviours is not well supported.

The insignificant association between neuroticism and risky sexual behaviours indicated in the current study supported many previous studies. For example, Hong and Paunonen (2009), Maglica (2011), Miller et al. (2004), Schmit, (2004), and Torres (2006), reported that there were no statistically significant relationships between risky sexual behaviour and neuroticism. However, Schmitt and Shackelford (2008) found a positive association between neuroticism and some forms of risky sexual behaviours, but the link was less consistent across sex and nation.

The variations among the findings of the current study and previous studies in the association between some personality traits such as openness and risky sexual behaviours may be due to variations in the distribution of personality traits across different nations and gender groups and variations in the cultural values associated with different kinds of sexual practices across different nations or cultural groups for males and females.

The negative causal relationship between agreeableness and conscientiousness with risky sexual behaviours and the positive association between extraversion and risky sexual behaviours are strongly supported by the results of previous studies. This may imply that while agreeableness and conscientiousness are protective traits, extraversion is a risk factor for risky sexual behaviour. It may also imply that helping students to develop behaviours underlying agreeableness and conscientiousness traits can help them prevent substance use behaviours.

6.2.5 Substance use as a mediator between personality traits and risky sexual behaviour

In the current study, the mediating effect of substance use behaviour on the predictive relationships between personality traits and risky sexual behaviours was tested using SEM. The mediation results of the current study supported the fifth hypothesis and showed that personality traits could indirectly influence students' risky sexual behaviours through substance use behaviours.

According to Hayes (2018) and Keith (2019), a mediator or intervening variable is one that is thought to wholly or partially explain the relationship between a predictor and an outcome variable. In this study, substance use behaviour was proposed as a mediator variable (M) influencing the association between personality traits (predictor) and risky sexual behaviour (outcome) variables. Based on the criteria set by Baron and Kenny (1986) and Hayes (2018), the direct effect of personality traits on substance use and the direct effect of substance use on risky sexual behaviours, explained in the previous sections, were considered as preconditions to assume the indirect effect of personality traits on risky sexual behaviour. Accordingly, substance use behaviour was found to mediate the association between four personality traits, namely conscientiousness, agreeableness, extraversion, and neuroticism and risky sexual behaviours.

Concerning the nature of the mediation, the effect of neuroticism on risky sexual behaviour was fully mediated (only indirectly) through substance use behaviour, which suggested that the mechanism through which neuroticism was related to risky sexual behaviour was entirely indirectly through substance use behaviour. This finding suggests that substance use behaviour account for risky sexual behaviours of persons with high neuroticism. According to Costa and McCrae (1992), persons high in neuroticism tend to experience unpleasant emotions such as anger, sadness, anxiety, guilt, depression, and vulnerability. Such persons are much more likely to engage in substance use behaviour, perhaps as a means to cope with aversive mood states or because of emotional impulsiveness (Lahey, 2009). Consumption of substance, in turn, decreases their ability to perceive risk, make a rational judgment and predict the serious consequence of their action (Wondemagegn et al., 2014). As a result, they may engage in risky sexual activities.

The causal relation between the three personality traits (extraversion, agreeableness and conscientiousness) and risky sexual behaviours were partially mediated by substance use behaviours. This result suggests that substance use behaviour does not entirely account for the association between the three personality traits and risky sexual behaviour. In other words, the mechanism through which the three personality traits (extraversion, agreeableness and conscientiousness) are related to risky sexual behaviours was not explained entirely by substance use behaviour, instead, there are direct (non-mediated) associations and other mechanisms which were not specified in the model of the current study. The result may imply that extraversion,

agreeableness, and conscientiousness traits are risk factors for risky sexual behaviours and the probability of those persons with high extraversion, agreeableness and conscientiousness to engage in risky sexual behaviours increases when they use substances.

The findings of the current study were consistent with the results of numerous studies that found direct effects of the three personality traits on substance use behaviours (Atherton, Robins, Rentfrow, & Lamb, 2014; Bogg & Roberts 2013; Hampson et al., 2013; Hong & Paunonen, 2009; Otonari et al., 2012; Raynor & Levine, 2009; Turiano et al., 2012), direct effects of substance use on risky sexual behaviours (Awoke et al., 2018; Choudhry et al., 2014; Hiwet et al., 2015; Solomon et al., 2018; Teshome & Gedif, 2013; Wondemagegn et al., 2014; Yitayal et al., 2014; Zelalem et al., 2013), as well as those that found mediation of substance use behaviour or the indirect effect of personality traits on risky sexual behaviour such as unprotected sex and having multiple sexual partners through substance use behaviour (Kalichman, Simbayi, Jooste, Cain, & Cherry, 2006).

Unlike other traits, the effect of openness on risky sexual behaviour was not mediated by substance use behaviour at all. This may be due to the fact that openness reflects the person's degree of intellectual curiosity, creativity and a preference for novelty. In most studies this trait related to academic and other intellectual achievements rather than health behaviours (Hong & Paunonen, 2009; Schmitt, 2004).

Therefore, based on the results of this study and supporting literature substance use behaviour was found to mediate the causal relationship between the four personality traits (agreeableness, conscientiousness, extraversion and neuroticism) and risky sexual behaviour. This may imply that persons who are low in conscientiousness and agreeableness and high in neuroticism and extroversion are more at risk of engaging in risky sexual behaviours when they consume substances like alcohol, khat, and shisha.

6.2.6 Moderation effect of gender

The sixth hypothesis proposing gender differences or moderation effects in the predictive relationship among personality traits, substance use and risky sexual behaviours was tested

through multigroup analysis in SEM. According to Hayes (2018), the effect of *X* on some variable *Y* is moderated by a moderator (*M*) if its size, sign, or strength depends on or can be predicted by *M*. The result of multigroup analysis or invariance test on the overall structural model level suggested that there was significant moderation effect or Chi-square difference between gender groups.

As the standardized coefficient (β) values suggested, the six causal paths or effects were significantly different for males and females, providing some support for Hypothesis 6. The negative effects of agreeableness and conscientiousness on substance use behaviour and the positive effects of extraversion on substance use behaviour were stronger for males than females. Furthermore, the positive effect of neuroticism on substance use behaviour and the positive effect of agreeableness on risky sexual behaviour were significant only for males. In contrast, the positive effect of extraversion on risky sexual behaviour was significant only for females. That means males who score high in neuroticism showed a greater tendency to use substances than females with high neuroticism. While males who score low on agreeableness have a predisposition to engage in risky sexual behaviour, females who score high in extraversion have a higher tendency to engage in risky sexual behaviour compared with their counterparts.

These findings were consistent with some previous research reports. For example, a finding by Torres (2006) indicated that males were less agreeable than females, thus males tended to be more tobacco users, more violent, and more illegal drug users. Further, Torres pointed out that there were virtually no differences between males and females with respect to conscientiousness and openness traits. Thus, there was no statistical significance found between females and males in risky sexual behaviour and other health-risk behaviours associated with these traits.

Schmitt and Shackelford (2008), in their cross-cultural study of personality traits and sexual behaviour, found that low levels of agreeableness are related to risky sexual behaviours such as promiscuity, infidelity, and the poaching more disagreeable, national levels of risky sexual behaviour such as short-term mating interest was higher. Schmitt and Shackelford further pointed out that the most agreeable men were found to reside in Africa (e.g., Ethiopia), and men in these nations were found very low in short-term mating interests. In contrast, most

169

disagreeable men were found to reside in Europe and South America and these countries had men who were relatively high in short-term mating interests. Similarly, Miller et al. (2004) found that less agreeableness was significantly negatively related to having sex with someone other than one's primary partner for men but not women.

However, the negative association of conscientiousness with risky sexual behaviour and the positive association of substance use behaviour with risky sexual behaviours were not significantly different for male and female students. The insignificant association of neuroticism and openness with risky sexual behaviour and openness with substance use behaviours were also not different for males and females. Although openness had a significant association in the overall data, its effect has been negligible for models with data from males and data from females during multi-group analysis. This inconsistency in the effect size or the significant association of openness with risky sexual behaviour in the overall data may be due to the large sample size in the overall model with data from both males and females. With large samples, even very small variations between groups can become statistically significant, but it does not mean that the discrepancy has any practical or theoretical significance (Hair et al., 2014; Mertler & Reinhart, 2017; Pallant, 2016; Tabachnick & Fidell, 2013)

6.3 Summary of the findings

This study sought to answer six research questions. The first research question (H1) was concerning the prevalence of substance use behaviours. The result indicated that the majority (72.18%) of respondents reported having used at least one of the substances (i.e., alcohol, khat, shisha, cigarette, or marijuana) in their lifetime. About half (50.27%) of the participants had consumed at least one of the substances in the past 30 days before the survey. The prevalence of substances in the 30 days before the survey was 46.3% for drinking alcohol, 16.1% for chewing khat, 9.9% for smoking shisha, 6.8% for smoking cigarettes, and 5.0% for marijuana use. The Chi-square tests of independence results proved that there were significant differences in the current prevalence of substance use behaviour among different groups of respondents based on gender, university, and year of study. All types of substance use were more prevalent among male students than female students. The significantly higher proportion of khat chewers, shisha smokers, cigarette smokers and marijuana users were found among Dire Dawa University

students. While a lower proportion of substance users were found among first year students, a higher proportion of substance users were found among third year and fourth year students.

The second research question (H2) was concerned with the prevalence of risky sexual behaviour among students. The results proved that 40.2% of respondents had sexual intercourse at least once in their lifetime and 25.6% had sexual intercourse in the past three months before the study period. Risky sexual behaviours were highly prevalent among sexually active respondents. Among sexually active respondents 35% began sexual intercourse at the age of 17 years old or younger, 64.3% had two or more sexual partners, 53.1% had substance-induced sex, 62.03% practised unsafe sex, and 45.3% had casual sex either rarely, sometimes or regularly. MANOVA results revealed that there are significant differences between gender, university and year of study groups in the prevalence of risky sexual behaviours. Sexually experienced male respondents had a younger mean age of first sexual encounter, a higher number of sex partners, and a higher incidence of casual sex than females. The proportion of younger mean age of sexual debut, number of sexual partners, the incidence of substance-induced sex, and the incidence of unsafe sex were significantly higher among Dire Dawa University respondents. Early sexual debut and incidence of unsafe sex were significantly higher among second year respondents. There were also moderate to strong positive associations among incidences of the five substance use behaviours and among the five risky sexual behaviours, which may signify that most of the respondents were engaged in multiple health-risk behaviours.

The third research question (H3) was whether personality traits predict substance use behaviours. Analysis of the structural relation revealed that four personality traits were found to be significant predictors of substance use behaviours. While agreeableness and conscientiousness had significant negative effects on substance use behaviours, extraversion and neuroticism had significant positive effects on substance use. Openness had no effect on substance use.

The fourth research question (H4) was whether personality traits predict risky sexual behaviours. As a result indicated, while agreeableness and conscientiousness had significant negative direct effects on risky sexual behaviours, extraversion had significant positive direct effects on risky sexual behaviours. Neuroticism had an insignificant direct effect, but it had only an indirect

(fully mediated) effect on risky sexual behaviour through substance use. The effect of openness on risky sexual behaviour was negligible.

The fifth research question (H5) was whether substance use mediates the association between personality traits and risky sexual behaviours. Substance use behaviours had a significant positive direct effect on risky sexual behaviour and a significant mediation effect in the predictive relationships between personality traits and risky sexual behaviours. It mediated the effect of agreeableness, conscientiousness, extraversion, and neuroticism traits on risky sexual behaviours.

The invariance test between gender groups attested that gender moderated (H6) the effect of personality trait on substance use and risky sexual behaviour. The effect of neuroticism on substance use and agreeableness on risky sexual behaviour were significant only for males and the effect of extraversion on risky sexual behaviour was significant only for females. Further, the effects of extraversion, agreeableness, and conscientiousness on substance use behaviour were stronger for males than for females.

6.4 Conclusion

As indicated in Chapter 1, the young segments of the Ethiopian population, especially university students are among the most at-risk groups of social, emotional, economic and health crisis such as HIV and AIDS which is often aggravated by substance use and risky sexual behaviours (Achenef et al., 2017; Alemu et al., 2018). The findings of this study uncovered that large numbers of Ethiopian university students are found to be substance users and practising risky sexual behaviours. More males than females and second year, third year, and fourth year students than first year students were the most at risk of substance use and risky sexual behaviours. The finding suggested the need for taking preventive measures for selected first year students and intervention measures for the selected second year, third year, and fourth year students who are in need.

The study also provided empirical support for the significant effect of personality traits on substance use and risky sexual behaviours. The negative predictive relationship between

consciousness and agreeableness traits and substance use and risky sexual behaviours suggested that these two traits are protective factors. The positive predictive association between extraversion and neuroticism and substance use behaviours suggested that the two traits are risk factors for substance use and risky sexual behaviours. Thus, the findings also suggest that students with high extraversion and neuroticism traits and who are more at risk of substance use and risky sexual behaviours need special attention, prevention and intervention supports. Furthermore, the findings argued for the value of focusing on substance use and risky sexual practices in programmes such as first year orientation programmes, life skills programmes and personal counselling programmes intended to prevent students from health risk behaviours and increase their chances of success in life.

6.5 Theoretical and practical implications

In terms of theoretical contribution, the findings of the current study could be applied to the fields of counselling and health psychology. The findings suggest the use of a traits-based model of prevention and counselling interventions as modes of application. The findings of this study can be utilised by student development and support intervention programmes to screen and better prepare at-risk university students to protect themselves from health-risk behaviours and related health outcome even in adverse situations.

The findings of the current study add to the body of knowledge regarding the pervasiveness of health risk behaviours among Ethiopian university students and its relation to their personality characteristics. Although there are some surveys conducted in Ethiopia to assess the role of personal and contextual factors on health risk behaviours, no investigations could be found concerning how people's substance use and sexual behaviours are influenced by their personality traits. While there were some studies on the issue in the context of other nations, the discoveries revealed contradictory results and the studies did not include 'khat' and 'shisha' as drugs, which are the most widely consumed substances in Ethiopia. Therefore, the study makes a valuable contribution to the body of knowledge on the topic.

Unlike previous theories and models that explain the relationship between personality traits and health behaviours, this study attested that there is a direct causal relationship among these

variables. Previous theories and models such as The health belief model (Becker, 1974), the theory of planned behaviour (Ajzen, 1985), the theory of reasoned action (Fishbein, 1979; Fishbein & Ajzen, 1977), and the five-factor trait theory (McCrae & Costa, 2008) presumed that there are mediating variables that link personality with health-related behaviours. Thus, the direct causal association between personality traits and health behaviours indicated by the findings of this study may provide a different insight in explaining health behaviours in the fields of psychology and health.

Studying and identifying the personality traits that strongly relate to substance use and risky sexual behaviours will also contribute its part in filling the gap (inconsistent findings in previous studies) in the field. Furthermore, the study may lay the foundation for further Ethiopian studies concerned with the association between personality and risky behaviours.

The findings of this study can be used for practical application. The findings suggested that university students, especially males, are at higher risk of substance use and risky sexual behaviours. While a higher proportion of third and fourth year students are substance users, a higher proportion of second year students are engaged in risky sexual practices. Students of some universities such as Dire Dawa University are more at risk than students at other universities in this regard. Hence, the findings are relevant to institutions of higher learning and other professionals who need to identify or target at-risk groups of students and provide appropriate preventions and interventions.

A comprehensive intervention programme intended for managing health-related behavioural problems requires the knowledge of both environmental and personality factors associated with health behaviours. In this regard, this study will play its own part by indicating the personality traits associated with substance use and risky sexual behaviours. The findings of the current study also pointed out that conscientiousness and agreeableness are protective factors whereas extraversion and neuroticism are risk factors for substance use and risky sexual behaviours. This may suggest the need to assess and manage students' personalities during the entrance to university.

Assessing students' personality could be done through the incorporation of the personality assessment as part of the screening tests or immediately after admission to universities that form part of first year students' profiling programme. Students who are found to have high levels of extraversion and neuroticism could be referred to programmes that are aimed at enhancing the relevant knowledge, skills and attitudes including health behaviours of freshman students, for example, life skills and personal counselling programmes. As the 'adaptation' postulate of McCrae and Costa (2008) and other intervention based researches (Hennecke, Bleidorn, Denissen, & Wood, 2014; Hudson & Fraley, 2015; Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2014; Roberts et al., 2017) argued, personality traits most linked to health problems such as extraversion and emotional stability can be modified with intervention.

6.6 Limitations and directions for future research

This study has some limitations. Perhaps the first and most obvious weakness of this study is the cross-sectional nature of its design. Since the data was collected at a specified time, the investigation captured only a snapshot of the effect of personality traits on risky health behaviours of students of Ethiopian universities. A longitudinal study is required to test the long-term effect of personality traits on health behaviours as well as on health status.

Second, the study relied on students' self-reports about their personality, substance use and sexual practices by use of anonymous questionnaires. Even in anonymous questionnaires, the data which were gathered about sexual matters through surveys may suffer from social desirability responses in which respondents usually tend to provide responses that are "morally and socially desirable" than reporting of their actual conduct (Streiner, Norman, & Cairney, 2015). Although considerable evidence exists, that self-report questions on substance use result in basically reliable and valid data (Lintonen, Ahlström, & Metso, 2004), other researchers have revealed that there is a probability of underreporting information on drug and alcohol use by respondents who want to show conformity with the society (Tourangeau & Yan, 2007). Similarly, despite its widespread use, personality traits data relied on self-report, with no confirmation by any objective measures that may tend to exaggerate the positivity or 'faking good' of the respondents' personality (Burger, 2011). Thus, acknowledging that no method is

perfect, using data collected through a variety of methods (self-report, informant reports, and behavioural measures) may improve the accuracy of the measurements.

Third, studying the effect of only the five broad dimensions of personality traits on risky health behaviours does not permit the investigator to conclude that only the five personality traits are predictors of health risk behaviours. As Miller et al. (2004) suggest, it is necessary to examine other dimensions of personality that are not incorporated in the FFM which may contribute to or predict substance use and sexual risk behaviours. As indicated by Paunonen and Jackson (2000) there are numerous broad personality variables such as *religiosity, honesty, ethical,* and *moral conduct* that have been neglected in the FFM. These facets were not included in this study as factors of the FFM. Thus, other researchers may study such factors as big personality variables in their own right which may affect health risk behaviours. Furthermore, this study examined only the effect of the broad dimensions of personality and not the specific facets of each trait on health risk behaviours. As the broad domains of personality scores help to sketch the outlines of the individual's personality quickly, facet scales enable us to fill in the details. Because facet level traits are more concretely tied to specific behaviours and experiences, it is expected that facet scales will often provide evidence that is more useful than the broader domain scales in interpreting the individual's behaviour and in choosing specific interventions (Costa & McCrae, 1995). Thus, future studies on personality traits may include and focus on the effects of the specific facets of each trait on health behaviours, so that interventions could target modifying or developing those specific traits associated with health risk behaviours.

Fourth, the study examined the personality traits of adolescents and emerging adults where personality is less stable than during adulthood. The study was also conducted on university students who are exposed to a range of situational factors. Thus, generalization on the causal relationship among personality traits, substance use and risky sexual behaviour requires conducting the study on the out-of-school adult population who have a relatively more stable personality and living in different environmental contexts.

Fifth, the study examined differences in the prevalence of substance use and risky sexual behaviour due to respondents' gender, university and year of study. It also examined the effect of

personality traits on risky sexual behaviours mediated by substance use behaviours and moderated by gender. Nevertheless, it has to be renowned that other mediating, moderating, and exogenous variables may affect the health behaviours of university students which are not examined in this study.

Sixth, the study examined only whether personality traits predict or affect health risk behaviours? It couldn't explain the mechanism (i.e., how personality traits influence health risk behaviours). Although such endeavours are beyond the scope of this study, future studies may focus on the mechanism through which personality traits influence health behaviours, which will require more intense experimental studies and may enable researchers to design better prevention and intervention strategies.

6.7 Recommendations

One of the major findings of the current study is that about half of the selected Ethiopian university students have used at least one of the substances (i.e., alcohol, khat, shisha, cigarette, or marijuana) in the 30 days before the survey. The most prevalent type of substance use problem behaviour was drinking alcohol followed by chewing khat, and smoking shisha. The higher proportion of substance users was found among males and third and fourth year students. The findings also showed that large numbers of university students were sexually active and practising risky sexual behaviours. The most prevalent form of risky sexual behaviour was having multiple sexual partners, followed by practising unsafe sex, alcohol or drug-induced sex, casual sex and early sexual debut. Further, risky sexual behaviours were highly prevalent among males and second year students. Thus:

➢ The above findings call for orientation, group counselling, and life skill programs in universities for newly admitted freshman students that incorporate awareness of substance use and risky sexual behaviours and their subsequent serious, long-term, and life-threatening consequences.

➢ It also calls for intervention measures or individual counselling for students who are involved in substance use and risky sexual behaviour problems and need counselling service.

- The findings of the study also suggest the need to incorporate youth health-risk behaviour in the programmes of high school settings intended to prepare prospective students in terms of protecting them from risky health behaviours in institutions of higher learning.

- The insight generated from this study could be used by student development practitioners to prepare and assist university students with substance use problems during their time in the institutions of higher learning;

- Legislative bodies of the country may consider developing and implementing laws that limit the sale of alcohols and drugs around the university compound.

- Universities could assign specific professionals that work towards prevention and management of substance abuse.

- Universities could train and empower the university guards or police members regarding control of the sale of substances around the university compound.

- Universities should provide culturally relevant, positive sexual behaviour and risk reduction programs which provide and strengthen user-friendly sexual and reproductive health services and allow active involvement of students.

Another major finding of the current study is that personality traits could predict students' substance use and risky sexual behaviours. While conscientiousness and agreeableness were found to be protective factors, extraversion and neuroticism were found to be risk factors for substance use and risky sexual behaviours. Thus:

- This finding suggests that it is useful for clinicians and researchers to collect data and identify individuals' personality traits to better understand and interpret the subsequent health behaviours of individuals;

- Counsellors and health psychologists can use personality traits as tools to modify or change the health-related behaviours of those at-risk students;

- Based on personality assessment results, students with high neuroticism and extraversion may be educated to change their personality characteristics through self-directed efforts and by changing their trait-related behaviours if they have the desire to change. It should be noted that if people can change their small patterns of thoughts, feelings, and

behaviours for a long enough period of time, those new patterns can crystallize into enduring trait change over time;

➢ The development and delivery of life skills programmes, health and wellness programmes, counselling services, general psychology and life skill courses for freshman students, and support materials developed by practitioners in student development departments should support students to develop behaviours underlying the protective traits and enabling them to succeed in their studies and life in general.

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APPENDICES

Appendix A

Ethical Clearance from Unisa, Higher Degrees Committee of the Department of Psychology in the College of Human Sciences

UNISA | university of south africa

Department of Psychology

Ethical Clearance for M/D students: Research on human participants

The Ethics Committee of the Department of Psychology at Unisa have evaluated this research proposal for a Higher Degree in Psychology in light of appropriate ethical requirements, with special reference to the requirements of the Code of Conduct for Psychologists of the HPCSA.

Student Name: T K Newaye   **Student no.** 50779168

Supervisor/promoter: Prof Alta Van Dyk   **Affiliation:** Department of Psychology UNISA

Title of project:

PERSONALITY TRAITS AS PREDICTORS OF SUBSTANCE USE AND RISKY SEXUAL BEHAVIOURS AMONG UNIVERSITY STUDENTS IN ETHIOPIA.

Ethical clearance is given to this project without any further conditions	X
Ethical clearance is given on conditions that certain requirements are met (as appended)	
Ethical clearance is deferred as the matter was referred to the Ethics Committee of the CHS, Unisa	
Ethical clearance is deferred until additional information is supplied (see the appended list)	
Ethical clearance cannot be granted on the basis of the information as presented (for reasons as listed in an appendix)	
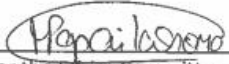
Signed: _____   Date: ___2013 -10- 1 8___
[For the Ethics Committee   ]
[Department of Psychology, Unisa]

Appendix B

Letter of Support from Unisa to the Target Universities for Cooperation in Accessing Data

UNISA | university of south africa

04 MAY, 2017

UNISA-ET/KA/ST/29/04-05-17

TO WHOM IT MAY CONCERN

Dears Madam/Sir,

The University of South Africa (UNISA) extends warm greetings. By this letter, we want to certify that Mr. Tedla Kutaye Neway (student number 50779168) is a PhD student in the Department of Psychology at UNISA. Currently, he is at the stage of data collection on his doctoral thesis entitled "*Personality traits as predictors of risky health behavior.*"

This is therefore to kindly request your cooperation in providing the student access to data sources from your esteemed University. We would like to thank you in advance for all the assistance that you would provide to the student.

Sincerely,

Tsige GebreMeskel Aberra

Deputy Director – Academic and ICT Support

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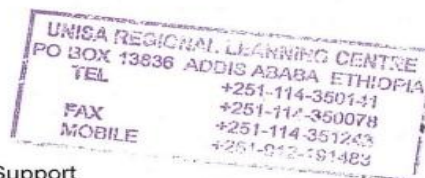
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Appendix C

Informed Consent for Data Collection

Dear Students,

Thank you so much for your willingness to complete this questionnaire. This research is being conducted by a student of UNISA in order to comply with the requirements of the degree of doctor of philosophy in psychology. This questionnaire is designed to collect data for a study that examines the prediction of substance use and sexual behaviours from personality traits, the outcome of which is crucial for the prevention of risky health behaviours. In order to maintain your anonymity, you will not be asked to write your name, ID or any personal address in this consent form. The implication of completing the questionnaire is that informed consent has been obtained from you. Your response is kept confidential so that nobody will identify you and your behaviour.

The questionnaire has three sections. The first section is about your demographic characteristics. The second section is regarding your personality traits and the third section is about your health-related behaviours. This is not a test so there is no correct or wrong answer. Respond only what you actually practice or believe. Please, check that you have completed all the questions genuinely.

Those of you who are not willing to participate in the study are not forced to fill in the questionnaire. Your participation in this study is completely voluntary and even you can terminate your participation at any point. Thank you in advance for deciding to participate in the study. Please feel free to ask me any question you may have.

Kind regards,

Tedla Kutaye

University of South Africa

Appendix D

Questionnaire

Part I: Social and Demographic variables

Please write down your responses in the blank spaces or put the tick (✓) mark in the checkboxes accordingly to indicate the various options that are applicable to you.

1. Sex: ☐ Male ☐ Female
2. Age: _____ years
3. Name of your university: _____
4. Name of your college: _____
5. Year of study:

    ☐ Year I ☐ Year II ☐ Year III ☐ Year IV ☐ Year V

6. Marital status

    ☐ Married ☐ Unmarried ☐ Divorced ☐ Widowed

Part II: Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number on the blank spaces for each statement to indicate the extent to which you agree or disagree with that statement. For example, if you *agree strongly* with the first statement 'I see myself as someone who 'is talkative', write a 5 in the space that precedes the question. If you *disagree a little,* write a 2 in the space. Please answer all the questions in the two columns.

Disagree Strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
1	2	3	4	5

I see myself as someone who...

___1. Is talkative

___2.Tends to find fault with others

___3.Does a thorough job

___4. Is depressed, blue

___5. Is original, comes up with new ideas

___6. Is reserved

___7. Is helpful and unselfish with others

___8. Can be somewhat careless

___9. Is relaxed, handles stress well

___10. Is curious about many different things

___11. Is full of energy

___12. Starts quarrels with others

___13. Is a reliable worker

___14. Can be tense

___15. Is ingenious, a deep thinker

___16. Generates a lot of enthusiasm

___17. Has a forgiving nature

___18. Tends to be disorganized

___19. Worries a lot

___23.Tends to be lazy

___24. Is emotionally stable, not easily upset

___25. Is inventive

___26. Has an assertive personality

___27. Can be cold and aloof

___28. Perseveres until the task is finished

___29. Can be moody

___30.Values artistic, aesthetic experiences

___31. Is sometimes shy, inhibited

___32. Is considerate and kind to almost everyone

___33. Does things efficiently

___34. Remains calm in tense situations

___35. Prefers work that is routine

___36. Is outgoing, sociable

___37. Is sometimes rude to others

___38. Makes plans and follows through with them

___39. Gets nervous easily

___40. Likes to reflect, play with ideas

___41. Has few artistic interests

___20. Has an active imagination   ___42. Likes to cooperate with others

___21.Tends to be quiet   ___43. Is easily distracted

___22. Is generally trusting   ___44. Is sophisticated in art, music, or literature

SECTION III: The following questions are about your health-related behaviours. Please put the tick mark (✓)in the check boxes to indicate the various options that are applicable to you:

1. During your life, have you ever drank any type of alcohol? (This may include drinking beer, wine, liquor or any locally produced alcohols like *Areke, Tej, Tella* etc.)

    ☐ Yes   ☐ No

2. During the past 30 days, how many times have you drank alcohol?

    ☐ 0 days   ☐ 1 or 2 days   ☐ 3 to 5 days   ☐ 6 to 9 days

    ☐ 10 to 19 days   ☐ 20 to 29 days   ☐ All 30 days

3. During your life, have you ever smoked shisha?

    ☐Yes   ☐ No

4. During the past 30 days, how many times have you smoked shisha?

    ☐ 0 days   ☐ 1 or 2 days   ☐ 3 to 5 days   ☐ 6 to 9 days

    ☐ 10 to 19 days   ☐ 20 to 29 days   ☐ All 30 days

5. During your life, have you ever chewed khat?

    ☐ Yes   ☐ No

6. During the past 30 days, how many times have you chewed khat?

    ☐ 0 days   ☐ 1 or 2 days   ☐ 3 to 5 days   ☐ 6 to 9 days

    ☐ 10 to 19 days   ☐ 20 to 29 days   ☐ All 30 days

7. During your life, have you ever smoked tobacco/cigarette?

    ☐ Yes   No ☐

8. During the past 30 days, how many times have you smoked tobacco/cigarette?

    ☐ 0 days   ☐ 1 or 2 days   ☐ 3 to 5 days   ☐ 6 to 9 days

    ☐ 10 to 19 days   ☐ 20 to 29 days   ☐ All 30 days

9. During your life, have you ever used Marijuana/Hashish/Ganja?

    ☐ Yes   ☐ No

10. During the past 30 days, how many times have you used marijuana/Hashish/Ganja?

☐ 0 days ☐ 1 or 2 days ☐ 3 to 5 days ☐ 6 to 9 days

☐ 10 to 19 days ☐ 20 to 29 days ☐ All 30 days

11. Have you ever had sexual intercourse in your lifetime?

☐ Yes ☐ No

12. Have you had sexual intercourse in the past three months?

☐ Yes ☐ No

13. How old were you when you had sexual intercourse for the first time?

☐ at 14 years old or younger ☐ at 15 years old ☐ at 16years old

☐ at 17 years old ☐ at 18 years old or older ☐ I have never had sex

14. How many partners have you had sexual intercourse with?

☐ 0 ☐ 1 person ☐ 2 people ☐ 3 people ☐ 4 or more

15. How often do you drink alcohol or use drugs before you had sexual intercourse?

☐ Never ☐ Rarely ☐ Sometimes ☐ Most of the time ☐ Always

16. How often did you have sex without a condom?

☐ Never ☐ Rarely ☐ Sometimes ☐ Most of the time ☐ Always

17. How often do you have sex with any casual partner whose health status is unknown?

☐ Never ☐ Rarely ☐ Sometimes ☐ Most of the time ☐ Always

Thank you for your participation in the research!

Appendix E

Observed Data Outputs

Appendix E1: **Test of Normality of the Data**

Table E1 *Assessment of Normality of the Data*

Variable	min	max	skew	c.r.	kurtosis	c.r.
E1_Item1	1.000	5.000	-.288	-6.001	-.810	-8.446
E2_Item6R	1.000	5.000	-.356	-7.429	-.563	-5.870
E3_Item11	1.000	5.000	-.240	-5.006	.164	1.706
E4_Item16	1.000	5.000	-.117	-2.434	-.230	-2.395
E5_Item21R	1.000	5.000	-.349	-7.285	-.567	-5.917
E6_Item26	1.000	5.000	-.390	-8.141	-.093	-.967
E7_Item31R	1.000	5.000	-.088	-1.838	-.699	-7.294
E8_Item36	1.000	5.000	-.299	-6.234	-.255	-2.664
A1_Item2R	1.000	5.000	-1.074	-22.408	.529	5.521
A2_Item7	1.000	5.000	-1.041	-21.703	.606	6.320
A3_Item12R	1.000	5.000	-1.084	-22.605	.591	6.168
A4_Item17	1.000	5.000	-1.079	-22.502	.482	5.024
A5_Item22	1.000	5.000	-.750	-15.647	-.057	-.590
A6_Item27R	1.000	5.000	-.978	-20.404	.217	2.259
A7_Item32	1.000	5.000	-1.048	-21.862	.509	5.303
A8_Item37R	1.000	5.000	-1.088	-22.692	.691	7.208
A9_Item42	1.000	5.000	-1.019	-21.261	.613	6.396
C1_Item3	1.000	5.000	-.855	-17.840	.277	2.894
C2_Item8R	1.000	5.000	-.712	-14.845	-.195	-2.036
C3_Item13	1.000	5.000	-.816	-17.026	-.057	-.590
C4_Item18R	1.000	5.000	-.871	-18.170	-.209	-2.175
C5_Item23R	1.000	5.000	-.789	-16.460	-.183	-1.911
C6_Item28	1.000	5.000	-.790	-16.471	-.168	-1.751
C7_Item33	1.000	5.000	-.664	-13.856	-.270	-2.815
C8_Item38	1.000	5.000	-.498	-10.391	-.441	-4.595
C9_Item43R	1.000	5.000	-.914	-19.060	.409	4.265
N1_Item4	1.000	5.000	.498	10.386	-.831	-8.666
N1_Item4	1.000	5.000	.500	10.418	-.820	-8.555
N2_Item9R	1.000	5.000	.712	14.855	-.375	-3.912
N3_Item14	1.000	5.000	.464	9.668	-.928	-9.677
N4_Item19	1.000	5.000	.457	9.522	-.852	-8.880
N5_Item24R	1.000	5.000	.331	6.896	-.826	-8.619
N6_Item29	1.000	5.000	.409	8.529	-.924	-9.638
N7_Item34R	1.000	5.000	.472	9.842	-.710	-7.401

Variable	min	max	skew	c.r.	kurtosis	c.r.
N8_Item39	1.000	5.000	.384	8.010	-1.075	-11.208
O1_Item5	1.000	5.000	-.636	-13.274	-.343	-3.575
O2_Item10	1.000	5.000	-.332	-6.933	-.577	-6.016
O3_Item15	1.000	5.000	-.605	-12.618	-.100	-1.040
O4_Item20	1.000	5.000	-.698	-14.560	-.130	-1.356
O5_Item25	1.000	5.000	-.517	-10.791	-.380	-3.967
O6_Item30	1.000	5.000	-.227	-4.731	-.630	-6.574
O7_Item35R	1.000	5.000	-.437	-9.106	-.245	-2.558
O8_Item40	1.000	5.000	-.694	-14.468	-.100	-1.047
O9_Item41R	1.000	5.000	-.238	-4.968	-.745	-7.769
O10_Item44	1.000	5.000	-.348	-7.258	-.591	-6.167
Alcoh_Days	1.000	7.000	1.697	35.403	2.995	31.232
Khat_Days	1.000	7.000	3.233	67.431	10.779	112.412
Shish_Days	1.000	7.000	4.260	88.853	19.881	207.329
Cigar_Days	1.000	7.000	5.619	117.199	36.164	377.131
Marij_Days	1.000	7.000	6.511	135.804	48.020	500.766
AgeFirstSex_R	1.000	6.000	1.988	41.469	4.296	44.802
Partners	1.000	5.000	1.294	26.995	.470	4.904
AlcoholSex	1.000	5.000	2.806	58.517	8.021	83.644
UnsafeSex	1.000	5.000	1.858	38.755	2.412	25.148
CasualSex	1.000	5.000	2.749	57.335	6.936	72.334
Multivariate					341.913	112.305

Note. The highlighted skewness values (> 3) and the highlighted kurtosis values (> 10) are indicators of the non-normality of the data to the associated variable.

Appendix E2: **Estimates of the Measurement Model**

Table E2.1 *Unstandardized Factor Loadings for the Hypothesized Measurement Model*

Parameter			Estimate	S.E.	C.R.	P	Label
E1_Item1	<---	Extraversion	1.000				
E2_Item6R	<---	Extraversion	.959	.019	51.402	***	par_1
E3_Item11	<---	Extraversion	.674	.016	41.185	***	par_2
E4_Item16	<---	Extraversion	.736	.016	46.135	***	par_3
E5_Item21R	<---	Extraversion	.941	.020	47.753	***	par_4
E6_Item26	<---	Extraversion	.823	.017	49.348	***	par_5
E7_Item31R	<---	Extraversion	1.011	.021	48.174	***	par_6
E8_Item36	<---	Extraversion	.810	.018	44.937	***	par_7
A1_Item2R	<---	Agreeableness	1.000				
A2_Item7	<---	Agreeableness	1.003	.019	53.464	***	par_8
A3_Item12R	<---	Agreeableness	.998	.019	53.398	***	par_9
A4_Item17	<---	Agreeableness	.944	.020	48.228	***	par_10
A5_Item22	<---	Agreeableness	.968	.020	49.313	***	par_11
A6_Item27R	<---	Agreeableness	1.035	.020	52.978	***	par_12
A7_Item32	<---	Agreeableness	.969	.019	50.739	***	par_13
A8_Item37R	<---	Agreeableness	.970	.018	52.532	***	par_14
A9_Item42	<---	Agreeableness	.946	.018	52.932	***	par_40
C1_Item3	<---	Conscientiousness	1.000				
C2_Item8R	<---	Conscientiousness	1.092	.021	52.280	***	par_15
C3_Item13	<---	Conscientiousness	.912	.021	42.555	***	par_16
C4_Item18R	<---	Conscientiousness	.989	.023	43.385	***	par_17
C5_Item23R	<---	Conscientiousness	1.060	.022	49.185	***	par_18
C6_Item28	<---	Conscientiousness	1.003	.022	44.762	***	par_19
C7_Item33	<---	Conscientiousness	.946	.021	45.626	***	par_20
C8_Item38	<---	Conscientiousness	1.067	.022	47.859	***	par_21
C9_Item43R	<---	Conscientiousness	1.008	.020	50.856	***	par_41
N1_Item4	<---	Neuroticism	1.000				
N2_Item9R	<---	Neuroticism	.976	.017	56.542	***	par_22
N3_Item14	<---	Neuroticism	1.002	.018	54.864	***	par_23
N4_Item19	<---	Neuroticism	.961	.018	52.789	***	par_24
N5_Item24R	<---	Neuroticism	.897	.018	51.222	***	par_25
N6_Item29	<---	Neuroticism	.927	.019	48.010	***	par_26
N7_Item34R	<---	Neuroticism	.953	.017	54.774	***	par_27
N8_Item39	<---	Neuroticism	1.000	.019	52.647	***	par_28
O1_Item5	<---	Openness	1.000				
O2_Item10	<---	Openness	1.004	.022	45.627	***	par_29
O3_Item15	<---	Openness	.935	.021	45.505	***	par_30
O4_Item20	<---	Openness	.945	.022	42.213	***	par_31
O5_Item25	<---	Openness	.950	.023	40.556	***	par_32
O6_Item30	<---	Openness	.877	.022	40.040	***	par_33
O7_Item35R	<---	Openness	.889	.021	42.526	***	par_34
O8_Item40	<---	Openness	1.029	.022	45.873	***	par_35
O9_Item41R	<---	Openness	1.056	.024	44.591	***	par_42
O10_Item44	<---	Openness	1.042	.023	45.438	***	par_43

Parameter			Estimate	S.E.	C.R.	P	Label
Alcoh_Days	<---	SubstanceUse	1.000				
Khat_Days	<---	SubstanceUse	1.074	.028	37.985	***	par_36
Shish_Days	<---	SubstanceUse	.944	.023	40.958	***	par_37
Cigar_Days	<---	SubstanceUse	.697	.017	40.435	***	par_38
Marij_Days	<---	SubstanceUse	.566	.015	37.467	***	par_39
AgeFirstSex_R	<---	RiskySex	1.000				
Partners	<---	RiskySex	1.296	.021	61.309	***	par_44
AlcoholSex	<---	RiskySex	.542	.014	38.352	***	par_45
UnsafeSex	<---	RiskySex	.886	.020	44.452	***	par_46
CasualSex	<---	RiskySex	.584	.016	37.499	***	par_47

Note. 1.000 = Constrained parameter estimates; *** = $p < .001$

Table E2.2 *Standardized Factor Loadings for the Hypothesized Measurement Model*

Parameters			Estimate
E1_Item1	<---	Extraversion	.817
E2_Item6R	<---	Extraversion	.845
E3_Item11	<---	Extraversion	.722
E4_Item16	<---	Extraversion	.784
E5_Item21R	<---	Extraversion	.804
E6_Item26	<---	Extraversion	.822
E7_Item31R	<---	Extraversion	.808
E8_Item36	<---	Extraversion	.770
A1_Item2R	<---	Agreeableness	.847
A2_Item7	<---	Agreeableness	.828
A3_Item12R	<---	Agreeableness	.827
A4_Item17	<---	Agreeableness	.776
A5_Item22	<---	Agreeableness	.788
A6_Item27R	<---	Agreeableness	.823
A7_Item32	<---	Agreeableness	.802
A8_Item37R	<---	Agreeableness	.819
A9_Item42	<---	Agreeableness	.823
C1_Item3	<---	Conscientiousness	.819
C2_Item8R	<---	Conscientiousness	.847
C3_Item13	<---	Conscientiousness	.734
C4_Item18R	<---	Conscientiousness	.745
C5_Item23R	<---	Conscientiousness	.814
C6_Item28	<---	Conscientiousness	.762
C7_Item33	<---	Conscientiousness	.772
C8_Item38	<---	Conscientiousness	.799
C9_Item43R	<---	Conscientiousness	.832
N1_Item4	<---	Neuroticism	.852
N2_Item9R	<---	Neuroticism	.852
N3_Item14	<---	Neuroticism	.837
N4_Item19	<---	Neuroticism	.818
N5_Item24R	<---	Neuroticism	.804
N6_Item29	<---	Neuroticism	.772
N7_Item34R	<---	Neuroticism	.836
N8_Item39	<---	Neuroticism	.817
O1_Item5	<---	Openness	.784
O2_Item10	<---	Openness	.807
O3_Item15	<---	Openness	.805
O4_Item20	<---	Openness	.759
O5_Item25	<---	Openness	.735
O6_Item30	<---	Openness	.728
O7_Item35R	<---	Openness	.764
O8_Item40	<---	Openness	.810
O9_Item41R	<---	Openness	.793
O10_Item44	<---	Openness	.804
Alcoh_Days	<---	SubstanceUse	.669
Khat_Days	<---	SubstanceUse	.833

Parameters			Estimate
Shish_Days	<---	SubstanceUse	.915
Cigar_Days	<---	SubstanceUse	.900
Marij_Days	<---	SubstanceUse	.820
AgeFirstSex_R	<---	RiskySex	.860
Partners	<---	RiskySex	.922
AlcoholSex	<---	RiskySex	.669
UnsafeSex	<---	RiskySex	.742
CasualSex	<---	RiskySex	.658

Note. The highlighted standardized loadings are less than 0.7

Table E2.3 *Unstandardized Estimates with Bias Corrected Percentile for the Revised Model*

Parameter			Estimate	Lower	Upper	P
E1_Item1	<---	Extraversion	1.000	1.000	1.000	...
E2_Item6R	<---	Extraversion	.954	.917	.989	.006
E3_Item11	<---	Extraversion	.681	.642	.712	.005
E4_Item16	<---	Extraversion	.737	.704	.768	.005
E6_Item26	<---	Extraversion	.838	.801	.880	.003
E8_Item36	<---	Extraversion	.815	.783	.848	.004
A1_Item2R	<---	Agreeableness	1.000	1.000	1.000	...
A2_Item7	<---	Agreeableness	1.009	.970	1.056	.004
A4_Item17	<---	Agreeableness	.950	.906	.992	.006
A5_Item22	<---	Agreeableness	.966	.928	1.007	.003
A6_Item27R	<---	Agreeableness	1.039	1.000	1.079	.004
A7_Item32	<---	Agreeableness	.974	.937	1.019	.004
A8_Item37R	<---	Agreeableness	.973	.937	1.023	.003
A9_Item42	<---	Agreeableness	.952	.914	.990	.004
C1_Item3	<---	Conscientiousness	1.000	1.000	1.000	...
C2_Item8R	<---	Conscientiousness	1.095	1.056	1.137	.005
C3_Item13	<---	Conscientiousness	.913	.877	.951	.005
C4_Item18R	<---	Conscientiousness	.995	.957	1.039	.004
C5_Item23R	<---	Conscientiousness	1.063	1.021	1.107	.005
C6_Item28	<---	Conscientiousness	1.008	.963	1.053	.004
C8_Item38	<---	Conscientiousness	1.072	1.030	1.112	.006
C9_Item43R	<---	Conscientiousness	1.013	.979	1.053	.003
N1_Item4	<---	Neuroticism	1.000	1.000	1.000	...
N3_Item14	<---	Neuroticism	1.006	.973	1.034	.007
N4_Item19	<---	Neuroticism	.956	.927	.989	.004
N5_Item24R	<---	Neuroticism	.899	.867	.928	.005
N6_Item29	<---	Neuroticism	.936	.899	.969	.006
N7_Item34R	<---	Neuroticism	.948	.918	.977	.006
N8_Item39	<---	Neuroticism	1.005	.976	1.039	.003
O1_Item5	<---	Openness	1.000	1.000	1.000	...
O3_Item15	<---	Openness	.937	.901	.979	.003
O5_Item25	<---	Openness	.948	.905	.996	.004
O6_Item30	<---	Openness	.876	.838	.922	.003
O7_Item35R	<---	Openness	.885	.847	.931	.002
O8_Item40	<---	Openness	1.030	.992	1.071	.003
O9_Item41R	<---	Openness	1.057	1.010	1.097	.009
O10_Item44	<---	Openness	1.042	1.004	1.090	.004
Khat_Days	<---	SubstanceUse	1.000	1.000	1.000	...
Shish_Days	<---	SubstanceUse	.890	.815	.968	.004
Cigar_Days	<---	SubstanceUse	.613	.548	.678	.004
Marij_Days	<---	SubstanceUse	.494	.414	.560	.005
AgeFirstSex_R	<---	RiskySex	1.000	1.000	1.000	...
Partners	<---	RiskySex	1.324	1.250	1.429	.002
UnsafeSex	<---	RiskySex	.870	.809	.933	.004

Note: All loadings are significant at $p < .01$ as the lower and upper boundaries (ranges) of all parameter estimates do not include zero. 1.000 = constrained parameter estimates.

Table E2.4 *Standard Errors and Means of Factor Loadings with Bootstrap Samples for the Revised Model*

Parameter			SE	SE-SE	Mean	Bias	SE-Bias
E1_Item1	<---	Extraversion	.000	.000	1.000	.000	.000
E2_Item6R	<---	Extraversion	.018	.001	.955	.001	.001
E3_Item11	<---	Extraversion	.017	.001	.681	.000	.001
E4_Item16	<---	Extraversion	.016	.001	.738	.000	.001
E6_Item26	<---	Extraversion	.019	.001	.838	.000	.001
E8_Item36	<---	Extraversion	.017	.001	.815	.000	.001
A1_Item2R	<---	Agreeableness	.000	.000	1.000	.000	.000
A2_Item7	<---	Agreeableness	.021	.001	1.010	.001	.001
A4_Item17	<---	Agreeableness	.021	.001	.951	.002	.001
A5_Item22	<---	Agreeableness	.019	.001	.965	.000	.001
A6_Item27R	<---	Agreeableness	.020	.001	1.040	.001	.001
A7_Item32	<---	Agreeableness	.021	.001	.974	.000	.001
A8_Item37R	<---	Agreeableness	.021	.001	.973	.001	.001
C1_Item3	<---	Conscientiousness	.000	.000	1.000	.000	.000
C2_Item8R	<---	Conscientiousness	.021	.001	1.096	.001	.001
C3_Item13	<---	Conscientiousness	.020	.001	.914	.001	.001
C4_Item18R	<---	Conscientiousness	.021	.001	.995	.000	.001
C5_Item23R	<---	Conscientiousness	.022	.001	1.064	.001	.001
C6_Item28	<---	Conscientiousness	.022	.001	1.008	.000	.001
C8_Item38	<---	Conscientiousness	.022	.001	1.072	.000	.001
N1_Item4	<---	Neuroticism	.000	.000	1.000	.000	.000
N3_Item14	<---	Neuroticism	.016	.001	1.007	.001	.001
N4_Item19	<---	Neuroticism	.016	.000	.957	.000	.001
N5_Item24R	<---	Neuroticism	.016	.001	.899	.000	.001
N6_Item29	<---	Neuroticism	.017	.001	.937	.001	.001
N7_Item34R	<---	Neuroticism	.015	.000	.949	.001	.001
N8_Item39	<---	Neuroticism	.016	.001	1.005	.000	.001
O1_Item5	<---	Openness	.000	.000	1.000	.000	.000
O3_Item15	<---	Openness	.020	.001	.937	-.001	.001
O5_Item25	<---	Openness	.024	.001	.948	.000	.001
O6_Item30	<---	Openness	.020	.001	.876	-.001	.001
O7_Item35R	<---	Openness	.021	.001	.884	-.001	.001
O8_Item40	<---	Openness	.020	.001	1.030	.000	.001
Khat_Days	<---	SubstanceUse	.000	.000	1.000	.000	.000
Shish_Days	<---	SubstanceUse	.037	.001	.891	.001	.002
Cigar_Days	<---	SubstanceUse	.033	.001	.612	.000	.001
Marij_Days	<---	SubstanceUse	.039	.001	.493	.000	.002
A9_Item42	<---	Agreeableness	.019	.001	.953	.001	.001
C9_Item43R	<---	Conscientiousness	.019	.001	1.013	.000	.001
O9_Item41R	<---	Openness	.023	.001	1.059	.002	.001
O10_Item44	<---	Openness	.022	.001	1.042	.000	.001
AgeFirstSex_R	<---	RiskySex	.000	.000	1.000	.000	.000
Partners	<---	RiskySex	.043	.001	1.323	-.001	.002
UnsafeSex	<---	RiskySex	.031	.001	.870	.001	.001

Note: Column 4 ("Bias") represented the difference between the estimate of SE with the original sample and SE of estimates across the bootstrap samples; Mean = 1.000 and SE = .000 are estimates for constrained parameters.

Appendix E3: **Post Hoc Test Results for Chi-square Test of Independence**

Table E3.1 *Summary of Post Hoc Test for the Chi-square Test of Independence Between Substance use Behaviour and Respondents' Universities*

Crosstab													
			Cur_Alcoh		Cur_Khat		Cur_Shisha		Cur_Cigar		Cur_Marij		
			No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	
University	Bahir-Dar Univ	Count	445	377	743	79	768	54	794	28	799	23	
		% within Univ	54.1%	45.9%	90.4%	9.6%	93.4%	6.6%	96.6%	3.4%	97.2	2.8	
		Adjusted Resid	.3	-.3	6.1	-6.1	3.8	-3.8	4.7	-4.7	3.5	-3.5	
		p	.771	.771	.000	.000	.000	.000	.000	.000	.000	.000	
	Dilla Univ	Count	287	226	407	106	467	46	464	49	482	31	
		% within Univ	55.9%	44.1%	79.3%	20.7%	91.0%	9.0%	90.4%	9.6%	94.0%	6.0%	
		Adjusted Resid	1.1	-1.1	-3.1	3.1	.8	-.8	-2.7	2.7	-1.2	1.2	
		p	.259	.259	0.002	0.002	.424	.424	.007	.007	.230	.230	
	Dire-Dawa Univ	Count	178	180	256	102	287	71	323	35	330	28	
		% within Univ	49.7%	50.3%	71.5%	28.5%	80.2%	19.8%	90.2%	9.8%	92.2%	7.8%	
		Adjusted Resid	-1.6	1.6	-6.8	6.8	-6.8	6.8	-2.4	2.4	-2.7	2.7	
		p	.103	.103	.000	.000	.000	.000	.016	.016	.007	.007	
	Debre-Berhan Univ	Count	207	217	358	66	371	53	385	39	398	26	
		% within Univ	48.8%	51.2%	84.4%	15.6%	87.5%	12.5%	90.8%	9.2%	93.9%	6.1%	
		Adjusted Resid	-2.2	2.2	.3	-.3	-2.0	2.0	-2.1	2.1	-1.2	1.2	
		p	.027	.027	.764	.764	.046	.046	.036	.036	.230	.230	
	Wollo Univ	Count	285	208	425	68	459	34	466	27	471	22	
		% within Univ	57.8%	42.2%	86.2%	13.8%	93.1%	6.9%	94.5%	5.5%	95.5%	4.5%	
		Adjusted Resid	2.0	-2.0	1.6	-1.6	2.5	-2.5	1.3	-1.3	.6	-.6	
		p	.043	.043	.110	.110	.012	.012	.194	.194	.549	.549	

Note. Univ = University; Resid = residuals; Cur_Alcoh = currently drink alcohol; Cur_Khat = currently chew khat; Cur_Shisha = currently smoke shisha; Cur_Cigar = currently smoke cigarette; Cur_Marij = currently use marijuana.

Table E3.2 *Summary of Post Hoc Test for the Chi-square Test of Independence Between Substance Use Behaviour and Year of Study*

			Cur_Alcoh		Cur_Khat		Cur_Shisha		Cur_Cigar		Cur_Marij	
			No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
	First Year	Count	383	259	633	9	616	26	629	13	630	12
		% within Year	59.7%	40.3%	98.6%	1.4%	96.0%	4.0%	98.0	2.0	98.1%	1.9%
		Adjusted Resid	3.5	-3.5	11.7	-11.7	5.7	-5.7	5.6	-5.6	4.2	-4.2
		p	.0005	.0005	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
	Second Year	Count	511	371	753	129	822	60	838	44	850	32
		% within Year	57.9%	42.1%	85.4%	14.6%	93.2%	6.8%	95.0%	5.0%	96.4%	3.6%
		Adjusted Resid	3.1	-3.1	1.5	-1.5	3.8	-3.8	2.7	-2.7	2.3	-2.3
		p	.0020	.0020	.1355	.1355	.0002	.0002	.0080	.0080	.0232	.0232
	Third Year	Count	326	366	483	209	576	116	617	75	643	49
		% within Year	47.1%	52.9%	69.8%	30.2%	83.2%	16.8%	89.2%	10.8%	92.9%	7.1%
		Adjusted Resid	-4.1	4.1	-11.7	11.7	-7.1	7.1	-4.9	4.9	-3.0	3.0
		p	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0031	.0031
	Fourth Year	Count	96	136	190	42	201	31	209	23	218	14
		% within Year	41.4%	58.6%	81.9%	18.1%	86.6%	13.4%	90.1%	9.9%	94.0%	6.0%
		Adjusted Resid	-3.9	3.9	-.9	.9	-1.9	1.9	-2.0	2.0	-.8	.8
		p	.0001	.0001	.3920	.3920	.0630	.0630	.0502	.0502	.4396	.4396
Year of Study	Fifth Year	Count	86	76	130	32	137	25	139	23	139	23
		% within Year	53.1%	46.9%	80.2%	19.8%	84.6%	15.4%	85.8%	14.2%	85.8%	14.2%
		Adjusted Resid	-.2	.2	-1.3	1.3	-2.4	2.4	-3.8	3.8	-5.6	5.6
		p	.8681	.8681	.1955	.1955	.0146	.0146	.0001	.0001	.0000	.0000

Note. % within Year = % within Year of study; Resid = residuals; Cur_Alcoh = currently drink alcohol; Cur_Khat = currently chew khat; Cur_Shisha = currently smoke shisha; Cur_Cigar = currently smoke cigarette; Cur_Marij = currently use marijuana.

Appendix E4: MANOVA Test Results

Table E4.1 *MANOVA Results for Risky Sexual Behaviours Differences by Gender*

Descriptive Statistics

	Gender	Mean	Std. Deviation	N
Age of First Sex	Female	4.60	.765	222
	Male	4.20	1.219	447
Number of Sex Partners	Female	2.67	.860	222
	Male	3.52	1.146	447
Alcohol/Drug Induced Sex	Female	1.82	1.041	222
	Male	1.91	1.053	447
Unsafe Sex	Female	2.41	1.195	222
	Male	2.67	1.310	447
Casual Sex	Female	1.71	1.121	222
	Male	1.98	1.143	447

Box's Test of Equality of Covariance Matrices [a]

Box's M	119.444
F	7.888
df1	15
df2	816652.838
Sig.	.000

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Gender

Multivariate Tests [a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.979	6262.729[b]	5.000	663.000	.000	.979
	Wilks' Lambda	.021	6262.729[b]	5.000	663.000	.000	.979
	Hotelling's Trace	47.230	6262.729[b]	5.000	663.000	.000	.979
	Roy's Largest Root	47.230	6262.729[b]	5.000	663.000	.000	.979
Gender	Pillai's Trace	.140	21.605[b]	5.000	663.000	.000	.140
	Wilks' Lambda	.860	21.605[b]	5.000	663.000	.000	.140
	Hotelling's Trace	.163	21.605[b]	5.000	663.000	.000	.140
	Roy's Largest Root	.163	21.605[b]	5.000	663.000	.000	.140

a. Design: Intercept + Gender
b. Exact statistic

Levene's Test of Equality of Error Variances [a]

	F	df1	df2	Sig.
Age of First Sex	51.438	1	667	.000
Number of Sex Partners	51.749	1	667	.000
Alcohol/Drug Induced Sex	1.464	1	667	.227
Unsafe Sex	4.487	1	667	.035
Casual Sex	.068	1	667	.795

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Gender

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
	Age of First Sex	23.732[a]	1	23.732	19.972	.000	.029
	Number of Sex Partners	107.763[b]	1	107.763	95.975	.000	.126
Corrected Model	Alcohol/Drug Induced Sex	1.474[c]	1	1.474	1.339	.248	.002
	Unsafe Sex	10.299[d]	1	10.299	6.358	.012	.009
	Casual Sex	10.313[e]	1	10.313	7.996	.005	.012
	Age of First Sex	11482.130	1	11482.130	9662.612	.000	.935
	Number of Sex Partners	5675.572	1	5675.572	5054.742	.000	.883
Intercept	Alcohol/Drug Induced Sex	2064.063	1	2064.063	1875.149	.000	.738
	Unsafe Sex	3819.339	1	3819.339	2357.679	.000	.779
	Casual Sex	2016.531	1	2016.531	1563.477	.000	.701
	Age of First Sex	23.732	1	23.732	19.972	.000	.029
	Number of Sex Partners	107.763	1	107.763	95.975	.000	.126
Gender	Alcohol/Drug Induced Sex	1.474	1	1.474	1.339	.248	.002
	Unsafe Sex	10.299	1	10.299	6.358	.012	.009
	Casual Sex	10.313	1	10.313	7.996	.005	.012
	Age of First Sex	792.599	667	1.188			
	Number of Sex Partners	748.922	667	1.123			
Error	Alcohol/Drug Induced Sex	734.198	667	1.101			
	Unsafe Sex	1080.511	667	1.620			
	Casual Sex	860.279	667	1.290			

a. R Squared = .029 (Adjusted R Squared = .028)
b. R Squared = .126 (Adjusted R Squared = .124)
c. R Squared = .002 (Adjusted R Squared = .001)
d. R Squared = .009 (Adjusted R Squared = .008)
e. R Squared = .012 (Adjusted R Squared = .010)

Table E4.2 *MANOVA Results for Risky sexual Behaviours Differences by Respondents University*

Descriptive Statistics

	University	Mean	Std. Deviation	N
Age of First Sex	Bahir Dar Univ	4.31	1.042	171
	Dilla Univ	4.45	.972	159
	Dire Dawa Univ	4.06	1.291	104
	Debre Berhan Univ	4.58	.952	119
	Wollo Univ	4.19	1.264	116
Number of Sex Partners	Bahir Dar Univ	3.27	1.127	171
	Dilla Univ	3.07	1.074	159
	Dire Dawa Univ	3.64	1.079	104
	Debre Berhan Univ	3.07	1.118	119
	Wollo Univ	3.22	1.200	116
Alcohol/Drug Induced Sex	Bahir Dar Univ	1.78	.979	171
	Dilla Univ	1.86	.924	159
	Dire Dawa Univ	2.40	1.187	104
	Debre Berhan Univ	1.74	.987	119
	Wollo Univ	1.73	1.114	116
Unsafe Sex	Bahir Dar Univ	2.30	1.247	171
	Dilla Univ	2.62	1.276	159
	Dire Dawa Univ	2.83	1.250	104
	Debre Berhan Univ	2.72	1.275	119
	Wollo Univ	2.57	1.300	116
Casual Sex	Bahir Dar Univ	1.77	1.080	171
	Dilla Univ	1.89	1.134	159
	Dire Dawa Univ	2.01	1.119	104
	Debre Berhan Univ	1.90	1.238	119
	Wollo Univ	1.93	1.163	116

Box's Test of Equality of Covariance Matrices [a]

Box's M	102.389
F	1.678
df1	60
df2	709368.328
Sig.	.001

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + University

Multivariate Tests [a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.981	6876.737[b]	5.000	660.000	.000	.981
	Wilks' Lambda	.019	6876.737[b]	5.000	660.000	.000	.981
	Hotelling's Trace	52.096	6876.737[b]	5.000	660.000	.000	.981
	Roy's Largest Root	52.096	6876.737[b]	5.000	660.000	.000	.981
University	Pillai's Trace	.105	3.562	20.000	2652.000	.000	.026
	Wilks' Lambda	.898	3.595	20.000	2189.922	.000	.026
	Hotelling's Trace	.110	3.613	20.000	2634.000	.000	.027
	Roy's Largest Root	.063	8.404[c]	5.000	663.000	.000	.060

a. Design: Intercept + University

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Levene's Test of Equality of Error Variances [a]

	F	df1	df2	Sig.
Age of First Sex	6.501	4	664	.000
Number of Sex Partners	2.520	4	664	.040
Alcohol/Drug Induced Sex	4.593	4	664	.001
Unsafe Sex	.272	4	664	.896
Casual Sex	1.796	4	664	.128

Tests the null hypothesis that the error variance of the dependent variable is
equal across groups.

a. Design: Intercept + University

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Age of First Sex	19.889[a]	4	4.972	4.146	.003	.024
	Number of Sex Partners	25.453[b]	4	6.363	5.083	.000	.030
	Alcohol/Drug Induced Sex	35.043[c]	4	8.761	8.303	.000	.048
	Unsafe Sex	22.083[d]	4	5.521	3.430	.009	.020
	Casual Sex	4.076[e]	4	1.019	.781	.538	.005
Intercept	Age of First Sex	12020.776	1	12020.776	10021.812	.000	.938
	Number of Sex Partners	6827.446	1	6827.446	5453.864	.000	.891
	Alcohol/Drug Induced Sex	2337.907	1	2337.907	2215.683	.000	.769
	Unsafe Sex	4388.723	1	4388.723	2726.713	.000	.804
	Casual Sex	2329.792	1	2329.792	1785.289	.000	.729
University	Age of First Sex	19.889	4	4.972	4.146	.003	.024
	Number of Sex Partners	25.453	4	6.363	5.083	.000	.030
	Alcohol/Drug Induced Sex	35.043	4	8.761	8.303	.000	.048
	Unsafe Sex	22.083	4	5.521	3.430	.009	.020
	Casual Sex	4.076	4	1.019	.781	.538	.005
Error	Age of First Sex	796.442	664	1.199			
	Number of Sex Partners	831.232	664	1.252			
	Alcohol/Drug Induced Sex	700.628	664	1.055			
	Unsafe Sex	1068.727	664	1.610			
	Casual Sex	866.516	664	1.305			

a. R Squared = .024 (Adjusted R Squared = .018)
b. R Squared = .030 (Adjusted R Squared = .024)
c. R Squared = .048 (Adjusted R Squared = .042)
d. R Squared = .020 (Adjusted R Squared = .014)
e. R Squared = .005 (Adjusted R Squared = -.001)

Post Hoc Test for Risky Sexual Behaviour Difference by University

Dependent Variable	(I) University	(J) University	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
			Multiple Comparisons				
			Games-Howell				
Age of First Sex	Bahir Dar Univ	Dilla Univ	-.14	.111	.698	-.45	.16
		Dire Dawa Univ	.25	.150	.445	-.16	.66
		Debre Berhan Univ	-.27	.118	.153	-.59	.05
		Wollo Univ	.12	.142	.915	-.27	.51
	Dilla Univ	Dire Dawa Univ	.40	.148	.063	-.01	.80
		Debre Berhan Univ	-.13	.116	.811	-.45	.19
		Wollo Univ	.26	.140	.335	-.12	.65
	Dire Dawa Univ	Debre Berhan Univ	-.52*	.154	.007	-.95	-.10
		Wollo Univ	-.13	.173	.940	-.61	.34
	Debre Berhan	Wollo Univ	.39	.146	.062	-.01	.79
Number of Sex Partners	Bahir Dar Univ	Dilla Univ	.21	.121	.437	-.13	.54
		Dire Dawa Univ	-.37	.136	.056	-.74	.01
		Debre Berhan Univ	.21	.134	.531	-.16	.58
		Wollo Univ	.06	.141	.993	-.33	.45
	Dilla Univ	Dire Dawa Univ	-.58*	.136	.000	-.95	-.20
		Debre Berhan Univ	.00	.133	1.000	-.36	.37
		Wollo Univ	-.15	.140	.835	-.53	.24
	Dire Dawa Univ	Debre Berhan Univ	.58*	.147	.001	.17	.98
		Wollo Univ	.43*	.154	.045	.01	.85
	Debre Berhan	Wollo Univ	-.15	.151	.864	-.56	.27
Alcohol/Drug Induced Sex	Bahir Dar Univ	Dilla Univ	-.08	.105	.946	-.37	.21
		Dire Dawa Univ	-.62*	.138	.000	-1.00	-.24
		Debre Berhan Univ	.04	.117	.996	-.28	.37
		Wollo Univ	.05	.128	.995	-.30	.40
	Dilla Univ	Dire Dawa Univ	-.54*	.138	.001	-.92	-.16
		Debre Berhan Univ	.12	.116	.832	-.20	.44
		Wollo Univ	.13	.127	.848	-.22	.48
	Dire Dawa Univ	Debre Berhan Univ	.66*	.147	.000	.26	1.07
		Wollo Univ	.67*	.156	.000	.24	1.10
	Debre Berhan	Wollo Univ	.01	.137	1.000	-.37	.38
Unsafe Sex	Bahir Dar Univ	Dilla Univ	-.32	.139	.150	-.70	.06
		Dire Dawa Univ	-.52*	.155	.008	-.95	-.10
		Debre Berhan Univ	-.42*	.151	.046	-.83	.00
		Wollo Univ	-.26	.154	.423	-.69	.16
	Dilla Univ	Dire Dawa Univ	-.20	.159	.701	-.64	.23
		Debre Berhan Univ	-.10	.155	.967	-.52	.32
		Wollo Univ	.05	.158	.997	-.38	.49
	Dire Dawa Univ	Debre Berhan Univ	.10	.169	.973	-.36	.57
		Wollo Univ	.26	.172	.564	-.22	.73
	Debre Berhan	Wollo Univ	.15	.168	.891	-.31	.62
Casual Sex	Bahir Dar	Dilla Univ	-.12	.122	.859	-.46	.21

		Dire Dawa Univ	-.24	.137	.417	-.62	.14
		Debre Berhan Univ	-.13	.140	.894	-.51	.26
		Wollo Univ	-.16	.136	.768	-.53	.21
	Dilla Univ	Dire Dawa Univ	-.12	.142	.924	-.51	.27
		Debre Berhan Univ	-.01	.145	1.000	-.40	.39
		Wollo Univ	-.04	.141	.999	-.42	.35
	Dire Dawa Univ	Debre Berhan Univ	.11	.158	.956	-.32	.54
		Wollo Univ	.08	.154	.986	-.34	.50
	Debre Berhan	Wollo Univ	-.03	.157	1.000	-.46	.40
Based on observed means. The error term is Mean Square (Error) = 1.305.							
*. The mean difference is significant at the .05 level.							

Note. Univ = University

Table E4.3 *MANOVA Results for Risky sexual Behaviours Difference by Respondents Year of Study*

Descriptive Statistics

	Year_of_Study	Mean	Std. Deviation	N
Age of First Sex	First Year	4.20	1.292	94
	Second Year	4.17	1.127	238
	Third Year	4.43	1.021	212
	Fourth Year	4.53	1.126	66
	Fifth Year	4.61	.831	59
Number of Sex Partners	First Year	3.21	1.086	94
	Second Year	3.25	1.119	238
	Third Year	3.27	1.156	212
	Fourth Year	3.29	1.092	66
	Fifth Year	3.02	1.225	59
Alcohol/Drug Induced Sex	First Year	1.60	.834	94
	Second Year	1.92	1.098	238
	Third Year	1.95	.984	212
	Fourth Year	1.89	1.152	66
	Fifth Year	1.93	1.216	59
Unsafe Sex	First Year	2.30	1.234	94
	Second Year	2.74	1.324	238
	Third Year	2.40	1.237	212
	Fourth Year	2.77	1.200	66
	Fifth Year	2.83	1.248	59
Casual Sex	First Year	1.80	1.073	94
	Second Year	1.91	1.187	238
	Third Year	1.96	1.147	212
	Fourth Year	1.85	1.113	66
	Fifth Year	1.73	1.080	59

Box's Test of Equality of Covariance Matrices [a]

Box's M	133.394
F	2.172
df1	60
df2	212491.258
Sig.	.000

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Year_of_Study

Multivariate Tests [a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.976	5266.281[b]	5.000	660.000	.000	.976
	Wilks' Lambda	.024	5266.281[b]	5.000	660.000	.000	.976
	Hotelling's Trace	39.896	5266.281[b]	5.000	660.000	.000	.976
	Roy's Largest Root	39.896	5266.281[b]	5.000	660.000	.000	.976
Year_of_Study	Pillai's Trace	.083	2.798	20.000	2652.000	.000	.021
	Wilks' Lambda	.919	2.811	20.000	2189.922	.000	.021
	Hotelling's Trace	.085	2.815	20.000	2634.000	.000	.021
	Roy's Largest Root	.042	5.583[c]	5.000	663.000	.000	.040

a. Design: Intercept + Year_of_Study

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Levene's Test of Equality of Error Variances [a]

	F	df1	df2	Sig.
Age of First Sex	4.140	4	664	.003
Number of Sex Partners	1.558	4	664	.184
Alcohol/Drug-induced Sex	3.805	4	664	.005
Unsafe Sex	1.478	4	664	.207
Casual Sex	.176	4	664	.951

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Year_of_Study

Tests of Between-Subjects Effects							
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Age of First Sex	17.346[a]	4	4.337	3.604	.006	.021
	Number of Sex Partners	3.421[b]	4	.855	.665	.616	.004
	Alcohol/Drug Induced Sex	9.134[c]	4	2.284	2.087	.081	.012
	Unsafe Sex	27.172[d]	4	6.793	4.241	.002	.025
	Casual Sex	3.622[e]	4	.905	.694	.597	.004
Intercept	Age of First Sex	9322.278	1	9322.278	7747.314	.000	.921
	Number of Sex Partners	4982.552	1	4982.552	3877.363	.000	.854
	Alcohol/Drug Induced Sex	1670.755	1	1670.755	1526.944	.000	.697
	Unsafe Sex	3292.225	1	3292.225	2055.245	.000	.756
	Casual Sex	1654.547	1	1654.547	1267.194	.000	.656
Year_of_Study	Age of First Sex	17.346	4	4.337	3.604	.006	.021
	Number of Sex Partners	3.421	4	.855	.665	.616	.004
	Alcohol/Drug Induced Sex	9.134	4	2.284	2.087	.081	.012
	Unsafe Sex	27.172	4	6.793	4.241	.002	.025
	Casual Sex	3.622	4	.905	.694	.597	.004
Error	Age of First Sex	798.986	664	1.203			
	Number of Sex Partners	853.264	664	1.285			
	Alcohol/Drug Induced Sex	726.537	664	1.094			
	Unsafe Sex	1063.638	664	1.602			
	Casual Sex	866.970	664	1.306			

a. R Squared = .021 (Adjusted R Squared = .015)

b. R Squared = .004 (Adjusted R Squared = -.002)

c. R Squared = .012 (Adjusted R Squared = .006)

d. R Squared = .025 (Adjusted R Squared = .019)

e. R Squared = .004 (Adjusted R Squared = -.002)

Post Hoc Test for Risky Sexual Behaviour Difference by Year of Study

Dependent Variable	(I) Year_of_Study	(J) Year_of_Study	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
			Multiple Comparisons				
Games-Howell							
Age of First Sex	First Year	Second Year	.03	.152	.999	-.39	.45
		Third Year	-.23	.151	.538	-.65	.18
		Fourth Year	-.33	.192	.433	-.86	.20
		Fifth Year	-.41	.172	.127	-.88	.07
	Second Year	Third Year	-.27	.101	.068	-.54	.01
		Fourth Year	-.36	.157	.149	-.80	.07
		Fifth Year	-.44*	.131	.008	-.80	-.08
	Third Year	Fourth Year	-.10	.155	.972	-.53	.34
		Fifth Year	-.18	.129	.650	-.53	.18
	Fourth Year	Fifth Year	-.08	.176	.991	-.57	.41
Number of Sex Partners	First Year	Second Year	-.04	.133	.998	-.41	.33
		Third Year	-.06	.137	.992	-.44	.32
		Fourth Year	-.08	.175	.993	-.56	.41
		Fifth Year	.20	.195	.853	-.34	.74
	Second Year	Third Year	-.02	.108	1.000	-.32	.27
		Fourth Year	-.04	.153	.999	-.46	.39
		Fifth Year	.24	.175	.666	-.25	.72
	Third Year	Fourth Year	-.01	.156	1.000	-.45	.42
		Fifth Year	.26	.178	.603	-.24	.75
	Fourth Year	Fifth Year	.27	.209	.692	-.31	.85
Alcohol/Drug Induced Sex	First Year	Second Year	-.32*	.112	.032	-.63	-.02
		Third Year	-.35*	.109	.013	-.65	-.05
		Fourth Year	-.30	.166	.380	-.76	.16
		Fifth Year	-.34	.180	.342	-.84	.16
	Second Year	Third Year	-.03	.098	.999	-.30	.24
		Fourth Year	.03	.159	1.000	-.41	.47
		Fifth Year	-.01	.174	1.000	-.50	.47
	Third Year	Fourth Year	.05	.157	.997	-.38	.49
		Fifth Year	.02	.172	1.000	-.46	.50
	Fourth Year	Fifth Year	-.04	.213	1.000	-.63	.55
Unsafe Sex	First Year	Second Year	-.45*	.154	.033	-.87	-.02
		Third Year	-.10	.153	.968	-.52	.32
		Fourth Year	-.47	.195	.112	-1.01	.06
		Fifth Year	-.53	.206	.080	-1.10	.04
	Second Year	Third Year	.35*	.121	.034	.02	.68
		Fourth Year	-.03	.171	1.000	-.50	.44
		Fifth Year	-.09	.184	.990	-.60	.42
	Third Year	Fourth Year	-.38	.170	.184	-.85	.10
		Fifth Year	-.43	.183	.133	-.94	.08
	Fourth Year	Fifth Year	-.06	.220	.999	-.67	.55
Casual Sex	First Year	Second Year	-.11	.135	.926	-.48	.26
		Third Year	-.16	.136	.746	-.54	.21
		Fourth Year	-.05	.176	.998	-.54	.44
		Fifth Year	.07	.179	.995	-.43	.56
	Second Year	Third Year	-.05	.110	.988	-.36	.25
		Fourth Year	.06	.157	.996	-.38	.49
		Fifth Year	.18	.160	.798	-.27	.62

Third Year	Fourth Year	.11	.158	.951	-.32	.55
	Fifth Year	.23	.161	.598	-.21	.68
Fourth Year	Fifth Year	.12	.196	.973	-.42	.66

Based on observed means. The error term is Mean Square (Error) = 1.306.

*. The mean difference is significant at the .05 level.