Alcohol-Related Harm in Relation to Demographic Factors: A Longitudinal Analysis of South African University Students

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

MASTERS BY THESIS in PSYCHOLOGY

of

RHODES UNIVERSITY

by

TATENDA CHAKABUDA

16c2223

Supervised by: Mr Sizwe Zondo

2024

ABSTRACT

Introduction: Substance abuse, particularly alcohol abuse, has been widely studied. Due to its nature as a legal substance, the negative effects of alcohol are seemingly undermined. However, studies over time have constantly shown that despite being legal, alcohol has detrimental effects that should not be ignored. The consequences of alcohol can be divided into two broad categories: short-term and long-term. Short-term effects include blackouts, poor decision-making, engaging in unsafe sexual practices, and vandalism. On the other end, long-term effects include physiological harm and declining neurocognitive capacity. These and many other forms of harm have been studied, mainly in diagnosed alcoholic populations. Overtime, the population of interest in terms of alcohol-related harm broadened and it increasingly became evident that university students are susceptible to alcohol-related harm and alcohol use disorders due to their drinking patterns. Student drinking patterns involving binge drinking, pre-drinking, and drinking games are common due to the fact that in university, young adults have less supervision and more freedom. University students are also in an environment where excessive alcohol use is normalised, which makes them prone to alcohol-harm. However, it is important to note that different demographics are predisposed to alcohol-harm differently. Gender, age, racial and socio-economic differences are some factors that have been proven to differentiate individuals' likelihood of experiencing alcohol-related harm. Unfortunately, the differences across these different demographics within a South African university population are yet to be adequately explored. A large percentage of existing literature on demographic differences in the experience of alcohol harm in university cohorts has been largely amongst Western student populations.

Methods: The present longitudinal study aimed to rectify this research gap by providing an evidence-based outcome analysis of demographic differences in the experience of alcohol-related harm in a South African student population. Data were collected using the Alcohol Use

Disorders Identification Test (AUDIT) over a three-year period (2015, 2016 & 2017) from the same Rhodes University student cohort. Demographic data in the form of age, race, gender, and socio-economic status was analysed to study alcohol-related harm.

Results: Data indicated that male students did not significantly experience greater alcohol-related harm compared to female students ($p > 0.05$). Similarly, white students did not experience significantly more alcohol-related harm compared to non-white students ($p > 0.05$). Findings further indicated that younger students experienced significantly greater alcohol-related harm in comparison to older students ($p < 0.05$). Lastly, students from a higher socio-economic background did not experience significantly greater alcohol-induced harm when compared to those from a lower socioeconomic status background ($p > 0.05$).

Conclusion: Differences by age could be related to early brain development being linked to greater risk-taking, resulting in greater alcohol-related harm. Moreover, the absence of guardians may place younger student populations at greater risk for unhealthy drinking patterns, which may result in alcohol-related harm. Findings from the study suggest a greater need for interventions to target younger student populations. Future studies should explore why younger students are at greater risk for alcohol-related harm and seek to develop interventions that are more effective for this population.

Keywords: Alcohol abuse, alcohol-related harm, race, age, gender, socio-economic status, demographic differences, AUDIT, quantitative analysis.

ACKNOWLEDGEMENTS

Throughout the completion of this research, I received a great deal of support, which should never go unappreciated. A big thank you to:

- Mr Sizwe Zondo, for the unmeasurable amount of support, guidance, and patience as my main supervisor. Your words of encouragement reminded me to have faith in myself and kept me going.
- Prof Charles Young, for making this research possible by providing the archival data that was analysed.
- National Research Fund for funding this project.
- My sister, Tafara, immediate family and friends, thank you for providing support despite not having a clear understanding of what I was studying.
- Dr Clarton Mangadza, for always checking on me, listening to me rant and encouraging me to take one day at a time.
- Dr Garth Cambray, for being a great mentor and always reminding me why I started, how far I have come and why I should keep going.
- The Almighty Lord, for giving me the strength I needed to complete this project.

TABLE OF CONTENTS

LIST OF FIGURES

TABLE OF TABLES

1 INTRODUCTION

1.1 Context and Rationale

The principal endeavour of this study was to explore the phenomenon of alcohol-related harm in a university student population. More specifically, my research was interested in understanding demographic factors that contribute to alcohol-related harm in a South African context. The focus was on this context because, despite being a global concern, the body of literature that focuses on alcohol use in African youths is considerably limited in comparison to other regions (Francis et al., 2015).

Alcohol consumption and alcohol misuse continue to be a significant global burden (Griswold et al., 2018). The use of alcohol globally has been increasing over the last three decades, and predictions suggest that both the prevalence and level of alcohol use will continue to increase (Manthey et al., 2019). Griswold et al. (2018) analysed longitudinal data (1990 – 2016) from 195 countries and territories that were drawn from 694 data sources. Findings from this study indicated that globally, alcohol was the seventh leading cause of death and disability. In 2021, Stockwell et al. (2021) alluded to the fact that alcohol use poses several social issues, such as domestic violence, child abuse, depression and suicide. Studies have also shown that due to spending a lot of time in isolation as a result of COVID-19, there has been a sharp increase in alcohol misuse (Kim et al., 2020; Pollard et al., 2020; Stockwell et al., 2021).

Intricately linked to alcohol consumption and alcohol use is the phenomenon of alcohol use disorder (AUD) (Witkiewitz et al., 2019). AUD refers to a spectrum of high-risk behaviours involving excessive alcohol use and alcohol dependence. Clinically, AUD is defined as a psychiatric illness that leads to negative emotional, physical and social well-being (Tawa et al., 2016). Consequence of AUD, and alcohol-related harm, cause a global disease burden and multiple social ills including, but not limited to, for example, the spread of HIV/AIDS

(Chersich & Rees, 2010; World Health Organization, 2019), an increase in crime (Bennett & Holloway, 2018), increase in health complications in the form of liver and kidney cancer (Pan et al., 2018), vandalism (Evans et al., 2021; Van Lier et al., 2009), increase in road accidence (Iranpour & Nakhaee, 2019), suicidal ideation (Amiri & Behnezhad, 2020; Swahn et al., 2011) alcohol dependency (Stockwell et al., 2021), and increased neurocognitive harm (Sachdeva et al., 2016).

Over time, young adults have been found to be a population heavily affected by AUDs and alcohol-related harm. An early study by Banks and Smith (1980) found that while 68% of the adult population in the United States of America (US) consumes alcohol at least occasionally, the rate of alcohol consumption is higher in university students. More recently and in the South African context, a report by the South African Medical Research Council (SAMRC, 2020) and Maphisa and Young (2018) report similar findings and reported that South Africa is facing several epidemics, and alcohol-related harm is one of the enormous burdens. The report goes on to state that young adults are more at risk (SAMRC, 2020). University students use alcohol as a coping mechanism to adjust to university life. A prevalent finding within the literature is that as younger university students have newly found freedom, this enables them to consume large amounts of alcohol due to limited to no adult supervision, inevitably leading to greater than normal alcohol-related harm. It thus suffices that there is a need to conduct greater research focused on the experiences of alcohol-harm in the university student populations (Nekgotha et al., 2020).

1.1.1 The Global Burden of Alcohol Use Disorders (AUD) and Alcohol-related Harm

Over the years, alcohol use has been a cause of global concern due to the negative effects of excessive alcohol use, which are further fostered by the easy accessibility of alcohol. Alcohol is a leading contributor to global diseases (Witkiewitz et al., 2019), and AUDs rank at the top of the most prevalent mental disorders globally (Rehm & Shield, 2019). In 2007, a

WHO report (Benegal et al., 2007) indicated that alcohol misuse caused approximately 1.8 million deaths, which accounted for 3.2% of global total deaths and 4% of the disease burden in the same year. By 2016, it was estimated that alcohol misuse was the seventeenth leading cause of death and disability globally (Griswold et al., 2018; Rehm & Shield, 2019), with 8.6% of men and 1.7% of women respectively, either dependent or living with an alcohol use disorder (World Health Organization, 2018a). Further research from the WHO, indicates that alcohol consumption contributes to approximately three million deaths annually (World Health Organization, 2019). In the South African context, a report by SAMRC showed that South Africa experiences issues such as violence, homicides and high cases of HIV and TB, which are largely attributed to the alcohol use patterns practised (SAMRC, 2020).

Of interest to my study, Benegal et al. (2007) and Rehm et al. (2009) reported that there has been a greater increase in the burden of alcohol use disorders (AUD) in low-middle-income countries compared to developed nations. More recently, according to Walls et al. (2020), this disparity is explained by findings which suggest that within developed countries, there is a greater emphasis on intervention programs directed towards alcohol-related harm and that these regions have introduced strict regulations against the supply and use of alcohol. Consequently, there has been a reduction in alcohol consumption and alcohol-related harm within these regions. There are, however, contradictory findings, with other research (e.g., Rehm & Shield 2019) reporting that the burden of alcohol use is higher in higher-income countries compared to developing incomes. Notwithstanding these differences, the vast majority of the research continues to indicate that low to middle-income countries experience higher levels of alcohol-related harm compared to higher-income regions (Rehm & Shield, 2019; World Health Organization, 2019). In South Africa, a report published by the South African Community Epidemiology Network on Drug Use showed that alcohol was a drug of choice for most people (SACENDU, 2024). This could be because it is easily accessible and more socially acceptable.

Despite all the negative implications of alcohol cited above, epidemiological data continues to indicate that the alcohol industry continues to thrive, mainly due to the properties of alcohol and high levels of alcohol dependency that lead to excessive alcohol consumption in most populations (Conway, 2020). The subsequent sections briefly detail the properties of alcohol and relate these to my sample of interest, University students.

1.2 Properties of Alcohol

The main component of alcohol is ethanol (Vale, 2007), and this property is primarily responsible for alcohol-related harm (Rehm & Shield, 2019; Vale, 2007). When consumed, ethanol is rapidly absorbed through the gastric and small intestinal mucosae, resulting in peak blood ethanol concentration being achieved 30-90 minutes after ingestion (Vale, 2007). If consumed in large quantities, ethanol can result in a coma, lactic acidosis, hypothermia, hypotension and/or hypoglycemia. Moreover, consuming alcohol after a long fast exacerbates the negative impact of ethanol, resulting in ethanol-induced hypoglycaemia, which typically happens 6-36 hours post alcohol consumption (Vale, 2007).

After eating, the pyloric sphincter that separates the stomach from the small intestine closes, allowing stomach acid to breakdown the meal (Koziolek et al., 2019). Since alcohol will no longer be able to enter the small intestine quickly, this significantly inhibits its absorption into gastric circulation, resulting in a delay in the experience of the immediate effects of alcohol. However, if no food is available, more alcohol passes into the small intestine, which has greater permeability and a larger surface area for ethanol uptake than the stomach (Keemink et al., 2019). Overtime, alcohol affects epithelial cells that line the small intestine and the stomach. Epithelia cells allow for ethanol uptake as they contain finger-like projections that protrude into the GI lumen, significantly increasing the surface area for absorbing nutrients and other substances via the gastric membranes (Keemink et al., 2019). As ethanol passes into the interstitial space via epithelial cells, it follows the concentration gradient, allowing ethanol

to move freely from high concentrations in the stomach to low concentrations in blood vessels, were it stays absorbed for longer (Koziolek et al., 2019).

As a result of the concentration gradient, uncharged substances such as ethanol (EtOH), CO2, and H2O, diffuse straight across biological membranes (Keemink et al., 2019), infiltrating veins and liver tissue with considerable ease. Ethanol, once in the bloodstream, is broken down by the enzyme alcohol dehydrogenase (ADH), which converts ethanol into acetaldehyde (CH3CHO), a harmful and recognized carcinogen (You & Arteel, 2019)[1].

1.2.1 Ethanol and the Brain

Once within the body, ethanol works as a central nervous system depressant, working on multiple neurological targets (Lotfullina & Khazipov, 2018; Vale, 2007). For example, when consumed in large quantities, ethanol depresses medullary function and interacts with a myriad of neurotransmitter receptors, influencing cognition, mood, mental states, and behaviour (Abrahao et al., 2017). At a nervous system level, ethanol non-competitively increases Gamma-Aminobutyric Acid (GABA) activity[2] (Dry et al., 2012), depressing the CNS, leading to, for example, less parasympathetic activity, thus inducing drowsiness (Dry et al., 2012; Abrahao et al., 2017). Due to GABAergic influence, ethanol further induces sleep, partly due to liver enzymes metabolizing ethanol during sleep and BAC levels declining (Lewin et al., 2018).

In addition to depressing the CNS, Ethanol also inhibits excitatory N-methyl-D-aspartate (NMDA) receptors (Vale, 2007). These receptors are essential for learning and

[1] Levels of ethanol in the circulatory system can be measured by an increase Blood Alcohol Content (BAC) which is accurately measured by a blood draw or breathalyzer test (Seidl et al., 2000) using the formulae: BAC = alcohol consumed [grams]/body weight [grams] × r x 100. Appendix A indicates the typical levels of alcohol intoxication once ethanol is in the circulatory system.

[2] GABA is the primary inhibitory transmitter in the CNS.

memory formation (Abrahao et al., 2017). The inhibition of glutamate[3] binding to NMDA receptors due to alcohol intake suppresses the release of glutamate, resulting in a slowdown in high-order cognitive functions (learning, memory, executive functions). Consequently, continued ethanol use is associated with decreased academic abilities, especially in the University population, and greater levels of amnesia (memory loss) in elderly patients (Abrahao et al., 2017).

Of further relevance to student populations, ethanol dysregulates the ventral tegmental area (VTA), a key dopaminergic[4] node that releases dopamine into the prefrontal cortex (PFC) through the mesocortical pathway (Flores-Bonilla & Richardson, 2020). The PFC is responsible for self-regulation and emotions related to cognition, and its dysregulation due to alcohol leads to compromised 'hot' functions, such as diminished "social lubricant," associated with poor decision-making and greater risk-taking (e.g., in risky sexual activity, and unplanned behaviour) (Davis & Bajaj, 2018).

Lastly, in addition to its effects on GABAergic and NMDA systems, ethanol induces excitatory neurotransmitter pathways, interrupting the brain's reward system and stress circuitry (Gilpin & Koob, 2008). Alcohol thus acts as a psychostimulant and activates the mesolimbic dopaminergic system, in addition to deactivating the mesocortical system. This drug-induced interaction increases motoric behaviour, autonomic arousal and facilitates changes in heart rate activity (Conrod et al., 2001). Briefly summarised, ethanol activates GABA receptors, inducing relaxation, yet simultaneously enhances euphoria and psycho-stimulation by releasing dopamine via the mesolimbic system. These cortical activities are

[3] Glutamate is the primary excitatory neurotransmitter.
[4] Dopamine as a neurotransmitter associated with reward and cognition.

relevant for a student population, as the effects of alcohol are more profound on the developing brain.

1.3 Summary of the Problem Statement and Research Objectives

Previous studies (Lategan et al., 2017; Witkiewitz et al., 2019) have suggested a dearth of research within University populations and the need for more research investigating demographic factors implicated in alcohol use disorders. As it pertains to South Africa, the World Health Organization (2019) indicates that the country has one of the highest levels of alcohol use, with approximately 31% of the South African population older than fifteen years of age consuming at least 28.9 litres of pure alcohol per capita. Previous studies investigating AUD within the South African context have focused chiefly on middle-aged male alcoholics (Fils-Aime et al., 1996; Stein et al., 2008) and young University student drinkers, have been under-researched within the South African context (Pengpid et al., 2013).

When alcohol research has focused on higher education students, findings have shown that blackouts are prevalent among university students even at the 1st-year level (Goodwin, 1995; Poikolainen, 2009). Other data have shown that alcohol is used as a coping mechanism within this population, namely against academic stress (Wardell et al., 2020). Nonetheless, there continues to be a dearth of research investigating demographic factors contributing to AUD and alcohol-related harm in university student populations. Primarily, my study sought to investigate demographic factors associated with alcohol-related harm within a South African university student population.

Secondarily, as noted by the South African Department of Trade Industry and Competition (n.d.) and other researchers (e.g., Seggie, 2012), drinking patterns and alcohol-related harm often persist into adulthood. As such, investigating and identifying key demographic variables implicated in alcohol-related harm has the potential to formulate

intervention protocols that could reduce alcohol-related harm in tertiary settings. To study the nature of alcohol-related harm, my study took the form of a longitudinal design. Alcohol drinking patterns and experiences of harm were tracked using the AUDIT over a three-year period. The demographics of focus were race, age, gender, and socio-economic status. Race was divided into five categories: Black, White, Indian, Coloured and others; Gender was binary with males and females as the subcategories; age was divided into below and above 20; and SES was categorised based on a monthly income of > R3000, R2001- R3000, R1000- R2000 and up to R1000.

1.4 Overview of Chapters

This Chapter (Chapter 1) provides an overview of the topic under discussion and provides the problem statement. Chapter 2 reviews the literature on alcohol use and University students and provides further rationale for my research study. The Chapter also provides the theoretical framework that shaped the research. Chapter 3 details the research methodology employed to answer the research objectives. Chapter 4 details the findings of this study. Chapter 5 provides a discussion of my findings in line with the literature on AUD and provides a conclusion and reflection on the topic under consideration.

2 LITERATURE REVIEW

2.1 Theoretical Framework

Before expanding on alcohol-related harm amongst university students, the thesis will detail the theoretical lens that shaped the study. Establishing a theoretical lens is vital in attempting to get a clear understanding of university students' drinking patterns. A theory can work as either a blindfold or a compass, depending on how it is applied. My research sought to understand university students' drinking patterns through the lens provided by intersectionality theory.

Intersectionality is a concept applied to facilitate understanding of how different aspects of a person's social and political identities combine to shape an individual's being (Rice et al., 2019). The concept was first developed by Kimberlé Crenshaw, and the notion of "interlocking" systems has since been used as a lens to understand peoples' positionalities around distinct contexts of being. Crenshaw initially conceptualised the broad concept of "intersectionality" in the context of anti-discrimination legislation, which she thought did not adequately address the multiple realities of black women subjected to prejudice and exclusion in society. Crenshaw particularly emphasized that prejudice and exclusion were further interlocked with the complexities of African American women, further having to navigate the complexities of womanhood and blackness in a fraught society. (Crenshaw, 2017). At the time of conceptualising the notion of intersectionality, Crenshaw maintained that current US laws were limited to accounting for gender and race by not considering how sexism and racism exacerbate the experiences of black women. Crenshaw (2017) argued that oppression should be examined as interconnected, and the term "intersectionality" was coined to describe the concept that people experience oppression differently, depending on their position, across various social markers that intersect with, for example, gender, race, sex, and class. Although Crenshaw initially introduced intersectionality to understand and adequately explore

oppression, the framework has been used as a lens to understand several other concerns, such as substance use (Vu et al., 2019).

Intersectionality theory highlights unique intersections of many identities. The concept of intersectionality may grant a valuable perspective for examining drug use (Vu et al., 2019). The present study thus utilises the intersectionality framework to understand how a multiplicity of social identities overlap and interact in relation to substance use and substance misuse amongst university student populations. In a similar extension, Collins et al. (2019) articulated that intersectionality can be studied and applied within a matrix of overlapping social values that foster and enable character formation. Within this nuanced framework, identity is not merely the sum of numerous social positions; rather, people's social identities interact and influence one another within a complexity of circumstances (Vu et al., 2019). Intersectionality theory thus provides an adequate lens through which to illuminate an explanation for the contradictory results that have been found in various studies that explore complexities such as substance use (or lack thereof) across different demographics.

Notwithstanding, the application of 'intersectionality theory' to explore substance use disparities is not without difficulties, as the framework was not designed to explain health outcomes and has methodological constraints (Logie et al., 2021). For example, the theory does not provide an exhaustive paradigm or research guidelines stipulated for quantitative research, which requires collecting and analysing numerical data to describe characteristics, test hypotheses or find correlations (Vu et al., 2019). Consequently, the formulation of a quantitative methodology for application within the concept of intersectionality requires greater evaluation and theoretical applications in quantitative research paradigms to improve its application in evaluating interpretations of drug use discrepancies (Vu et al., 2019).

Nonetheless, the intersectionality framework has several benefits when applied to health-related research. For example, the framework emphasizes the interaction of many identities with interconnected systems of privilege and behaviour, as well as the experiences of people belonging to numerous minority identities (Quinn et al., 2019). Additionally, the framework allows researchers to employ diverse social categories (in this case, sex, race, gender and socio-economic status) to understand and explain personal behaviours (in my thesis, alcohol use and alcohol-related harm are explained from these positionalities) (Wemrell, 2017).

Contextually, in my thesis, in order to understand, for example, different variables, such as age, in relation to substance abuse, the intersectionality framework allows me to look into, for example, how age may be segmented into 'adolescents', 'young adults', 'middle-aged adults', and 'older adults'. For each of these positionalities, precise information on drinking patterns and associated outcomes becomes essential. The analysis of early alcohol usage among 'adolescents' and 'young adults' thus enables an analysis of long-term implications of alcohol usage and health repercussions across the life cycle, based on, for example, cortical maturation or lack thereof, in 'adolescents' and 'young adults' (Patrick et al., 2013).

Moreover, intersectionality theory enables the analysis of, for example, racial differences in health outcomes. Based on this framework, conclusions can be drawn on the effect of race on substance usage. For example, the 2007 US National Survey on Drug Use and Health (NSDUH) indicated that Whites[5] consumed the most alcohol (59.8 %) in the US, compared to Asian Americans (38.0%). It is through intersectionality and positionality theory, consciously and unconsciously applied, that, for example, comparable rates of alcohol consumption can be concluded by race. Interestingly, based on race and alcohol usage, further intersectionality analysis based on economic positionality can explain variances in alcohol

[5] Based on self -reports.

usage. For example, data from the US National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) Wave 1 indicated that the hierarchy of alcohol usage across racial groups was as follows: Native Americans and Alaska Natives (47.8%), Hispanics (46.3%), and Blacks[6] (43.8%). Interestingly, the Wave 1 survey found that disparities in alcohol usage amongst the different races were better explained by positionality in terms of economic earning potential (i.e., weekly working patterns: weekly or monthly salary pay (Hasin & Grant, 2015).

Similarly, intersectionality can also be observed in alcohol use disparities by gender. For example, the NESARC Wave I Study reported male participants indicated a greater consumption of alcohol than female participants (Wilsnack et al., 2013). Despite persistent epidemiologic data (e.g., NSDUH, Wave 1) suggesting male participants report a greater risk for alcohol use than women, such traditional gender trends are not uniform (White et al., 2015; Substance Abuse and Mental Health Services Administration, 2014). For example, epidemiological data suggests that women (defined by sex) report similar drinking patterns, and at times greater than those of men (defined by sex) (Grant et al., 2017; White et al., 2015). The epidemiological change in these reported rates can be explained by intersectionality based on race and economic status, which influence alcohol usage over and above gender.

A growing body of evidence (e.g., Settles et al., 2020; Buchanan & Wiklund, 2021) highlights a dearth of research investigating drinking patterns amongst university students based on demographic factors. Given this dearth, my research thus investigated AUD and alcohol-related harm based on demographic factors. This approach was steeped on the theoretical premises of intersectional theory. The subsequent sections detail alcohol use among university students and conclude by highlighting the primary research questions arising from the reviewed literature.

[6] Based on self -reports.

2.2 Alcohol Use in Students

Universities afford students the liberty to be away from parents and guardians. The absence of primary caregivers allows students the freedom to engage in a wide range of activities. One of these experiences includes engagement in, and experimentation with, certain reckless behaviours, such as excessive alcohol consumption (Young & De Klerk, 2008), which is the focus of this research. Due to this newly attained freedom, universities have difficulty regulating alcohol consumption. Young adults attending university consume considerably more than young adults who are not in tertiary institutions (Hingson et al., 2016). Globally, university students have proven to be one of the groups with the highest levels of alcohol consumption (Davoren et al., 2016; Lategan et al., 2017; Perkins, 2007). Alcohol use by university students has increasingly become a concern over the past years, leading to varied levels of research. For example, research conducted in New Zealand (Kypri et al., 2009) indicates that 81% of the University participants consumed alcohol regularly and that 37% engaged in one or more binge drinking episodes weekly.

Moreover, a Vietnamese study (Diep et al., 2013), inclusive of 1216 participants from 1st to 6th-year students, indicated that despite the high levels of alcohol consumption, male students were twice as likely to consume alcohol compared to females. Male students were also more likely to experience alcohol-related harm than females. The study further found that alcohol consumption amongst university students was associated with negative influences on their daily lives and social interactions. Interestingly, the study found that students who stayed in university residences were more likely to engage in excessive alcohol consumption compared to off-campus living students.

2.2.1 Alcohol Use in African Universities

Recent research studies conducted in South Africa confirm that alcohol use by university students on campuses within African institutions is high. Young and Mayson (2010)

investigated drinking norms amongst students living in university residences and found that students tended to overestimate their peers' drinking patterns, resulting in higher alcohol consumption rates in University residence spaces. Findings from Young and Mayson (2010) are similar to those reported by Lategan et al. (2017), who found that students (n=474) reported consuming large quantities of alcohol over weekends, especially Friday and Saturday nights because their peers will also be consuming alcohol.

Pengpid et al. (2013) conducted a study investigating the prevalence of alcohol use and alcohol-related harm at the University of Limpopo. Findings indicated that participants (n=722; 57.6% = men, 42.4% = women) who completed the AUDIT indicated a prevalence of 23.1% of male participants and 7.2% of all female participants were classified as hazardous drinkers. 9.1% of male participants met the criteria for alcohol dependence, compared to 1.3% of female participants. Overall, the study reported that 22.2% of the university students were hazardous or harmful alcohol users, a considerable rate according to the AUDIT guidelines.

Findings from Pengpid et al. (2013) are corroborated by findings from Maphisa and Young (2018), who investigated alcohol usage disorder at Rhodes University. Findings from the AUDIT and the Drinking Motives Questionnaire-Revised (DMQ-R) indicated a drinking prevalence of 68.5%, with 51.3% of participants (n = 501) reporting binge drinking. The risk of AUD among the sample was reported at 76.1% for males and 67% for females (Maphisa & Young, 2018). Interestingly, the study found that AUD risk intersected with social motives such as enhancement motives, which include drinking for fun and to improve social interactions and mood (Bresin & Mekawi, 2021), as well as living with minimal University supervision.

Of interest to my study, research indicates that excessive alcohol use is associated with *alcohol-related harm*, including, but not limited to, (a) neurocognitive harm (Sachdeva et al.,

2016), leading to impaired intellectual skills and (b) social and physical harm (Sachdeva et al., 2016). Before expanding on the phenomenon of 'alcohol-related harm', the subsequent section provides the theoretical lenses to explain probable reasons for alcohol consumption amongst youth and University populations.

2.3 Students Drinking Motives

University students' alcohol consumption is fuelled by a wide range of factors, including peer pressure, recreational purposes, the desire to experience the effects of alcohol, and stress. Although drinking motives differ for every reference group and within each context, university students' drinking motives are broadly divided into two categories: (a) *coping and conformity motives* and (b) *social and enhancement motives*. The subsequent sections expand on student drinking motives.

2.3.1 Coping Motives

According to Peltier et al. (2019), negative emotional well-being is one of the driving reasons for high alcohol usage related to alcohol-related harm. To this end, Stewart-Brown et al. (2000) state that university students tend to be more stressed than their peers, not in a higher education context. Higher education distress, in the form of academic pressure, financial constraints (when compared to peers), identity formation, and comparison with peers, is thought to affect drinking behaviour within the setting. (Brown et al., 2009).

In their study, Miller et al. (2020) reported that 39% of students in their study (n = 350) reported excessive alcohol consumption (defined as drinking with the intention of experiencing a blackout and losing memory of the night) to cope with academic distress and depression. In a similar study, Charles et al. (2021) indicated that participants (n= 685) in a US college study reported increased alcohol intake as a coping mechanism to deal with COVID-19-induced stress. Lastly, Kenney et al. (2018) investigated the link between drinking to cope and the

relationship that exists between depression and alcohol-related problems in young adults. Findings from the study indicated that young adults tend to consume alcohol as a coping mechanism, and this drinking motive can mediate depressed mood-alcohol problems. These findings suggest that the motives behind drinking patterns play a role in the effects of alcohol use behaviour.

2.3.2 Social Motives

Social motives for alcohol use refer to alcohol usage to facilitate or improve social interactions or to enhance enjoyment in social settings (Mezquita et al., 2011). Maphisa and Young (2018) further define social motives as positive reinforcement generated from the social effects of drinking alcohol. As noted by Van Damme et al. (2013), particular populations of certain populations of students tend to be naturally reserved, and alcohol use may be used as a stimulant to foster social interaction in group or party settings. Importantly, studies have found social motives to be related to non-problematic alcohol use (Mezquita et al., 2011; Labouvie & Bates, 2015).

2.3.3 Conformity Motives

An additional motive is that among young adults, alcohol consumption is often glamourised. It has thus been hypothesised that conformity motives are a driving force in the student population to explain alcohol consumption, resulting in alcohol-related harm (Linden-Carmichael & Lau-Barraco, 2018). Conformity motives are largely common in young adults, as this period is associated with character formation decisions around identity (Mezquita et al., 2011). It has thus been hypothesised that, in intending to fit into the group, students adopt drinking patterns similar to those of their peers, in so doing, overestimating their drinking patterns to match those of their peers (Perkins, 2007; Young & De Klerk, 2012). Exaggerated perceptions of drinking patterns result in significantly greater alcohol

consumption and increased risk of alcohol-related harm (Linden-Carmichael & Lau-Barraco, 2018).

2.3.4 Enhancement Motives

In addition to the above motives, the literature also indicates that students consume alcohol for the positive reinforcement of alcohol use. As a psychoactive depressant (Gilpin & Koob, 2008), alcohol consumption results in feelings of relaxation. It is thus hypothesised that students partake in alcohol consumption to experience the short-term effects of alcohol as a relaxant. In spite of the above, short-term enhancement motives for alcohol consumption place students at a greater risk of experiencing blackouts (Wechsler et al., 2002). In their longitudinal study exploring the relationship between drinking motives and binge drinking, Lannoy et al. (2019) found that binge drinking for enhancement motives was associated with a greater number of blackouts linked to the dysregulation of dopamine release.

2.4 Students Drinking Patterns

Linked to the above, drinking motives are a key determinant of drinking patterns. Significantly, drinking patterns and subsequent motives of drinking, such as having ‘drinking buddies’ (a friend with whom one drinks alcohol), have been found to be strong predictors of alcohol usage (Kehayes et al., 2021). In the subsequent sections, I highlight students’ drinking patterns, including pre-drinking culture, drinking games and binge drinking, and how this influences alcohol-related harm among University populations.

2.4.1 Pre-Drinking

According to Santos et al. (2022), pre-drinking is an act of consuming alcohol in a private space, such as at home or in the residence, before going out for a social event. This practice is thought to invariably lead to drinking all night and is associated with excessive

consumption of alcohol. Pre-drinking is common among young people, and it is often done for various reasons, such as reducing the desire for drunkenness and social anxiety or saving money on alcohol during a night out (Lorant et al., 2013).

Pre-drinking is a common practice in university settings. According to Gambles et al. (2021), most students are involved in pre-drinking for image enhancement, enjoyment, social enhancement, or coping motives. Additionally, Lorant et al. (2013) state that pre-drinking behaviour is driven by variables such as the easy availability of alcohol, increased social homogeneity, reduced parental control, and independent living. Fry (2011) further states that, in their study, which comprised 102 Australian university participants aged 18–25 years, students engaged in pre-drinking behaviour, despite their knowledge of the negative impacts of excessive drinking, stating such activities enabled them to drink for pleasure and to become more socially interactive with new people. Yurasek found that pre-drinking is a significant factor in alcohol consumption and, ultimately, alcohol harm.

2.4.2 Drinking Games

Linked to the above, research by Young and De Klerk (2012) indicates that most university students drink in ways that maximise the effects of alcohol at minimal cost. Drinking games are one way students seek to maximise the effects of alcohol, at least from a metabolic, physiological level. Drinking games are defined as social drinking events where games are played involving cognitive or motor tasks. These games are governed by a specific set of rules, determining when and the quantity a player should imbibe to promote rapid consumption of alcohol (Zamboanga et al., 2010). Typically, drinking games occur when students drink alcohol before attending a social event (Borsari et al., 2007). Primarily, these games enable students to maximise alcohol effects at a minimal cost through the consumption of cheaper alcohol (Young & De Klerk, 2012).

Regarding their association with alcohol harm, drinking games have been shown to alter students' perception of drinking. The nascent literature indicates that students view drinking games as part of fun and not harmful. However, these games have been indicated to lead to excessive alcohol use (Dornier et al., 2010). For example, Ray et al. (2014) found that students who participated in drinking games were more likely to experience alcohol-induced amnesia compared to those who did not. Typically, drinking games enable the consumption of large amounts of alcohol in a short space of time (binge drinking), in turn quickly increasing the alcohol content in the body system, resulting in alcohol-induced blackouts (Zamboanga et al., 2021).

2.4.3 Binge Drinking

The last pattern related to drinking games is "binge drinking". Binge drinking refers to a pattern of drinking in which five or more (four or more for women) drinks are consumed on a single occasion (Read et al., 2008). Succinctly, this form of drinking is associated with alternate periods of heavy drinking followed by abstinence (Courtney & Polich, 2009; Lannoy et al., 2019). Noteworthy, binge drinking is associated with greater neurological harm due to higher concentrations of ethanol circulating in the brain as a result of binge drinking and withdrawal phases (Rang et al., 2012). Within adolescents and college students, some noted neurological effects of binge drinking include acute intoxication, blackouts and hangovers (Zeigler et al., 2005). Within University samples, long-term effects of binge drinking include cortical thinning and frontostriatal disturbances, which have been implicated in memory, attention, and motor impairment among student samples (Rang et al., 2012; Thoma et al., 2011).

To illustrate the severity of binge drinking in student populations, Kypri et al. (2009) found that amongst undergraduate students (n = 2548) in a New Zealand study, 37% of participants reported at least one binge-drinking episode during their studies. In a Spanish study

(n = 103), more than half of participants in the study engaged in binge drinking (Herrero-Montes et al., 2019). A South African study by Vellios and Van Walbeek (2017) reported that between 2014 and 2015, 43% of students in their study reported engaging in binge drinking within the previous academic year. Lastly, Maphisa and Young (2018) found that 51.3% of participants (n=343), drawn from a sample of Rhodes University students, engaged in binge drinking. Based on these studies, binge drinking is a common feature in university students' drinking patterns that fuels alcohol-related harm. With these drinking patterns in mind, the subsequent section details the effect of alcohol-related harm, both amongst students and the greater public.

2.5 Consequences of Alcohol Use and Alcohol-Related Harm

Despite suggestions that small doses of alcohol can have positive implications, such as the prevention of diabetes, ischemic heart disease, dementia, or reverse cognitive decline (Iranpour & Nakhaee, 2019), the negative consequences of alcohol consumption override these benefits. While adult deaths as a result of alcohol poisoning are relatively uncommon (Vale, 2007), there are other common and concerning consequences of excessive alcohol use.

Heavy alcohol use is positively correlated with alcohol use disorder (AUDs) (World Health Organization, 2018b). AUDs encompass harmful patterns of alcohol use, which result in a disruption in one's day-to-day life (Tang et al., 2013). AUDs are further associated with a high risk of mortality and increased burden of disease (measured in disability-adjusted life years (DALYs)) (Rehm & Shield, 2019). Other research indicates that AUDs are associated with risky behaviours and unintentional injuries (Kasolo, n.d.). Data from the World Health Organization (2018) further indicates that alcohol consumption accounts for 18% of suicides, 18% of interpersonal conflicts and violence, 27% of road accidents, 13% of epilepsy, 48% of

liver cirrhosis, 26% of oral cancer, and 7% of hypertension (HTN). In South Africa alone, the estimated costs of harmful alcohol use are said to have amounted to an estimated R37.9 billion or 1.6% of the 2009 annual gross domestic product (GDP) (Matzopoulos et al., 2014). Given these adverse findings, researchers have called for more research on the effects of alcohol-related harm on youth and university students (Brown et al., 2009; Lategan et al., 2017).

For the purposes of my study, the term "effect" is defined as "a change which is a result or consequence of an action or other cause" ("Oxford Dict. English," 2010). Effects of any given consequence include but are not limited to, social, financial, psychological and biological effects (Hull, 1981). The following sections detail the effects of alcohol on the central nervous system (CNS) and parasympathetic nervous system (PNS). Once these effects have been detailed, the next section details demographic factors associated with alcohol-related harm, thus providing further rationale for my research objectives.

2.5.1 Cognitive Neurocognitive Harm - Blackouts

As previously detailed, ethanol affects the cerebral cortex. Subsequent consequences include slow cognitive functioning, resulting in difficulties in, for example, cognitive processing speed and disruption in higher-order functions, such as working memory and attention. Significantly, as it pertains to adolescents and University cohorts, one of the most common immediate effects of alcohol use is alcohol-induced blackouts. Alcohol-induced blackouts are defined as short periods of amnesia resulting from heavy alcohol consumption (Marino & Fromme, 2015). The terms 'alcohol-induced blackouts' and 'alcohol-induced amnesia' are used interchangeably in the literature.

Blackouts can either be a disruption (fragmentary) or complete (en bloc) block in one's ability to form memories of events that occurred while intoxicated (White, 2003). *Fragmentary blackouts* are a result of retrieval-based difficulties in the frontal lobes (Miller et al., 2018). An

individual will have difficulties recalling activities that occurred when they were intoxicated, but relevant cues will assist them in remembering those events. On the other hand, *en bloc blackouts* result from a disruption in the hippocampus (Miller et al., 2018). This disruption is thought to hinder the transfer of memories from short to long-term memories. Despite the individual getting cues to assist them in remembering lost memories, these memories will not be recovered. Research indicates that *fragmentary blackouts* are more common than *en-bloc blackouts* (Marino & Fromme, 2015; White, 2003).

Related to blood alcohol content (BAC), the amount of alcohol consumed increases an individual's likelihood and magnitude of experiencing alcohol-induced memory impairment or blackout (White, 2003). As a result of drinking patterns such as binge drinking, students are prone to blackouts. Goodwin et al. (1969) researched students' blackouts and found that 52% of the participants had experienced some form of blackout. Most of the students did not have a memory of events that occurred when they were intoxicated, and some reported waking up in unfamiliar places. Further research by White and colleagues (2002) amongst American college students showed that over 50% of students who consume alcohol experience some form of alcohol-induced blackout (either *en bloc* or *fragmentary*). More recently, Ward and Guo (2020) researched the link between social norms and alcohol-induced blackouts in university students (n= 4430; Mean age = 19.27 years). Findings indicated that 41.6% of participants reported having experienced blackouts due to alcohol intoxication. Several theses have been forwarded to explain the higher incidence of alcohol-induced blackouts amongst university students, and explanations include factors such as family history of problematic alcohol use (Marino & Fromme, 2015) and that in some cases, students purposefully induce blackouts as a way of dealing with university-related distress (Miller et al., 2020).

With reference to blackouts and neurocognition, blackouts are often associated with a decline in neurocognitive processes (Sachdeva et al., 2016). Seggie (2012) mentions that

excessive alcohol consumption results in low academic productivity. A relevant case example is the study conducted by Chai et al. (2020) among 3675 Chinese adolescents. Findings from the study indicated that alcohol was directly related to compromised academic performance. Linked to this, Thoma et al. (2011) further state that, amongst student populations, constant exposure to alcohol-induced blackouts decreases concentration levels and the consolidation of knowledge, thus impeding learning. From a harm perspective, researchers primarily link alcohol-related blackouts to white matter dysfunction in the developing brain (Jacobus & Tapert, 2013).

Notwithstanding the above, other data disprove that blackouts compromise cognition amongst University samples. For example, Vorster et al. (2019) found that alcohol and subsequent blackouts did not affect academic performance among medical students (n=171) at a South African university. This finding is consistent with Paschall and Freisthler (2003), who found that high academic achievers who consumed large volumes of alcohol did not experience associated cognitive decline. The explanation for these latter findings amongst medical students and high achievers may be indicative of greater cognitive reserve capacity within these samples (Paschall & Freisthler., 2003).

2.5.2 Physical Harm Associated with Alcohol

Besides the cognitive effects of alcohol, excessive alcohol consumption is associated with behavioural maleficence, such as vandalism, drunk driving, and drug use/overdose (Labrie et al., 2011). These behaviours are attributed to the poor judgement induced by alcohol (Vale, 2007). Alcohol affects the cerebellum, a brain structure responsible for the control of limb and ocular movement, balance and walking (Marsden, 2018). Alcohol use thus results in ataxia, characterised by difficulties in walking, balance and motor movement. Poor motor and compromised decision-making, consequently, result in drunk driving and road accidents. Within the South African context, in 2014 alone, alcohol-induced road accidents accounted for

an estimated R7. 9 billion in losses in economic revenue due to low productivity and road accident fund applications (Matzopoulos et al., 2014).

2.5.3 Alcohol Harm and Reckless Sexual Behaviours

Notwithstanding the above, alcohol, when consumed in large volumes, inhibits the decision-making processes. Related to impaired decision-making and lack of inhibition, alcohol use has been associated with the spread of sexually transmitted diseases, including the spread of human immunodeficiency virus (HIV) (Chersich & Rees, 2010; Fritz et al., 2002). Unsafe sexual practices due to excessive alcohol use are commonly reported among university student populations (Labrie et al., 2011). For example, Cooper (2002) found that 6% of first-year university students at a Canadian university were diagnosed with a sexually transmitted infection (STI) as a result of reckless sexual behaviours emanating from alcohol use. Similarly, Gilchrist et al. (2012) found that female students at an Australian university were at greater risk for risky sexual behaviour following alcohol intoxication. Similar findings were reported by Chanakira et al. (2014) amongst university students in England who reported risky sexual behaviours primarily linked to alcohol intoxication.

Within the African context, research emanating from Zimbabwe on men attending beer halls showed a significant association between alcohol use and high-risk sexual behaviour (Fritz et al., 2002). Similarly, within the South African context, Simbayi et al. (2007) investigated sexual concurrency (n=226) and found that in 134 male participants, alcohol use was associated with having multiple sexual partners and less condom usage. Of the study population, 92 female participants indicated a link between alcohol usage, having multiple sexual partners and having a history of exchanging sex for money or material gain.

2.5.4 Physiological Harm

Alcohol use can result in major long-term physiological effects that have a negative impact on quality of life. Negative physiological effects related to alcohol use disorder include cancer (Connor, 2017), liver disease (Simpson et al., 2019), and kidney disease (Pan et al., 2018). The subsequent sections briefly expand on these physiological harm effects.

2.5.4.1 Cancer and Liver Disease

Alcohol has been indicated to reduce levels of antioxidants such as vitamins A and vitamin E. Similarly, ethanol reduces zinc and iron levels, as well as folic acid, all critical in maintaining a healthy immune system (Connor, 2017). The reduction of these elements has been associated with the likelihood of developing various types of cancer, such as gastrointestinal (GI), throat, lung, oesophageal, stomach, liver, rectum, and breast cancer (Connor, 2017). Closely linked to the above, AUD has been indicated in alcohol-induced liver diseases (ALDs).

ALDs are a wide spectrum of diseases that include liver steatosis, steatohepatitis, hepatitis, cirrhosis, and hepatocellular carcinoma (HCC) (Liu et al., 2021). Upon consumption, alcohol is absorbed through the gastrointestinal tract into blood circulation, where it gradually increases BAC. Alcohol is then metabolised within hepatocytes by hepatocyte cytoplasmic alcohol dehydrogenase (ADH), microsomal ethanol-oxidizing system (MEOS), and heme-containing catalase in peroxisomes (Liu et al., 2021). Constant alcohol use upregulates cytochrome P450 2E1 (CYP2E1), an enzyme that oxidizes ethanol to acetaldehyde. The resultant metabolism results in increased acetaldehyde concentration diminished ALDH activity, and reduced acetaldehyde oxidation, resulting in acetaldehyde accumulation, which directly damages the mitochondria and microtubules of hepatocytes in the liver (Liu et al., 2021). The resultant biochemical pathway leads to liver damage and, in severe cases, cirrhosis.

Simpson et al. (2019) conducted 'The Million Women Study' in the United Kingdom, a study that included 401 806 female participants (M = 60 years of age). Findings indicated that the likelihood of cirrhosis is strongly increased with the amount of alcohol consumed ($p<0.0001$). Although this study was conducted on demography inclusive of middle-aged women, these findings show the magnitude of the impact of excessive alcohol use.

2.5.4.2 Kidney diseases

In addition to liver cancer, AUD has been indicated in chronic kidney disease (CKD), which is a progressive loss of renal function (Kalantar-Zadeh et al., 2021). Alcohol intake has been indicated to increase blood pressure, which damages the kidneys (Pan et al., 2018). Pan et al. (2018) investigated the relationship between CKD and AUD amongst Taiwanese nationals over the age of 20 (n=11 639). Findings from the longitudinal study (conducted between 2000 and 2013) found that alcohol use increases the likelihood of CKD regardless of gender (male or female) ($p < 0.001$).

Research (e.g., Flentje et al., 2020; Gardner et al., 2020) indicates that in order to unpack the true effects of alcohol-related harm, the study of demographic variables, such as physical stages of development, age, race, gender, and socioeconomic status, must be adequately studied, to understand the far-reaching effect of alcohol-related harm.

2.6 Demographic Factors Increasing the Likelihood of Alcohol-Related Harm

With reference to university contexts, there is a particular dearth of research investigating alcohol-induced harm (neurocognitive impairment, physical harm, STDs, physiological harm) in relation to demographic variables (Swahn et al., 2011), the subsequent section briefly details the effect of key demographic variables, in relation to alcohol-induced harm, and develops the research questions of my study.

2.6.1 Age

Research indicates that age is a significant explanatory variable in understanding drinking patterns. As students get older (typically in the later stages of their academic career), their drinking patterns change, and they start to consume less alcohol (Courtney & Polich, 2009; Hermens & Lagopoulos, 2018), thereby reducing their likelihood of experiencing alcohol-related harm. Van Damme et al. (2013) explained that as students transition into adulthood, they go through a 'maturing out' process that results in a decrease in their alcohol consumption. The findings from Van Damme et al. (2013) are supported by Beynon et al. (2019), who conducted a longitudinal study in the United Kingdom investigating the relationship between alcohol-related harm and age. The study used the Alcohol Toolkit Survey and found that the prevalence and frequency of alcohol-related harm to others (AHTO) significantly decreased as young adults grew older. Interestingly, the study also found that being at a family stage of life (defined as having children in the household), compared to being single, strongly decreases alcohol usage and subsequent harm.

Contradictory findings have, however, been reported in the literature. For example, Squeglia et al. (2014) indicated that there is no linear relationship between an increase in age and a reduction in harm. Research indicates that young adults and some elderly students continue to heavily consume alcohol primarily as a coping mechanism to deal with the new responsibilities brought about by young adulthood. Wadd and Papadopoulos, (2014) also add that although older populations might drink less, they are likely to experience more harm.

It thus emerges that there are mixed and contradictory findings regarding the influence of age (young adults and older adults) in relation to alcohol-related harm. To this end, researchers (Courtney & Polich, 2009; Wechsler et al., 2002) have suggested that more research be conducted to arrive at a nuanced understanding of the relationship between age, alcohol use, and alcohol-related harm. One of the primary goals of my study is thus to

investigate the influence of age, to understand how different age groups (young adults vs older adults) experience alcohol-harm in a South African university context.

Moreover, age differences also influence the experiences of alcohol-related cognitive harm. Hermens and Lagopoulos (2018) reviewed the effects of binge drinking on young drinkers (20-25-year-olds). Magnetic resonance spectroscopy (MRS) imaging indicated that oxidative stress in the hippocampal region and elevated neurotransmission (glutamate, GABA) amongst young binge drinkers (20-25year olds) may be the key underlying distinctive feature, resulting in memory impairments and compromised neurocognition in the population compared to older populations. The authors conclude that since younger adults' brains are not fully developed, this age group is susceptible to greater alcohol-induced cognitive harm. However, more research ought to be conducted to study this relationship.

2.6.2 Gender

Notwithstanding age, gender[7] differences have also been shown to be influential in determining alcohol use and alcohol-related harm. Excessive alcohol use and alcohol-related harm have commonly been reported among males (Peltier et al., 2019). For example, Pengpid et al. (2013) found that males at a South African university had a higher risk of developing harmful drinking patterns leading to harm. The study found that 23.1% of all males were hazardous drinkers, and 9.1% of males had alcohol dependence. Prevalence rates were lower amongst women, who indicated a prevalence rate of 7.2% for hazardous drinkers and only 1.3% being dependent on alcohol. Similar research (e.g., Rehm & Shield, 2019) points to the findings that, on average, males report a greater prevalence rate of 8.6% for experiencing AUDs, while women report an AUD prevalence rate of 1.7% per 100 population. Similarly,

[7] Gender in this sense is defined as differences between male and females.

Nekgotha et al. (2020) found that males at a South African University (University of Limpopo) reported more harmful drinking patterns compared to their female counterparts.

Researchers have, however, cautioned against the disproportional reporting of AUDs and alcohol-related harm based on gender. For example, Peltier et al. (2019) state that disproportional reporting has been attributed to the high levels of bias in research regarding excessive alcohol consumption among male participants. In their scoping review, Saquib et al. (2020) also found that of the 23 studies eligible for analysing the relationship between gender and AUD, all studies except two studies included female participants as the unit of analysis. It has been hypothesised that the reason the existent literature focuses on male participants is the normalisation of male alcohol consumption along the lines of social and cultural expectations (Lemle, 1984; Saquib et al., 2020). Notwithstanding the above, as studies have become more inclusive, the gap between the experiences of alcohol use and alcohol-related harm between genders has been narrowing (Grant et al., 2017; McCrady et al., 2020; White et al., 2015).

For example, Grant et al. (2017) found that AUD in women has increased by 84% over the last ten years, yet in men, there has been a 35% increase. These findings are confirmed by claims by Marino and Fromme (2015), who suggest that females experience more alcohol-related harm in comparison to their male counterparts. White et al. (2002) conducted a study investigating the prevalence and correlates of alcohol-induced blackouts in university students (n=722). Findings indicated that contrary to expectation, females were more likely to experience blackouts than males, leading to greater alcohol-related harm in this population compared to males.

Collectively, there is a lack of consensus regarding which of the genders experience greater levels of alcohol-related harm. While some studies cite that alcohol is metabolised

differently in female and male bodies, the extent to which physiological tolerance influences alcohol-related harm by gender is not entirely understood. Moreover, with emerging research suggesting that oestrogens, such as oestradiol, increase reward stimulation for alcohol in women, leading to greater tolerance and increase in the mesolimbic dopamine pathway (DA), motivating females to consume greater levels of alcohol, there is no consensus, whether alcohol increases greater harm by gender.

Key to the above, there appear to be mixed and contradictory results regarding the effects of alcohol usage and alcohol-related harm by gender. While some studies (e.g., Griswold et al. 2018) indicate higher consumption rates amongst males, other studies (e.g., Marino & Fromme 2015) indicate greater alcohol-related harm amongst females due to physiological characteristics unique to this population.

2.6.3 Race And Socio-Economic Status

With reference to race, Fesahazion et al. (2012) found that racial disparities in reported alcohol consumption can be attributed to sociocultural and economic differences rather than race per se. Fesahazion et al. (2012) noted that individuals from low-income neighbourhoods had similar drinking patterns despite racial differences. Simply stated, socio-economic status may be a greater contributor to alcohol use and alcohol-related harm than race. Interestingly, Fesahazion et al. (2012) found that when the sample of their study was stratified by socioeconomic background, the effect of racial differences on consumption rates was more evident as a covariate.

Other studies (e.g., Chan, 1986; Pamplin et al., 2020; Pedersen et al., 2012) have specifically investigated the role of racial differences in alcohol-related harm. A study by Lategan et al. (2017) amongst university students at a South African university (Stellenbosch University) found that Black students reported significantly greater harmful drinking patterns

on the Alcohol Use Disorders Identification Test (AUDIT) compared to their White and Coloured counterparts ($p < 0.05$). On the contrary, Young and de Klerk (2012), using the same measure (AUDIT), found that White students at Rhodes University consumed greater levels of alcohol and experienced greater alcohol-related harm compared to Black and coloured students ($p < 0.05$, $n = 2177$). Young and de Klerk (2012) attributed differences between the groups, due to access to disposable income to access alcohol.

In another study, Peltzer et al. (2011) conducted a national survey inclusive of 15 828 South African participants, investigating the extent of alcohol use and problematic drinking among South Africans. Findings from the AUDIT indicated that differences in socioeconomic status affected alcohol consumption rates and subsequent alcohol-related harm. More precisely, individuals with a higher disposable income were more likely to consume more alcohol compared to those with less disposable income. Interestingly, the study found that people from a lower socio-economic status are at greater risk of experiencing alcohol-related harm.

Summarily, race and socio-economic status appear to be key factors in explaining patterns related to alcohol use and alcohol-related harm. Notwithstanding the above, there is inconclusive evidence regarding the interaction of these variables in explaining variances in relation to alcohol use and alcohol-related harm.

2.7 Summary of Reviewed Literature and Research Goals

The reviewed literature indicates a high prevalence of alcohol use disorders on university campuses around the world. The reviewed literature further indicates inconclusive and contradictory findings regarding the effects of age, gender, race, and socioeconomics in explaining the prevalence of alcohol-related harm. More significantly, there is a dearth of research investigating the intersectionality of alcohol-related harm by age, gender, race, and socioeconomics (Mereish & Bradford, 2014). Given this dearth, coupled with mixed findings

within the existing literature, my study investigated the nature of demographic variables to explain the variance of reported alcohol-related harm amongst a student population. To investigate the intersectionality of demographic variables in explaining alcohol-related harm, my study took the form of a longitudinal study and investigated alcohol-related harm using the Alcohol Use Identification Test (AUDIT). The longitudinal data was collected over three years, from 2015 to 2017. The unit of analysis was comprised of Rhodes University students. As a departure from previous studies (e.g., Lategan et al., 2017), my study allowed for the observation of alcohol-related harm over a longitudinal period.

Research Questions:

Over a three-year period:

1. Does gender affect students' likelihood of experiencing alcohol-induced harm?
2. Does race affect students' likelihood of experiencing alcohol-induced harm?
3. Does age affect students' likelihood of experiencing alcohol-induced harm?
4. Does different socio-economic status affect students' likelihood of experiencing alcohol-induced harm?

3 RESEARCH METHODOLOGY AND RESEARCH DESIGN

3.1 Research Design

This study adopted a quantitative research methods approach. The quantitative approach allows for numerical analyses to be conducted on a sample of interest and for findings to be inferred to a larger population (Leung, 2015). The quantitative study took the form of an archival analysis of Rhodes University students' drinking patterns as measured by the 'Alcohol Use Disorders Identification Test (AUDIT). For the purposes of my archival analysis, Rhodes University students' drinking patterns were collected over a three-year period (2015-2017) using the AUDIT. A longitudinal quantitative research design was thus adopted to analyse and report on student drinking patterns and to study alcohol-related harm over a three-year period. The longitudinal research design was deemed befitting as it allowed for the detection of patterns within the data based on age, gender, race, and socio-economic status (SES) to explain the dependent variable (alcohol-induced harm) (Ployhart & Vandenberg, 2009).

3.2 Setting

The research study was conducted at Rhodes University, a public university in South Africa which has a reputation for being a 'drinking university' (Young & De Klerk, 2008). Data for my study was collected over three years (2015-2017), namely amongst undergraduate students enrolled at the university during the above-stated years.

3.3 Participants

Convenience sampling was used to collect data from university students. The AUDIT survey was emailed to students once a year over a period of three years. The same research participants were followed over a three-year period, and as such, the study consisted of a cohort of undergraduate university students undertaking their 1st year of study in 2015, 2nd year in 2016, and 3rd in 2017.

Participants were asked to provide some demographic data, i.e. race, gender, SES and age), which was analysed in this study. Participants entered information that they self-identified with, and for the purpose of this study, only two genders (male and female) were given options. As most students do not earn an income, pocket money was used to determine SES, as done in the study conducted by Lategan et al. (2017).

As indicated in Table 3.1, 603 students participated in the study in 2015, 254 participated in 2016, and 161 participated in 2017. Of the participants, there were 226 (37.50%) males in 2015, 87 (34.30%) in 2016, and 55 (34.20%) male participants in 2017. In 2015, there were 149 (24.75%) White students, 393 (65.2%) black students, 24 (4%) Coloured students, 23 (3.8%) Indian students, and 14 (2.3%) students designated as 'Other's. In 2016, there were 69 (27.2%) White students, 156 (61.4%) Black students, 10 (3.9%) Coloureds students, 12 (4.7%) Indian students and 7 (2.8%) students designated as Others. Regarding dispensable pocket money, based on 2015 data, 34.5% of students had ≤ R500 in dispensable pocket money, 31.2% had R501-R1000 in dispensable pocket money, 19.6% had R1001-R1500 in dispensable pocket money, 7% had R1501-R200 in dispensable pocket money, 2.8% had R2001-2500 in dispensable pocket money, 2.2% had R2501-R3000 in dispensable pocket money, and only 2.3% had over R3000 in dispensable pocket money.

When the data was merged, there were 1018 participants in the study (64% females). 53% were over 20 years old (mean =19.8; SD = 1.69), and White students constituted 26.9% of the population, with Black students constituting 64.1% of the sample. On average, 59.2 % of the sample had a dispensable income of up to R1000; 27.6% had a dispensable income between R1001-R2000, 8.6% had a dispensable income of R2001-R3000, and 4.1% had a dispensable earning greater than R3000.

TABLE 3.1 DEMOGRAPHIC VARIABLES DESCRIPTIVES

		YEAR		
		2015	**2016**	**2017**
Gender	Male	226	87	55
		37.50%	34.30%	34.20%
	Female	377	167	106
		62.50%	65.70%	65.80%
Total		603	254	161
		100.00%	100.00%	100.00%
Race	White	149	69	52
		24.70%	27.20%	32.30%
	Black	393	156	95
		65.20%	61.40%	59.00%
	Coloured	24	10	5
		4.00%	3.90%	3.10%
	Indian	23	12	6
		3.80%	4.70%	3.70%
	Other	14	7	3
		2.30%	2.80%	1.90%
Total		603	254	161
		100.00%	100.00%	100.00%
Age	17	6	2	0
	18	171	77	0
	19	277	113	2
	20	89	40	46
	21	35	11	73
	22	10	4	24
	23-25	13	5	13
	above 25	2	2	3
Total		603	254	161

		100.00%	100.00%	100.00%
Pocket money	500 or less	208	58	27
		34.5%	22.90%	16.80%
	501-1000	188	82	40
		31.2%	32.40%	24.80%
	1001-1500	118	41	33
		19.60%	16.20%	20.50%
	1501-2000	42	33	14
		7.00%	13.00%	8.70%
	2001-2500	17	15	16
		2.80%	5.90%	9.90%
	2501-3000	13	11	16
		2.20%	4.30%	9.90%
	>3000	14	13	15
		2.30%	5.10%	9.30%
	Missing	3	1	0
		0.50%	0.20%	0.00%
Total		603	253	161
		100.00%	100.00%	100.00%

Note. Demographics of data collected in 2015, 2016 and 2017.

3.4 Material/Measures

3.4.1 Alcohol Use Disorder Identification Test (AUDIT)

Data were collected using the 'Alcohol Use Disorders Identification Test' (AUDIT) (Appendix A). The AUDIT is an internationally recognised measure developed from a WHO collaborative project in six countries (Babor et al., 2001). Scale items for the AUDIT were drawn from 150 items, with the primary objective to aid in the identification of alcohol use disorder and alcohol dependence (Higgins-Biddle & Babor, 2018).

3.4.1.1 AUDIT Scale Composition

In its entirety, the AUDIT assesses one's (a) level of alcohol consumption, (b) symptoms of alcohol dependence, and (c) problems associated with alcohol use (Pengpid et al., 2013). The scale ascertains drinking patterns on four domains: no risk, hazardous use (at risk of developing harmful consequences), harmful use (experiencing significant physical, mental, and social consequences), and alcohol dependence (preoccupation with alcohol, increased tolerance and withdrawal symptoms) (Babor et al., 2001; Sriken et al., 2023).

In its entirety, the AUDIT comprises ten questions, delineated into three categories: Levels of alcohol consumption (Questions 1 to 3), Signs of alcohol dependence (Questions 4 to 6) and Alcohol-related harm (Questions 7 to 10). As detailed in the scoring manual, Questions 1-8 are scored on a 5-point scale ranging from 0 to 4. Questions 9 and 10 are scored 0, 2 and 4. Within the AUDIT, the highest possible score is a score of 40, with higher scores denoting a greater likelihood of alcohol-related harm. Scores between 0 -7 are considered low-risk drinking patterns; 8-15 hazardous; 16-19 is harmful, and all scores over 20 are suggestive of alcohol dependency (Babor et al., 2001).

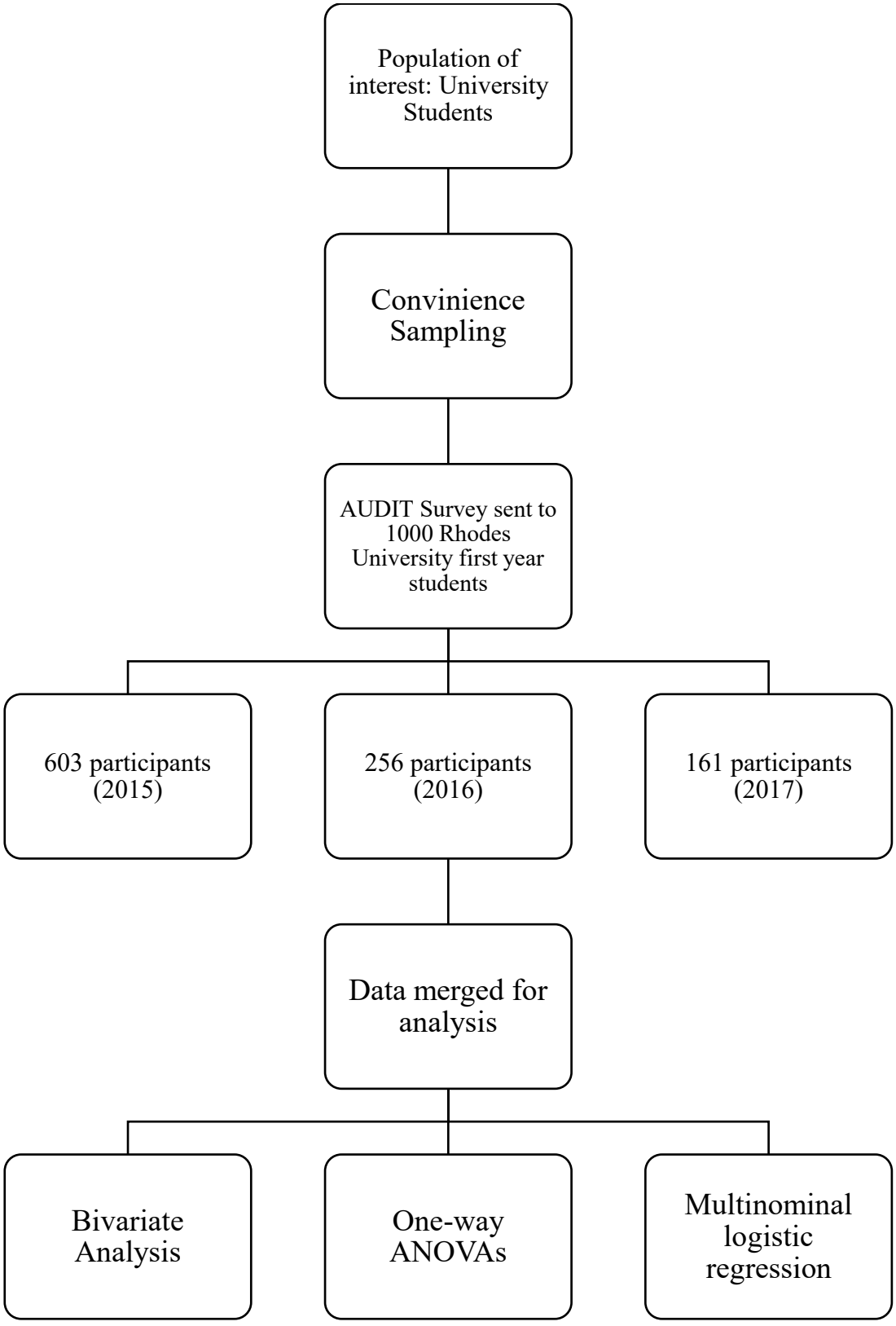
3.4.1.2 Psychometric properties

The psychometric properties of the AUDIT are well-attested and include a reported sensitivity of 92% with a specificity of 94% in detecting harmful and hazardous alcohol use (Pengpid et al., 2013; Saunders et al., 1993). Kokotailo et al. (2004) found that the AUDIT indicated a sensitivity of 91% and specificity of 60% in detecting high-risk drinkers. Previous research (e.g., Reinert & Allen, 2007) has found the AUDIT to be a consistent, valid and reliable measure for alcohol use patterns and alcohol harm. Specific to university settings, the AUDIT has effectively been used to identify demographic factors contributing to alcohol use amongst American students (e.g., Lui & Zamboanga, 2019), Zimbabwean students (Makuyana et al., 2018), and South African student populations (e.g., Lategan et al., 2017; Pengpid et al., 2013; Young & De Klerk, 2012; Young & Mayson, 2010), to name a few.

3.5 Study Procedures

Upon receiving email notification regarding the study and providing consent, students were emailed the AUDIT survey to complete. All surveys were administered online via Survey Monkey (Surveymonkey.com). Online surveys are easier to administer and lead to reasonable response rates (Greenlaw & Brown-Welty, 2009). Once participants completed the survey, the researchers received an Excel output of all responses sent via Survey Monkey configurations. The researchers then entered the collected data into SPSS for further analysis. To circumvent dropouts, at the completion of each survey, students were presented with an option to agree to receive follow-up surveys in the preceding years. Participants were further informed that they stood a chance to be entered into a R1000 lucky draw. Figure 3.1 below shows the research procedures undertaken for the study to collect and analyse data.

FIGURE 3.1 RESEARCH PROCEDURE



Note. The flow of research procedures taken for the study.

3.6 Data Manipulations and Data Analysis

All data from subsequent years (2015-2017) were merged into a single data set using IBM SPSS Version 27 (IBM Corp, 2020). Data manipulations were undertaken on the data to this effect: the variable age was classified into two categories: (a) below 20 years of age and (b) 20 years and above. The variable race was divided into five categories: Black, White, Coloured, Indian and others. SES is divided into four categories, earning below R1000, R1001-R2000, R2001-R3000, and over R3000. Gender was categorised into two categories: male and female.

ANOVAs were conducted to test the significance of the relationship between the AUDIT score and the demographic variables, which had more than two categories (race and SES). ANOVAs can test for differences in means for variables that have more than two categories (Quirk, 2012). T-tests were conducted to see if there is a significant difference between the outcomes in cases where the independent variable has two categories. Independent samples t-tests are used when comparing the means of a variable with two groups (Kim, 2015). In this study, only two genders are considered (male and female), and age was divided into two categories (< 20 and 20+); therefore, t-tests were appropriate. The independent sample t-test provided a sample statistic that is compared to the alpha level of significance to determine whether the two means are statistically significantly different from each other (Gerald, 2018). Lastly, a multinomial logistic regression was conducted to make predictions and determine which independent variables have the most (and least) effect on the dependent variable (Sarstedt & Mooi, 2019). A multinomial logistic regression was used to predict categorical placement in or the probability of category membership on a dependent variable (alcohol harm) based on multiple independent variables (El-Habil, 2012). The dependent variable has a classification (more than one category); hence, the use of multinomial logistic regression was appropriate (Connelly, 2020).

3.7 Ethics

This study received ethical clearance (2020-2719-4871) from the Rhodes University Human Ethics Committee (RU-HEC) (Appendix F). Key ethical considerations included participants providing informed consent and ensuring participant anonymity. Participants were also encouraged but not obliged to commit to the study over the three-year duration of the research study.

4 RESULTS

Student drinking patterns/trends were analysed over a three-year period based on demographic variables. The main research questions were: Over a three-year period:

1. Does gender affect students' likelihood of experiencing alcohol-induced harm?
2. Does race affect students' likelihood of experiencing alcohol-induced harm?
3. Does age affect students' likelihood of experiencing alcohol-induced harm?
4. Does different socio-economic status affect students' likelihood of experiencing alcohol-induced harm?

The subsequent section details the results of the study. All statistical analyses were conducted at a 95% confidence interval and 5% level of significance.

4.1 Demographic Characteristics by Year

The study comprised of a total of 1018 participants. 368 were male participants. In general, male participants comprised 61.4% of the sample in 2015, at least a fifth (23.6%) in 2016, and less than a fifth (14.9%) in 2017. 84.9% of the sample were aged 20 years and younger in 2015, and the percentage decreased to 14.8% in 2016 and less than 1% in 2017. By contrast, 30.8% of the participants were aged less than 20 years of age in 2015, with a constant balance of 36.2% in 2017 and 32.9% in 2017. In terms of race, Black students had the highest number of participants (n=644) and comprised of 61% of the sample in 2015 and 14.8% in 2017. Coloured (n=39) and Indian (n=41) students represented the least number of participants over the years. Socio-economic data indicated that the highest proportion of students (n= 293) earned a disposable income/pocket money of less than R500, followed by those who received R501-R1000 (n=192). Fewer students (n=42) had a disposable income greater than R3000. Table 4.1 summarises these demographics.

Table 4.1 Descriptive Statistics

Independent Variables * Year Crosstabulation

			Year			Total
			2015	2016	2017	
Gender	Male	Count	226	87	55	368
		% within Gender	61,4%	23,6%	14,9%	100,0%
	Female	Count	377	167	106	650
		% within Gender	58,0%	25,7%	16,3%	100,0%
Age group	Less than 20	Count	454	79	2	535
		% within Age group	84,9%	14,8%	0,4%	100,0%
	20 above	Count	149	175	159	483
		% within Age group	30,8%	36,2%	32,9%	100,0%
Race	White	Count	149	69	52	270
		% within Race	55,2%	25,6%	19,3%	100,0%
***14 missing cases**	Black	Count	393	156	95	644
		% within Race	61,0%	24,2%	14,8%	100,0%
	Coloured	Count	24	10	5	39
		% within Race	61,5%	25,6%	12,8%	100,0%
	Indian	Count	23	12	6	41
		% within Race	56,1%	29,3%	14,6%	100,0%
	Others	Count	0	7	3	10
		% within Race	0,0%	70,0%	30,0%	100,0%
Pocket money	500 or less	Count	208	58	27	293
		% within Pocket money	71,0%	19,8%	9,2%	100,0%
***4 missing cases**	501-1000	Count	188	82	40	310
		% within Pocket money	60,6%	26,5%	12,9%	100,0%
	1001-1500	Count	118	41	33	192
		% within Pocket money	61,5%	21,4%	17,2%	100,0%
	1501-2000	Count	42	33	14	89
		% within Pocket money	47,2%	37,1%	15,7%	100,0%
	2001-2500	Count	17	15	16	48
		% within Pocket money	35,4%	31,3%	33,3%	100,0%
	2501-3000	Count	13	11	16	40
		% within Pocket money	32,5%	27,5%	40,0%	100,0%
	>3000	Count	14	13	15	42
		% within Pocket money	33,3%	31,0%	35,7%	100,0%
Total		**Count**	**603**	**254**	**161**	**1018**
		% within total population	**59,2%**	**25,0%**	**15,8%**	**100,0%**

Note. Table shows the demographic characteristics of participants from each year and their % towards the overall study population.

4.2 Alcohol Use Trends as Measured by the AUDIT

In this study, data was merged and analysed collectively. The trends explained in this section are in relation to the collective data. Over the three years (2015-2017), the prevalence rate of students who had a drink containing at least alcohol was 75.6%, while 24.4% of the sample had never consumed any alcohol in their lives. 45.3% of respondents consumed alcohol less than 2-3 times a month, while a fifth (20.4%) had frequent uptake of alcohol, also known as 'weekly binges. Slightly more than half (55%) of the respondents imbibed 1-4 drinks containing alcohol per day, with over a quarter (28.9%) indicating they consumed 5-6 alcoholic drinks per day.

Alcoholic trend data further indicated that slightly over a quarter of the participants had never ingested six or more drinks on one occasion (28.3%). Moreover, more than half (57.1%) drank six or more drinks on one occasion, less than monthly (25.7%) or monthly (13.7%). Weekly or daily binges of six or more drinks on one occasion were not common in this sample (14.6%). In the year preceding the survey, seven out of ten (73.5%) participants never found they were unable to stop drinking, once they had drunk alcohol, fewer were unable to stop drinking less than monthly (13.4%), while 12.8% struggled to stop taking alcohol frequently (monthly, weekly, or daily).

Two-thirds (67.4%) of the collective participants in this sample reported having failed to do what was normally expected from them because of consuming alcohol in the year preceding the survey, and three in every ten (30%) could not do what was expected of them less frequently (monthly to less than monthly). Very few students (2.7%) reported that they had ever failed to perform normally weekly or daily after drinking alcoholic beverages.

Trend data further indicated that most students (92.8%) never at any time in the previous year needed a first drink in the morning to get themselves going after a heavy drinking

session. During the last year, 48.7% of the students had never experienced feelings of guilt or remorse after drinking. The prevalence of guilt after drinking was stated at 51.3%. Less than 5% of participants responded that they never experienced guilt after drinking.

Trend data further indicated that 49.5% of participants were unable to remember what happened the night before (blackout) engaging in a drinking spree. Of those who reported blackouts (49.5%), 12.5% reported having blackouts monthly. A small proportion of participants experienced blackouts weekly (2.8%) or daily (1%), suggesting that backouts were not common among participants in this sample.

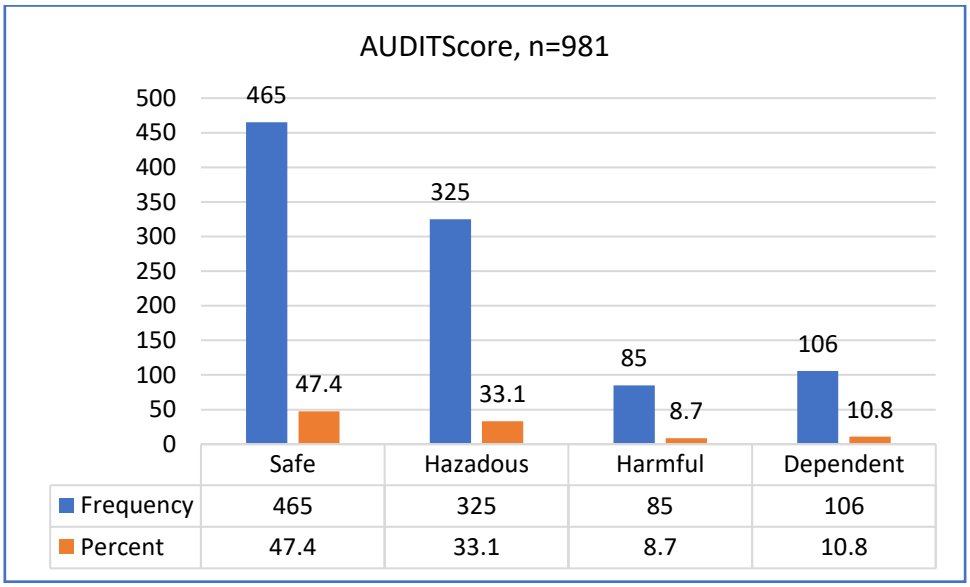
The prevalence of injury and harm resulting from participants drinking their own liquor was found to be 22.3%. At least three-quarters of the participants had never had an injury resulting from excessive alcohol intake (77.7%). Most participants (91.6%) had never experienced a relative, friend, doctor, or another health professional express concern about their drinking or suggest that they cut down on their alcohol intake. The alcohol use trends measured by the AUDIT are indicated in Appendix D.

4.2.1 Alcohol Use Disorder Identification Test (AUDIT)

In relation to the AUDIT scores, 47.4% of students indicated drinking patterns in the 'low risk' zone, a third (33%) indicated drinking patterns in the 'hazardous' zone (at risk for developing harmful consequences), with 8.7 % of respondents scoring in the harmful zone (likely to experience significant physical, mental, and social consequences). Lastly, 10.8% of the sample were deemed to be alcohol dependent (preoccupied with alcohol, increased tolerance, and withdrawal symptoms) levels[8]. Figure 4.1 below indicates the AUDIT scores.

[8] AUDIT scores between 0 -7 were considered 'low-risk', 8-15 = 'hazardous', 16-19, = 'harmful'. All scores over 20 suggested alcohol dependency. The possible maximum score was 40 (AUDIT guidelines).

FIGURE 4.1 AUDIT SCORES



Note. AUDIT scores in the low-risk, hazardous, harmful, and dependent categories.

4.3 Descriptive Statistics: Level of Alcohol Usage and Demographic Variables

Before conducting inferential analysis, Chi-Square tests of Associations were run between alcohol-related harm (No Risk, Hazardous, Harmful, and Dependent) and demographic data (gender, age, race, and socioeconomic status).

Gender and Alcohol-Related Harm: No significant gender differences were noted on AUDIT scores pertaining to alcohol-related risk/harm within the 2015 cohort ($p > 0.05$). Significantly, males (42.9%) were equally likely to be in the 'low risk' alcohol usage zone as females (41.4%). Both genders were equally in the 'hazardous' zone (Male =33.5% vs Female = 34.8%), and both were equally likely to experience harmful effects of alcohol usage (Male = 11.8% vs Female = 9.4%). A slight difference was noted in terms of alcohol dependency, with female participants being more likely to report alcohol dependency (14.4%) compared to males (11.8%). Importantly, all the above effects were non-significant ($p > 0.05$) for the 2015 cohort.

For the 2016 cohort, similarly, no significant gender differences were observed in relation to AUDIT scores ($p > 0.05$). Regardless, females (50%) had a slightly higher likelihood of being in the low-risk drinking zone compared to males (47.6%). There was a higher proportion of male students (10.7%) in the harmful zone compared to females (8.6%). Non-significant differences between males and females were noted with regard to hazardous (32.1 vs 30.2%) or alcohol dependence (9.5% vs 11.1%).

A significant difference in gender with regard to alcohol harm ($p < 0.05$) was observed in the 2017 cohort. A larger proportion of female participants scored in the low-risk zone (69.8%) compared to males (52.7%) participants. A larger proportion of male students scored within the hazardous zone (41.8%) compared to females (27.4%). Lastly, male students had a greater likelihood of being categorised in the dependent zone (3.6% vs 0.9%-females). The above results suggest that significant gender differences in relation to alcohol harm were primarily observed in the 2017 cohort. Data indicate that between 2015 and 2016, generally, a slightly larger proportion of female students were in the low-risk zone compared to male participants who were more in the harmful and hazardous zone**.**

TABLE 4.2 GENDER AND THE AUDIT RISK ZONES

Year			AUDIT Score				Total
			Low-risk	Hazardous	Harmful	Dependent	
2015	Gender	Male	91	71	25	25	212
			42,9%	33,5%	11,8%	11,8%	100,0%
		Female	150	126	34	52	362
			41,4%	34,8%	9,4%	14,4%	100,0%
	Total		241	197	59	77	574
			42,0%	34,3%	10,3%	13,4%	100,0%
2016	Gender	Male	40	27	9	8	84
			47,6%	32,1%	10,7%	9,5%	100,0%
		Female	81	49	14	18	162
			50,0%	30,2%	8,6%	11,1%	100,0%
	Total		121	76	23	26	246
			49,2%	30,9%	9,3%	10,6%	100,0%
2017	Gender	Male	29	23	1	2	55
			52,7%	41,8%	1,8%	3,6%	100,0%
		Female	74	29	2	1	106
			69,8%	27,4%	1,9%	0,9%	100,0%
	Total		103	52	3	3	161
			64,0%	32,3%	1,9%	1,9%	100,0%
Total	Gender	Male	160	121	35	35	351
			45,6%	34,5%	10,0%	10,0%	100,0%
		Female	305	204	50	71	630
			48,4%	32,4%	7,9%	11,3%	100,0%
	Total		465	325	85	106	981
			47,4%	33,1%	8,7%	10,8%	100,0%

Note. Gender differences in AUDIT scores over the three years.

Age and Alcohol-Related Harm: Between 2015-2017, data indicated a statistically significant ($p < 0.05$) difference in the experience of alcohol-related harm across different age groups stipulated above in Section 3.6. Students aged 20 years and above indicated a greater prevalence of drinking in the low-risk zone (52.3%) compared to those aged less than 20 years (42.9%). Younger participants (< 20 years) also reported a less likelihood for hazardous (11.4% vs 5.7%) and harmful (12.3% vs 9.1%) drinking patterns.

In 2015, there was a non-significant difference ($p > 0.05$) in students' low-risk levels regarding alcohol harm. Notwithstanding, students above 20 years of age reported greater exposure to hazardous drinking (37.1% vs 33.4%) and drinking in the harmful zone (11.4% vs 7%). For 2016, a relatively higher proportion of students above 20 years scored in the low-risk drinking zone (50% vs 47.4%), while those aged 20 years and below were more likely to be in the hazardous (34.6% vs 29.2%) and harmful (11.5% vs 8.3%) zones. For the 2017 cohort, very few students were below 20 years old, making comparisons by age challenging to execute.

TABLE 4.3 AGE GROUP AND THE AUDIT RISK ZONES

Year			AUDIT Score				Total
			Low-risk	Hazardous	Harmful	Dependent	
2015	Age group	Less than 20	180	144	49	58	431
			41,8%	33,4%	11,4%	13,5%	100,0%
		20 above	61	53	10	19	143
			42,7%	37,1%	7,0%	13,3%	100,0%
	Total		241	197	59	77	574
			42,0%	34,3%	10,3%	13,4%	100,0%
2016	Age group	Less than 20	37	27	9	5	78
			47,4%	34,6%	11,5%	6,4%	100,0%
		20 above	84	49	14	21	168
			50,0%	29,2%	8,3%	12,5%	100,0%
	Total		121	76	23	26	246
			49,2%	30,9%	9,3%	10,6%	100,0%
2017	Age group	Less than 20	2	0	0	0	2
			100,0%	0,0%	0,0%	0,0%	100,0%
		20 above	101	52	3	3	159
			63,5%	32,7%	1,9%	1,9%	100,0%
	Total		103	52	3	3	161
			64,0%	32,3%	1,9%	1,9%	100,0%
Total (p=0.001)	Age group	Less than 20	219	171	58	63	511
			42,9%	33,5%	11,4%	12,3%	100,0%
		20 above	246	154	27	43	470
			52,3%	32,8%	5,7%	9,1%	100,0%
	Total		465	325	85	106	981
			47,4%	33,1%	8,7%	10,8%	100,0%

Note. AUDIT risk zones by age group. The total shows a significant difference in risk zones by age group.

Race and Alcohol-Related Harm: No significant ($p > 0.05$) differences were noted between race and alcohol harm. For the 2015 cohort, Coloured students indicated being dominant in the low-risk drinking zone (57.1%), followed by Indian (45.5%), White (42.3%) and Black (40.6%) students. White participants (32.4%) and Black participants (35.8%) had relatively higher proportions of drinking in the hazardous zone; these were followed by Indian participants (9.1%) and Coloured participants (4.8%). White students indicated the highest scores for harmful drinking (13.4%), followed by Black participants (9.5%). Those in the dependent zone were mostly Indian participants (18.2%), followed by White participants (14.1%).

For the 2016 cohort, Coloured participants (60%) and Indian participants (58.3%) had relatively higher proportions of students who fell into the low-risk drinking category, followed by White participants (52.9%) and least Black participants (46.3%). Black participants (32.9%) and other races (57%) had higher proportions in the hazardous zone, while Black participants and Coloured participants had relatively higher proportions in the harmful zone compared to White participants and Indian participants. Additionally, Indian participants (16.2%) and White participants (16.7%) had higher proportions of those in the dependent alcohol pattern zone compared to Black and Coloured participants.

For the 2017 cohort, it was Indian participants (100%), other races (66%) and Black participants (66.3%) who had higher proportions in the low-risk zone, compared to White (57.7%) and Coloured (40%) participants. Coloured students (60%) had the highest proportion of students in the hazardous zone, followed by White participants (38.5%), Black participants (29.5%) and other races (33.3%). There were very few numbers of students in the harmful and dependent zones. These were White participants and Black participants.

As summarised in Table 4.4, over the three years, more than 50% of Coloured participants (57%), Indian participants (55.6%), and other races (50%) fell within the low-risk zone of drinking. On the other hand, less than 50% of White participants (48.1%) and Black participants (45.9%) were in the low-risk zone. Data indicated that Black (34.1%) and White (32.2%) students had relatively higher proportions of hazardous and harmful tendencies of drinking. In 2017, 100% of the Indian participants had low-risk drinking levels.

TABLE 4.4 RACE AND THE AUDIT RISK ZONES

Year			AUDIT Score				Total
			lowRisk	Hazardous	Harmful	Dependent	
2015	Race	White	60	46	19	17	142
			42,3%	32,4%	13,4%	12,0%	100,0%
		Black	153	135	36	53	377
			40,6%	35,8%	9,5%	14,1%	100,0%
		Coloured	12	6	1	2	21
			57,1%	28,6%	4,8%	9,5%	100,0%
		Indian	10	6	2	4	22
			45,5%	27,3%	9,1%	18,2%	100,0%
	Total		235	193	58	76	562
			41,8%	34,3%	10,3%	13,5%	100,0%
2016	Race	White	36	18	3	11	68
			52,9%	26,5%	4,4%	16,2%	100,0%
		Black	69	49	18	13	149
			46,3%	32,9%	12,1%	8,7%	100,0%
		Coloured	6	2	2	0	10
			60,0%	20,0%	20,0%	0,0%	100,0%
		Indian	7	3	0	2	12
			58,3%	25,0%	0,0%	16,7%	100,0%
		Others	3	4	0	0	7
			42,9%	57,1%	0,0%	0,0%	100,0%
	Total		121	76	23	26	246
			49,2%	30,9%	9,3%	10,6%	100,0%
2017	Race	White	30	20	1	1	52
			57,7%	38,5%	1,9%	1,9%	100,0%
		Black	63	28	2	2	95
			66,3%	29,5%	2,1%	2,1%	100,0%
		Coloured	2	3	0	0	5
			40,0%	60,0%	0,0%	0,0%	100,0%
		Indian	6	0	0	0	6
			100,0%	0,0%	0,0%	0,0%	100,0%
		Others	2	1	0	0	3
			66,7%	33,3%	0,0%	0,0%	100,0%
	Total		103	52	3	3	161
			64,0%	32,3%	1,9%	1,9%	100,0%
Total	Race	White	126	84	23	29	262
			48,1%	32,1%	8,8%	11,1%	100,0%
		Black	285	212	56	68	621

		45,9%	34,1%	9,0%	11,0%	100,0%
	Coloured	20	11	3	2	36
		55,6%	30,6%	8,3%	5,6%	100,0%
	Indian	23	9	2	6	40
		57,5%	22,5%	5,0%	15,0%	100,0%
	Others	5	5	0	0	10
		50,0%	50,0%	0,0%	0,0%	100,0%
Total		459	321	84	105	969
		47,4%	33,1%	8,7%	10,8%	100,0%

Note. Racial demographics in AUDIT scores over the three years.

Socio-economic Status and Alcohol-Related Harm: No significant differences were observed with reference to alcohol-related harm and SES levels. The lowest proportion of students in the low-risk zone in 2015 earned an average of R3000 or more (35.7%) compared to those who earned R3000 or less. The highest proportion of those in the hazard zone were in the R20001-R3000 income bracket (46.2%), compared to those who earned 2000 and below. Similarly, those in the harmful zone were students in the R1000-2000 income bracket (13.5%) compared to those who earned less. Lastly, the proportion of those who belonged in the dependent zone was mainly in the highest income bracket (35.7%), compared to those who earned less than R3000.

For the 2016 cohort, participants in the highest income bracket (> R3000) and participants with the least income (up to R1000) had the lowest proportion of those in the low-risk zone, which is 46.2% and the ones in the lower income brackets were more likely to be in the low-risk zone. Those in the hazardous zone were more likely to be in the lower upper-income bracket (37.5% vs 30.6% vs 30.9%), while those in the harmful zone were more likely to be in the lowest-income bracket (11% vs 9.7% vs 7.7%) In 2017, the notable difference in SES was among those who were in the lower higher income bracket (R2000-R3000), who had the least proportion (53.1%) on those in the low-risk zone. Those in the hazardous zone were more likely to be in this lower high-income bracket (40.6%) compared to lower-income brackets. There were very few students in the harmful and dependent zones in 2017.

TABLE 4.5 SOCIO-ECONOMIC STATUS AND THE AUDIT RISK ZONES

Year			AUDIT Score				Total
			low-risk	Hazardous	Harmful	Dependent	
2015	SES	Up to R1000	162	125	37	52	376
			43,1%	33,2%	9,8%	13,8%	100,0%
		R1001-R2000	61	55	21	18	155
			39,4%	35,5%	13,5%	11,6%	100,0%
		R2001-R3000	11	12	1	2	26
			42,3%	46,2%	3,8%	7,7%	100,0%
		>R3000	5	4	0	5	14
			35,7%	28,6%	0,0%	35,7%	100,0%
	Total		239	196	59	77	571
			41,9%	34,3%	10,3%	13,5%	100,0%
2016	SES	Up to R1000	62	42	15	17	136
			45,6%	30,9%	11,0%	12,5%	100,0%
		R1001-R2000	39	22	7	4	72
			54,2%	30,6%	9,7%	5,6%	100,0%
		R2001-R3000	13	9	0	2	24
			54,2%	37,5%	0,0%	8,3%	100,0%
		>R3000	6	3	1	3	13
			46,2%	23,1%	7,7%	23,1%	100,0%
	Total		120	76	23	26	245
			49,0%	31,0%	9,4%	10,6%	100,0%
2017	SES	Up to R1000	45	21	1	0	67
			67,2%	31,3%	1,5%	0,0%	100,0%
		R1001-R2000	31	14	1	1	47
			66,0%	29,8%	2,1%	2,1%	100,0%
		R2001-R3000	17	13	1	1	32
			53,1%	40,6%	3,1%	3,1%	100,0%
		>R3000	10	4	0	1	15
			66,7%	26,7%	0,0%	6,7%	100,0%
	Total		103	52	3	3	161
			64,0%	32,3%	1,9%	1,9%	100,0%
Total	SES (p=0.038)	Up to R1000	269	188	53	69	579
			46,5%	32,5%	9,2%	11,9%	100,0%
		R1001-R2000	131	91	29	23	274
			47,8%	33,2%	10,6%	8,4%	100,0%
		R2001-R3000	41	34	2	5	82
			50,0%	41,5%	2,4%	6,1%	100,0%
		>R3000	21	11	1	9	42

	50,0%	26,2%	2,4%	21,4%	100,0%
Total	462	324	85	106	977
	47,3%	33,2%	8,7%	10,8%	100,0%

Note. SES differences in AUDIT scores over the three years.

4.4 Inferential Analysis and Hypothesis Testing

Independent samples t-test and Analysis of Variance (ANOVA) were run on the data, based on mean scores categorised on the AUDIT zone, namely as: 1= low-risk, 2=hazardous, 3=harmful, 4=dependency. After testing for normality, parametric analysis was conducted to answer the research questions. Table 4.8 summarises the key independent and dependent variables of interest for analysis.

TABLE 4.6 SUMMARY OF AUDIT SCORES

Variable	Category	Mean	Std. Dev.	Freq.
	Male	1.8433048	.96567041	351
Gender	Female	1.8206349	.99180405	630
	Less than 20 years	1.9315068	1.0161468	511
Age group	20 years and above	1.7170213	.93197618	470
	White	1.8282443	.99283061	262
	Black	1.8502415	.98297808	621
	Coloured	1.6388889	.86694135	36
	Indian	1.775	1.0974913	40
Race	Others	1.5	.52704628	10
	Up to R1000	1.865285	1.0081778	579
	R1001-R2000	1.7956204	.93869745	274
	R2001-R3000	1.6463415	.80694442	82
SES	>R3000	1.952381	1.188407	42

Note. Summaries of AUDIT scores across all dependent variables. The mean scores were drawn for the AUDIT scores that were categorised as 1= low-risk, 2=hazardous, 3=harmful, and 4=dependency. Lower mean scores indicate being closer to the low-risk zone.

4.4.1 Research question 1 (Gender)

In the first research question, I investigated whether there were gender differences in relation to alcohol-induced harm. The dependent variable for my study was alcohol-related harm, and the independent variable was gender. As summarised in Table 4.7, results indicated a non-significant difference based on gender, males ($M = 0.46$, $SD = 0.49$), females ($M = 0.48$, $SD = 0.50$), $t\ (97) = 0.85$ $p = 0.08$

4.4.2 Research question 2 (Race)

In the second research question, I investigated the effect of race on alcohol-induced harm. The dependent variable was alcohol-related harm, and the independent variable was race. As summarised in Table 4.9, results indicated a non-significant effect of race on the dependent variable (alcohol-related harm) (F (4, 964) = 0.72 p = 0.57.

4.4.3 Research question 3 (Age)

In the third research question, I investigated the effect of age on alcohol-induced harm. As summarised in Table 4.8, results indicated a significant difference between participants below the age of 20 years (M = 0.43, SD = 0.49) and participants aged 20 years and above (M = 0.52, SD = 0.50), t (97) = -2.98 p = 0.008.

4.4.4 Research question 4 (Socio-economic status)

In the fourth research question, I investigated the effect of SES on alcohol-induced harm. The dependent variable was alcohol-related harm, and the independent variable was SES. As summarised in Table 4.9, results indicated (F (3, 973) = 1.53 p = 0.20, which suggests a difference that is not significant across SES groups.

TABLE 4.7 INDEPENDENT SAMPLES TEST: GENDER

		Levene's Test For Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
AUDIT	Equal variances assumed	3.039	.082	.850	979	.396	.028	.033	.037	.094
	Equal variances not assumed			.851	725.346	.395	.028	.033	.037	.094

TABLE 4.8 INDEPENDENT SAMPLES TEST: AGE

		Levene's Test For Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
AUDIT	Equal variances assumed	7.075	.008	-2.982	979	.003	-.095	.032	-157	-032
	Equal variances not assumed			-2.981	970.599	.003	-.095	.032	-157	-032

Note. T-test showing that the difference between genders is not significant $p > 0.05$ and a statistically significant difference between age $p < 0.05$

TABLE 4.9 ANALYSIS OF VARIANCE (ANOVA) FOR RACE AND SES

Race

Source	SS	Df	MS	F	Sig.
Between groups	2.78001308	4	.695003269	0.72	0.5792
Within groups	932.124012	964	.966933622		
Total	934.904025	968	.965809943		

Socio-economic status

Source	SS	Df	MS	F	Sig.
Between groups	4.43844708	3	1.47948236	1.53	0.204
Within groups	938.695637	973	.964743717		
Total	943.134084	976	.966325906		

Note. ANOVA showing that the race and SES differences are not significant $p > 0.05$.

4.1 Multinomial logistic regression-Correlates of Drinking patterns

Multinomial logistic regression was run to predict AUDIT risk zones (low-risk, hazardous, harmful, alcohol dependency) based on multiple independent variables (age, gender, SES, and race). The below regression command was run on the data:

mlogit Audit Score i. Gender i.SES i. Age group i. Race, base outcome(1= low-risk)

4.1.1 Hazardous Alcohol Use

A multinomial logistic regression was performed to create a model of the relationship between the predictor variables (hazardous alcohol use) and demographic variables (gender, age group, and race). As indicated in Table 4.10, gender was a non-significant predictor of hazardous alcohol use. Although non-significant, results suggest when compared to females, male students were slightly less likely to have hazardous alcohol use in comparison to female students (β =-0.1, $p > 0.05$). Data further suggested that age was a non-significant predictor of hazardous alcohol use ($p > 0.05$). Nonetheless, in comparison to 2015 (baseline), younger students in 2017 were relatively less likely to experience hazardous drinking patterns (β =-0.57, $p < 0.05$). Simply stated, older students were less likely to experience hazardous alcohol use. No differences were noted in hazardous alcohol use between the 2015 and 2016 cohorts in

terms of drinking patterns as they relate to hazardous alcohol use. Lastly, although race was a non-significant predictor ($p > 0.05$) of hazardous alcohol use, Black students were more likely to be at risk for developing hazardous consequences for alcohol use compared to White students ($\beta = 0.14$, $p < 0.05$).

4.1.2 Harmful Alcohol Use

Regarding harmful alcohol use as the predictor variable, data indicates that male students do not experience more harmful effects than female university students. Although non-significant, results indicate that female students were more likely to experience harmful effects associated with alcohol use compared to male participants counterparts ($\beta = -0.32$, $p > 0.05$). Non-significant findings were noted in relation to SES. Significantly, students with more disposable income (R3000 and above) and (R2001-3000) were less likely to fall within the 'harmful' alcohol use zone ($\beta = -0.1.4$, $p > 0.05$) compared to students from a lower socio-economic status. As indicated in Table 4.10, age was a significant predictor of 'harmful' alcohol use. Data indicated that older students (> 20 years) reported fewer chances of experiencing 'harmful' alcoholic effects ($\beta = -0.52$, $p < 0.1$) compared to younger students. Lastly, race was a non-significant predictor of harmful alcohol use. When used as the reference group, White students did not experience more 'harmful' effects of alcohol compared to non-white students. Further beta coefficient analysis indicates that when compared to White students, Black ($\beta = 0.03$, $p < 0.05$) and Indian ($\beta = -74$, $p < 0.05$) students indicated a greater likelihood of reported 'harmful' consequences of alcohol use. No comparative differences were found between White and Coloured students ($\beta = -0.26$, $p > 0.05$) in relation to 'harmful' alcohol use. As indicated in Table 4.10, when compared to the 2015 cohort (baseline), data indicated that the 2017 cohort was less likely to report experiencing 'harmful' alcohol use ($\beta = -0.16$ $p<0.05$).

4.1.3 *Alcohol Dependence* (preoccupation with alcohol)

Regarding alcohol dependency, there was a non-significant racial difference. However, female students were more likely to experience dependence effects (preoccupation with alcohol, increased tolerance, and withdrawal symptoms) compared to male counterparts (β =0.21, p>0.05). Participants who were in the high-income bracket (R3000 and above) were less likely to be subjected to dependency effects (β =-0.85, p<0.05) compared to those in the lower-income brackets (R1001-R3000). Although nonsignificant results, it is worth noting that students in the middle socio-economic status (R1000-3000) in this context were less likely to experience dependency effects (p>0.05), meaning that there could be a possibility that students from lower socio-economic status could be affected by the alcohol dependency syndrome. Further results indicate that age was not a significant predictor of alcohol dependency effects; results are nonsignificant at a 5% level. The results provide insight into the fact that older students (above 20 years) had higher chances of experiencing dependency effects (p>0.01). Lastly, White students did not experience more dependency effects than non-white students**.** Although the results are nonsignificant, they provide an insight that Black and Coloured students were less likely to be at risk of dependence (preoccupation with alcohol, increased tolerance, and withdrawal symptoms). However, Indians were more likely to do so. Compared to 2015 (baseline), all students in 2016 (β =-0.47, p<0.1) and 2017 (β =-2.59, p<0.05) were less likely to experience dependency alcohol effects.

TABLE 4.10 MULTINOMIAL REGRESSION SHOWING RELATIVE RISK RATIOS FOR ALCOHOL-HARM

AUDIT Score	Coef.	Std. err	Z	P>z	[95%	Conf.
Low-risk (base outcome)						
Hazardous: hazardous use (at risk of developing harmful consequences)						
Gender						
Female	-.100927	.1548886	-0.65	0.515	-.40503	.2026491
SES						

R1001-R2000	.0590282	.1738495	0.34	0.734	-.28710	.399767
R2001-R3000	.4488235	.2702437	1.66	**0.097	-.08044	.978491
>R3000	-.0224273	.4003493	-0.06	0.955	-.80797	.762243
Age group						
20 above	.0085446	.1844856	0.05	0.963	-.35040	.370129
Race						
Black	.1413561	.1770718	0.80	0.425	-.20598	.488410
Coloured	-.2036174	.4077545	-0.50	0.618	-1.0080	.595566
Indian	-.4307828	.4286522	-1.00	0.315	-1.2792	.40936
Others	.7006483	.6627802	1.06	0.290	-.59876	1.99967
Year						
2016	-.3051154	.1983708	-1.54	0.124	-.69315	.083684
2017	-.570638	.2479029	-2.30	*0.021	-1.0561	-.084757
_cons	-.2428822	.2112405	-1.15	0.250	-.65906	.1711416
Harmful use (experiencing significant physical, mental, and social consequences)						
Gender						
Female	-.3115107	.2491881	-1.25	0.211	-.79910	.1768891
SES						
R1001-R2000	.190676	.2682371	0.71	0.477	-.33559	.7164111
R2001-R3000	-.9914091	.7572785	-1.31	0.190	-2.4754	.4928295
>R3000	-1.039798	1.054333	-0.99	0.324	-3.1025	1.026656
Age group						
20 above	-.5218458	.2957975	-1.76	**0.078	-1.1059	.0579067
Race						
Black	.0375176	.2855011	0.13	0.895	-.52254	.5970894
Coloured	-.2558038	.6748087	-0.38	0.705	-1.5840	1.066797
Indian	-.7387614	.7875078	-0.94	0.348	-2.2824	.8047256
Others	-12.55388	600.0739	-0.02	0.983	-1188.6	1163.569
Year						
2016	.0561612	.3022298	0.19	0.853	-.53698	.6485207
2017	-1.581966	.6532862	-2.42	*0.015	-2.8628	-.305481
_cons	-1.097539	.3242909	-3.38	0.001	-1.7313	-.461403
Dependence (preoccupation with alcohol)						

Gender						
Female	.2089119	.2379221	0.88	0.380	-.25746	.6752307
SES						
R1001-R2000	-.2947781	.2757832	-1.07	0.285	-.83533	.245747
R2001-R3000	-.2532125	.5175831	-0.49	0.625	-1.2675	.7612318
>R3000	.8576238	.4812153	1.78	**0.075	-.08540	1.800789
Age group						
20 above	.1498912	.2571354	0.58	0.560	-.35084	.6538674
Race						
Black	-.1055252	.2631483	-0.40	0.688	-.62128	.410236
Coloured	-.9658499	.7803372	-1.24	0.216	-2.4952	.5635829
Indian	.0022773	.5318011	0.00	0.997	-1.0400	1.044588
Others	-12.50033	547.6098	-0.02	0.982	-1085.9	1060.795
Year						
2016	-.4747221	.2848149	-1.67	**0.096	-1.0324	.0835048
2017	-2.595243	.6404662	-4.05	0.000	-3.8505	-1.33995
_cons	-1.146909	.3109912	-3.69	0.000	-1.7564	-.537377

Number of obs= 965 LR chi2(33) =81.4 Prob > chi2= 0.0000
Log likelihood = -1092.2834 Pseudo R2= 0.0360
**Significant at 10% level *Significant at 5% level

5 DISCUSSION AND CONCLUSION

The lack of consistency regarding demographic differences in alcohol-related harm necessitated the study. To date, research (e.g., Griswold et al., 2018) indicates that alcohol use is the leading cause of harm in multiple domains related to cognition, diminished health outcomes, disability, and death, to name a few. Given these consequences, my study investigated students' responses to alcohol-related harm using the AUDIT questionnaire. The study specifically examined alcohol-related harm by socio-demographic variables, namely race, gender, sex, and socio-economic status. The study expands on the work of Fontes Marx (et al., 2021), who found that race, age, SES and gender influence alcohol use and alcohol-related harm. A departure from Fontes Marx et al. (2021) is that my study took the form of a longitudinal study spanning three years (2015-2017).

Key findings indicated that gender, race and SES were non-significant determinants of alcohol-related harm in the current study population. Notwithstanding the above, age (< 20 years vs > 20 years) was a significant determinant of alcohol harm within the trend analysis. These findings suggest that from an intersectionality perspective, age is a significant factor when it comes to alcohol-related harm. Therefore, people who are in similar demographics except age can experience alcohol harm differently. Moreover, other factors such as SES that can be closely linked to age can also explain why people who are in the same age group can experience alcohol use and harm differently.

Contextualising Study Findings with the Literature

Alcohol continues to be a major health challenge, with students who indulge in excessive alcohol consumption often presenting with compromised cognitive skills, leading to poor scholastic and academic outcomes (Davoren et al., 2016; Hingson et al., 2016; Lategan et al., 2017). Findings from the study indicate a prevalence rate of 75.6% of students who had a

drink containing alcohol. Of this rate, 47.4% indicated drinking patterns within the low-risk zone, 33% in the hazardous zone (at risk of developing harmful consequences), 8.7% in the harmful zone (experiencing significant physical, mental, and social consequences); and 10.18% falling within the alcohol dependent zone (preoccupation with alcohol, increased tolerance, and withdrawal symptoms).

These prevalence rates are similar to those reported by Rehm et al. (2014), who suggest high levels of alcohol consumption in South Africa, with the most common age for binge drinking being between eighteen and thirty-five years. A significant proportion of students in the study reported binge drinking, with similar findings noted by Assanangkornchai et al. (2009) among Thai youth. Findings from my study also indicated that the proportion of males and females engaging in alcohol use was high, with male students reporting comparatively higher levels of alcohol consumption. These findings are similar to those in the extant literature, indicating a high prevalence of alcohol usage in both male and female students in developed countries such as New Zealand and the USA (Pham et al., 2010).

Within the African context, Francis et al. (2015) conducted a study in Tanzania which indicated that college students reported the highest prevalence of alcohol use (45% among males; 26% among females) and heavy episodic drinking (71% among males; 27% among females), followed by casual labourers. Findings from my study indicate that less than half of the participants (45.3%) consumed alcohol at least two to three times a month. Worryingly, more than half of the participants (55%) reported consuming one to four drinks containing alcohol per day. Moreover, two-thirds (67.4%) of participants reported having failed to do what was normally expected of them due to consuming alcohol or due to experiencing a hangover. Similar findings are indicated among students, as in Pham et al. (2010), where 67% of study participants reported having failed to do what was normally expected of them academically due to alcohol usage. The study by Pham et al. (2010) further found that hangovers were

associated with unintended/ unprotected sexual activity, short- and long-term physical illness, and poor mental health.

The explanation for the high prevalence rates above warrants explanation. When exploring high drinking patterns, various explanations have been offered; for example, Maserumule et al. (2019) noted that learners who had parents and friends who consumed alcohol were more likely to consume alcohol. Previous studies on drinking motives amongst students have suggested enhancement motives, social motives, coping motives and conformity motives (Maphisa & Young, 2018) may drive drinking patterns. Others have motivated socio-demographic variables as an explicator of alcohol consumption and alcohol harm. The subsequent sections expand on the discussion of alcohol-related harm in relation to my study findings. The section concludes by suggesting policy recommendations related to the reduction of alcohol-related harm within the South African context.

5.1 Gender and Alcohol-Induced Harm?

Findings indicated no significant effect of gender on alcohol-related harm in the 2015 cohort. Findings indicated that males (42.9%) were equally likely as females (41.4%) to indicate 'low-risk' drinking habits. Both males and females reported similar 'hazardous' (33.5% vs 34.8%) and 'harmful' alcohol usage (11.8% vs 9.4%). Findings from the same cohort in 2016 suggested that females (50%) had a slightly higher likelihood of reporting 'low-risk' drinking patterns zone compared to males (47.6%). Male students (10.7%) reported a slightly higher likelihood of reporting harmful drinking compared to females (8.6%). Results from my study are similar to those reported in a Tanzania study (Francis et al., 2015), where the researchers found that the prevalence of reported alcohol use was higher among males (47–70%) compared to females (24–54%). Similar results from Tang et al. (2013) indicate that 62.7% of males and 51.0% of females in their Chinese study reported excessive drinking patterns.

Significant gender differences in terms of harm were noted between the genders for the 2017 cohort. Results indicated that a larger proportion of females reported being in the low-risk drinking zone (69.8%) compared to males (52.7%). In their study, Griswold et al. (2018) provide evidence suggesting that female participants consumed less alcohol than males, with disparities explained mainly by economic status. These results confirm findings from Waller and Lorch (1977), who found that males reported drinking significantly more than females. However, females were less likely to experience the harmful effects of alcohol (Waller & Day Lorch, 1977).

Similar to other studies (Nekgotha et al., 2020; Pengpid et al., 2013), findings from my study indicated that a larger proportion of male students scored higher for 'hazardous alcohol usage' and alcohol dependency (41.8%) compared to female students (27.4%). These findings are consistent with findings indicating that males drink more frequently and experience greater alcohol-related harm than females (Pham et al., 2010; Nekgotha et al., 2020). However, studies indicate that age is a mitigating factor in terms of gender and alcohol-related harm. For example, Zakletskaia et al. (2009) found that older female students experience less alcohol-related harm compared to male and younger students. These findings suggest that regardless of gender, age may be a mitigating factor to alcohol-related harm.

In summary, although the literature suggests that male students are likely to be exposed to 'harmful' effects of alcohol, leading to greater alcohol-related harm, than females (Nolen-Hoeksema, 2004; Van Damme et al., 2013; White, 2020), the trend analysis indicated non-significant gender differences in reported experiences of alcohol-related harm. Although the findings are non-significant, the patterns in the data suggest that males consume marginally more alcohol than females. Moreover, these non-significant findings mirror those indicating that females experience more alcohol-related harm than males (Grant et al., 2017).

5.2 Race, SES and Alcohol-Induced Harm?

Findings indicated that within the 2015 cohort, Coloured students indicated a relatively higher proportion of 'low risk' drinking patterns, followed by Indian, White, and Black students. Although possibly a result of sample size differences, Black students indicated greater patterns of 'hazardous' and 'harmful' drinking followed by White participants. The trend in 2017 indicated that Indian students had greater low-risk drinking patterns compared to other races. White participants reported the greatest 'harmful' alcoholic use. Study findings are similar to those by Ghuman et al. (2012), who found that White students in their study cohort (South African secondary school students) were likely to engage in harmful drinking patterns, defined as binge drinking. Young & Mayson (2010) also found that in a South African higher education institution, White students consume more alcohol than their peers in their racial groups. Differences in 'harmful' drinking patterns between the races could, however, be explained by differences in socioeconomic status and access to disposable income within the sample of White students. It is probable that this population may likely have access to more disposable income, allowing them to consume more alcohol and, consequently, experience more harm. The link between these two variables emphasises the intersectionality theory that was used for this study. Students who fit within particular demographics (in this case, were White and of higher SES) were likely to experience more harmful drinking patterns.

Notwithstanding the above, analysis of variance investigations from the study indicated that SES was a non-significant predictor of alcohol-related harm. However, a World Health Organization review (2011) indicated that middle- to high-income youth are equally vulnerable because of youth-specific marketing strategies that are created to increase alcohol use in young adults.

In contrast to trends observed in 2017, overall trend analysis suggests that Black students were more exposed to or at risk for developing 'harmful' alcoholic consequences

($\beta=0.14$, $p<0.05$). These racial differences could be a result of national trends indicating greater enrolment of people of colour at institutions of higher learning. Interestingly, findings from the Survey on Alcohol and Related Conditions and the National Survey on Drug Use and Health (USA) found that White respondents reported higher prevalence rates of alcohol usage. However, alcohol abuse and alcohol dependency were more prevalent among Native Americans (Delker et al., 2014). Looking at statistics in the South African context, racial differences have also been found in alcohol use patterns, with White participants consuming more than other racial groups (Lategan et al., 2017; Young & de Klerk, 2012). The levels of alcohol consumption reported by white participants could be attributed to higher levels of disposable income. It is thus safe to conclude that White students with a higher SES are likely to engage in more harmful drinking patterns in comparison to non-White students with a lower SES.

5.3 Age, SES and Alcohol-Induced Harm?

Trend analysis from the AUDIT indicated that by 2017, the same cohort analysed at baseline (2015) indicated less likelihood of reporting 'hazardous' alcohol use. Results indicate that of the participants below the age of 20 in 2015, 41.8% were in the low-risk category. This increased to 47.4% in 2016 and 100% in 2017. Of participants who were aged 20+ years, 42.7% were in the low-risk category in 2015, 50% in 2016 and 63.5% in 2017. Among those who fell in the hazardous zone and were less than 20 years old, the proportion was 33% in 2015, which slightly increased to 34.6% in 2016 and to 0% in 2017. Regarding participants who were more than 20 years old, the proportion was 37.1% in 2015, 29.2% in 2016, and 32.7% in 2017. Among those who were in the harmful zone and less than 20 years, the proportion was 11.4% in 2015, 11.5% in 2016 and 0% in 2017. For those aged more than 20 years, the proportion was 7% in 2015, 8.3% in 2016 and 1.9% in 2017.

As such, by extension, younger students (< 20 years) were more likely to report 'hazardous' alcohol use compared to older years at university (3rd year). Similarly, trend analysis indicated that by 2017 (3rd year of study), students were less likely to report episodes of harmful binge drinking compared to 2015 and 2016 levels. Similarly, with an increase in age and year of study (1st to 3rd year), there was a decrease in alcohol dependency within the sample.

Findings from my study are similar to suggestions that binge drinking and heightened alcohol use are more prevalent among younger individuals between 18 and 20 years of age (Cherian et al., 2014) and seem to plateau with increase in age (Courtney & Polich, 2009; Hermens & Lagopoulos, 2018). These results are consistent with the findings from a study conducted by Beynon et al. (2019), who found that younger participants aged 16 to 24 years had greater odds of experiencing harm than older age groups. Moreover, national surveys, such as the National Epidemiologic Survey on Alcohol and Related Conditions, found that young adults aged 18 to 25 years were at exceptionally high risk of alcohol use disorder and unintentional injury caused by drinking compared to older populations (Delker et al., 2014). Findings from the study are supported by results from the United Kingdom, indicating that young adults are more likely to report alcohol-related harm in the form of violence and alcohol-related regretted sex (Pham et al., 2010).

With reference to age and SES, results showed that in 2015, the proportion of those who belonged in the 'dependent' alcohol usage zone were mostly high earners with higher disposable income and below the age of 20. This again goes on to show how the intersectionality of specific characteristics can increase or impact one's likelihood of experiencing alcohol-related harm.

With reference to age and SES, in the 2016 and 2017 cohorts, participants in the < 20 years who were in the high-income bracket consumed more alcohol than other participants and experienced more 'hazardous' effects of alcohol. By implication, students who received less money were safer in terms of alcohol harm compared to those who were in the higher income brackets (>R3000) and younger. These findings might be explained by the possibility that older students likely had more responsibilities, leaving them with less disposable income. Consistent with these findings, a study in Tanzania shows that alcohol use is associated with greater disposable income (Francis et al., 2015).

The multivariate regression results indicate that socio-economic status was a predictor of alcohol-related dependency in this study. The results are significant ($\beta=0.075$, $p<0.05$). Hence, the null hypothesis that students with higher socio-economic status do not experience dependency effects compared to lower socio-economic status is rejected. The implication here would be that although there is no significant difference in the experience of harm in general, those with a higher socio-economic status are more likely to be dependent. Although socioeconomic status is not a predictor of the hazardous and harmful effects of alcohol, it provides insight.

5.4 Some Recommendations from Study Findings

When taken together, the data indicates that the prevalence of alcohol usage is high among university students. For example, almost half the study participants (49.5%) reported being unable to remember events of the previous night (i.e., experiencing a blackout) due to alcohol use. These findings are concerning given the consequences of alcohol use, such as, for example, unintended/unprotected sexual activity and cognitive decline associated with alcohol use. Given the trends unmasks in the study, some recommendations for reducing alcohol consumption are suggested.

From a university perspective, it is suggested that government agencies consider increasing taxation and legislation protocol for liquor outlets around university settings. For example, in Makhanda, where this study was conducted, these programs could include community mobilisation to assist in regulating the opening and closing hours of taverns in close proximity to schools and regulation of alcohol advertisements around alcohol use (Chersich & Rees, 2010).

To further reduce the effects of alcohol usage amongst university populations, it is also recommended that public organisations, such as Aware (aware.org.za), target vulnerable youth, especially young adults (of all races), by detailing the negative consequences of alcohol abuse and misuse. It is also strongly recommended that universities implement alcohol prevention programmes in their curricula. Such curricula could include, for example, having campaigns and talks related to the long- and short-term effects of excessive alcohol usage amongst younger student populations who may be new to the University environment, where there is minimal supervision around substance use.

As young adults have been proven to have a high likelihood of experiencing more alcohol-related harm as a consequence of excessive drinking patterns, such as binge drinking and pre-drinking, institutions can also create programs centred around supporting young students and helping them transition into adulthood. As young adults experience newly found freedom, they might not always be able to understand the long-term consequences of the behaviours they engage in. Such programs might help these young adults enjoy their freedom while also being mindful of the consequences that might come with some behaviour patterns.

5.5 Study Limitations and Future Recommendations

Despite the valuable findings brought about by this study, the study is plagued by a number of limitations. Firstly, participants were students drawn from a single (and one of the

smallest) university. As drinking cultures differ across institutions, these participants do not provide an accurate demographic representation of the South African student population. It is recommended that future studies could benefit from a larger cohort of student participants drawn from other higher education institutions from around South Africa. Secondly, the study examined the association between alcohol-related harm and demographic variables but not the causal links thereof. This is a major limitation of the study, and it is recommended that future studies conduct robust statistical analysis, such as the use of multivariate statistics, to understand the relationship between demographic variables and other variables of relevance to study alcohol-related harm within this population.

Lastly, since answers to the AUDIT questionnaire are self-reported, this inevitably poses self-report bias in the study. It is thus probable that participants might have recalled information to the AUDIT questions incorrectly, resulting in either the overestimating or underestimation of alcohol-related harm response. It is recommended that future research studies, for example, implement qualitative interviews and collect observation data to study student drinking habits. The above procedures could be supplemented by quantitative findings.

5.6 Conclusion

In conclusion, the study investigated demographic factors related to alcohol harm using an intersectionality lens. Study findings indicated that race, gender, and SES are non-significant predictors for alcohol-related harm within a South African University context. However, findings indicated that age was a significant predictor of alcohol-related harm, with younger (under 20 years) students more likely to experience alcohol-related harm than older students. Although the analysis of demographic variables provides insightful findings, this approach neglects other confounds, such as how family structure, parental education, and employment, for example, may aid in explaining alcohol-related harm within University populations.

REFERENCES

Abrahao, K. P., Salinas, A. G., & Lovinger, D. M. (2017). Alcohol and the Brain: Neuronal Molecular Targets, Synapses, and Circuits. *Neuron*, *96*(6), 1223–1238. https://doi.org/10.1016/J.NEURON.2017.10.032

Amiri, S., & Behnezhad, S. (2020). Alcohol use and risk of suicide: a systematic review and Meta-analysis. *Journal of Addictive Diseases*, *38*(2), 200–213. https://doi.org/10.1080/10550887.2020.1736757

Assanangkornchai, S., Mukthong, A., & Intanont, T. (2009). Prevalence and Patterns of Alcohol Consumption and Health-Risk Behaviors Among High School Students in Thailand. *Alcoholism: Clinical and Experimental Research*, *33*(12), 2037–2046. https://doi.org/10.1111/J.1530-0277.2009.01043.X

Babor, T., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). The Alcohol Use Disorders Identification Test: Guidelines for use in primary care. *Geneva: World Health Organization*.

Banks, E., & Smith, M. R. (1980). Attitudes and background factors related to alcohol use among college students. *Psychological Reports*, *46*(2), 571–577. https://doi.org/10.2466/pr0.1980.46.2.571

Benegal, V., Borges, G., Casswell, S., Cherpitel, C., Cremonte, M., & Evsegneev, R. (2007). *Alcohol and injury in emergency departments : summary of the report from the WHO collaborative study on alcohol and injuries. World Health Organization. http://www.who.int/iris/handle/10665/43581*.

Bennett, T., & Holloway, K. (2018). Drug and Alcohol-Related Crime Among University Students. *International Journal of Offender Therapy and Comparative Criminology*, *62*(14), 4489–4509. https://doi.org/10.1177/0306624X18769601

Beynon, C., Bayliss, D., Mason, J., Sweeney, K., Perkins, C., & Henn, C. (2019). Alcohol-related harm to others in England: A cross-sectional analysis of national survey data. *BMJ Open*, *9*(5), 1–13. https://doi.org/10.1136/bmjopen-2017-021046

Borsari, B., Boyle, K. E., Hustad, J. T. P., Barnett, N. P., O'Leary Tevyaw, T., & Kahler, C. W. (2007). Drinking before drinking: Pregaming and drinking games in mandated students. *Addictive Behaviors*, *32*(11), 2694–2705. https://doi.org/10.1016/j.addbeh.2007.05.003

Bresin, K., & Mekawi, Y. (2021). The "Why" of Drinking Matters: A Meta-Analysis of the Association Between Drinking Motives and Drinking Outcomes. *Alcoholism: Clinical and Experimental Research*, *45*(1), 38–50. https://doi.org/10.1111/ACER.14518

Brown, S. A., McGue, M., Maggs, J., Schulenberg, J., Hingson, R., Swartzwelder, S., Martin, C., Chung, T., Tapert, S. F., Winters, K. C., Lowman, C., & Murphy, S. (2009). Underage alcohol use. *Cognitive Development*, *32*(1), 41–52. https://doi.org/10.1002/hec.1126

Buchanan, N. C. T., & Wiklund, L. O. (2021). Intersectionality Research in Psychological Science: Resisting the Tendency to Disconnect, Dilute, and Depoliticize. *Research on Child and Adolescent Psychopathology*, *49*(1), 25–31. https://doi.org/10.1007/S10802-020-00748-Y/TABLES/1

Chai, L., Xue, J., & Han, Z. (2020). The effects of alcohol and tobacco use on academic performance among Chinese children and adolescents: Assessing the mediating effect of skipping class. *Children and Youth Services Review*, *119*, 105646. https://doi.org/10.1016/J.CHILDYOUTH.2020.105646

Chan, A. W. K. (1986). RACIAL DIFFERENCES IN ALCOHOL SENSITIVITY. *Alcohol and Alcoholism*, *21*(1), 93–104.

https://doi.org/10.1093/OXFORDJOURNALS.ALCALC.A044598

Chanakira, E., O'Cathain, A., Goyder, E. C., & Freeman, J. V. (2014). Factors perceived to influence risky sexual behaviours among university students in the United Kingdom: A qualitative telephone interview study. *BMC Public Health*, *14*(1), 1–7. https://doi.org/10.1186/1471-2458-14-1055

Charles, N. E., Strong, S. J., Burns, L. C., Bullerjahn, M. R., & Serafine, K. M. (2021). Increased mood disorder symptoms, perceived stress, and alcohol use among college students during the COVID-19 pandemic. *Psychiatry Research*, *296*, 113706. https://doi.org/10.1016/j.psychres.2021.113706

Cherian, L., Mboweni, M. M., Mabasa, L., & Mafumo, T. (2014). Patterns and Prevalence of Alcohol Use among University of Utopia Students in South Africa. *Print) Mediterranean Journal of Social Sciences MCSER Publishing*, *5*, 2039–2117. https://doi.org/10.5901/mjss.2014.v5n20p1573

Chersich, M. F., & Rees, H. V. (2010). Causal links between binge drinking patterns, unsafe sex and HIV in South Africa: Its time to intervene. *International Journal of STD and AIDS*, *21*(1), 2–7. https://doi.org/10.1258/ijsa.2000.009432

Collins, A. B., Boyd, J., Cooper, H. L. F., & McNeil, R. (2019). The intersectional risk environment of people who use drugs. *Social Science & Medicine*, *234*, 112384. https://doi.org/10.1016/J.SOCSCIMED.2019.112384

Connelly, L. (2020). Understanding Research: Logistic Regression. *MEDSURG Nursing*, *29*(5).

Connor, J. (2017). Alcohol consumption as a cause of cancer. *Addiction*, *112*(2), 222–228. https://doi.org/10.1111/add.13477

Conrod, P. J., Peterson, J. B., & Pihl, R. O. (2001). Reliability and validity of alcohol-induced heart rate increase as a measure of sensitivity to the stimulant properties of alcohol. *Psychopharmacology*, *157*(1), 20–30. https://doi.org/10.1007/S002130100741

Conway, J. (2020). • *Alcohol industry worth l Statista | Statista*. https://www.statista.com/statistics/696641/market-value-alcoholic-beverages-worldwide/

Cooper, M. L. (2002). Alcohol use and risky sexual behavior among college students and youth: Evaluating the evidence. *Article in Journal of Studies on Alcohol. Supplement*, *April*, 101–116. https://doi.org/10.15288/jsas.2002.s14.101

Courtney, K. E., & Polich, J. (2009). Binge Drinking in Young Adults: Data, Definitions, and Determinants. *Psychological Bulletin*, *135*(1), 142–156. https://doi.org/10.1037/a0014414

Crenshaw, K. (2017). *On Intersectionality: Essential Writings*. The New Press.

Davis, B. C., & Bajaj, J. S. (2018). Effects of Alcohol on the Brain in Cirrhosis: Beyond Hepatic Encephalopathy. *Alcoholism: Clinical and Experimental Research*, *42*(4), 660–667. https://doi.org/10.1111/ACER.13605

Davoren, M. P., Demant, J., Shiely, F., & Perry, I. J. (2016). Alcohol consumption among university students in Ireland and the United Kingdom from 2002 to 2014: A systematic review. *BMC Public Health*, *16*(1), 1–13. https://doi.org/10.1186/S12889-016-2843-1/TABLES/3

Delker, E., Brown, Q., Hasin, D. S., & Hasin, D. W. S. (2014). Alcohol Consumption in Demographic Subpopulations An Epidemiologic Overview. *Alchohol Research: Current Reviews*, *38*(1), 10.

Diep, P. B., Knibbe, R. A., Giang, K. B., & De Vries, N. (2013). Alcohol-related harm among university students in Hanoi, Vietnam. *Global Health Action*, *6*(1), 1–10. https://doi.org/10.3402/gha.v6i0.18857

Dornier, L. J., Fauquier, K. J., Field, A. R., & Budden, M. C. (2010). Understanding And Confronting Alcohol-Induced Risky Behavior Among College Students. *Contemporary Issues in Education Research (CIER)*, *3*(6), 45. https://doi.org/10.19030/cier.v3i6.214

Dry, M. J., Burns, N. R., Nettelbeck, T., Farquharson, A. L., & White, J. M. (2012). Dose-Related Effects of Alcohol on Cognitive Functioning. *PLOS ONE*, *7*(11), e50977. https://doi.org/10.1371/JOURNAL.PONE.0050977

El-Habil, A. M. (2012). An Application on Multinomial Logistic Regression Model. *Pakistan Journal of Statistics and Operation Research*, *8*(2), 271–291. https://doi.org/10.18187/pjsor.v8i2.234

Evans, I., Heron, J., Murray, J., Hickman, M., & Hammerton, G. (2021). The Influence of Alcohol Consumption on Fighting, Shoplifting and Vandalism in Young Adults. *Public Health*, *18*, 3509. https://doi.org/10.3390/ijerph18073509

Fesahazion, R. G., Thorpe, R. J., Bell, C. N., & LaVeist, T. A. (2012). Disparities in alcohol use: Does race matter as much as place? *Preventive Medicine*, *55*(5), 482–484.

Fils-Aime, M. L., Eckardt, M. J., George, D. T., Brown, G. L., Mefford, I., & Linnoila, M. (1996). Early-onset alcoholics have lower cerebrospinal fluid 5-hydroxyindoleacetic acid levels than late-onset alcoholics. *Archives of General Psychiatry*, *53*(3), 211–216. https://doi.org/10.1001/archpsyc.1996.01830030029006

Flentje, A., Barger, B. T., Capriotti, M. R., Lubensky, M. E., Tierney, M., Obedin-Maliver, J., & Lunn, M. R. (2020). Screening gender minority people for harmful alcohol use. *PLOS*

ONE, *15*(4), e0231022. https://doi.org/10.1371/JOURNAL.PONE.0231022

Flores-Bonilla, A., & Richardson, H. N. (2020). Sex Differences in the Neurobiology of Alcohol Use Disorder. *Alcohol Research : Current Reviews*, *40*(2). https://doi.org/10.35946/ARCR.V40.2.04

Fontes Marx, M., London, L., Harker, N., & Ataguba, J. E. (2021). Assessing Intertemporal Socioeconomic Inequalities in Alcohol Consumption in South Africa. *Frontiers in Public Health*, *9*. https://doi.org/10.3389/FPUBH.2021.606050/FULL

Francis, J. M., Weiss, H. A., Mshana, G., Baisley, K., Grosskurth, H., & Kapiga, S. H. (2015). The epidemiology of alcohol use and alcohol use disorders among young people in Northern Tanzania. *PLoS ONE*, *10*(10).

Fritz, K. E., Woelk, G. B., Bassett, M. T., McFarland, W. C., Routh, J. A., Tobaiwa, O., & Stall, R. D. (2002). The association between alcohol use, sexual risk behavior, and HIV infection among men attending beerhalls in Harare, Zimbabwe. *AIDS and Behavior*, *6*(3), 221–228. https://doi.org/10.1023/A:1019887707474

Fry, M. L. (2011). Seeking the Pleasure Zone: Understanding Young Adult's Intoxication Culture. *Https://Doi.Org/10.1016/j.Ausmj.2010.11.009*, *19*(1), 65–70. https://doi.org/10.1016/J.AUSMJ.2010.11.009

Gardner, S. K., Robertson, A. A., Tatch, A., & Walker, C. S. (2020). Racial differences in college-student drinking. *Journal of Ethnicity in Substance Abuse*, *19*(1), 28–43. https://doi.org/10.1080/15332640.2018.1446376

Gerald, B. (2018). A Brief Review of Independent, Dependent and One Sample t-test. *International Journal of Applied Mathematics and Theoretical Physics*, *4*(2), 50–54. https://doi.org/10.11648/J.IJAMTP.20180402.13

Ghuman, S., Meyer-Weitz, A., & Knight, S. (2012). Prevalence patterns and predictors of alcohol use and abuse among secondary school students in southern KwaZulu-Natal, South Africa: demographic factors and the influence of parents and peers. *South African Family Practice*, *54*(2), 132–138. https://doi.org/10.1080/20786204.2012.10874192

Gilchrist, H., Smith, K., Magee, C. A., & Jones, S. (2012). A hangover and a one-night stand: Alcohol and risky sexual behaviour among female students at an Australian university. *Youth Studies Australia*, *31*(2), 35–43. https://doi.org/https://ro.uow.edu.au/hbspapers/2329

Gilpin, N. W., & Koob, G. F. (2008). Neurobiology of Alcohol Dependence: Focus on Motivational Mechanisms. *Alcohol Research and Health*, *31*(3), 185–195.

Goodwin, D. W., Crane, J. B., & Guze, S. B. (1969). Alcoholic "blackouts": a review and clinical study of 100 alcoholics. *The American Journal of Psychiatry*, *126*(2), 191–198. https://doi.org/10.1176/ajp.126.2.191

Grant, B. F., Chou, S. P., Saha, T. D., Pickering, R. P., Kerridge, B. T., Ruan, W. J., Huang, B., Jung, J., Zhang, H., Fan, A., & Hasin, D. S. (2017). Prevalence of 12-Month Alcohol Use, High-Risk Drinking, and DSM-IV Alcohol Use Disorder in the United States, 2001-2002 to 2012-2013: Results From the National Epidemiologic Survey on Alcohol and Related Conditions. *JAMA Psychiatry*, *74*(9), 911–923. https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2647079

Greenlaw, C., & Brown-Welty, S. (2009). A Comparison of Web-Based and Paper-Based Survey Methods Testing Assumptions of Survey Mode and Response Cost. *Evaluation Review*, *33*(5), 464–280. https://doi.org/https://doi.org/10.1177/0193841X09340214

Griswold, M. G., Fullman, N., Hawley, C., Arian, N., Zimsen, S. R. M., Tymeson, H. D.,

Venkateswaran, V., Tapp, A. D., Forouzanfar, M. H., Salama, J. S., Abate, K. H., Abate, D., Abay, S. M., Abbafati, C., Abdulkader, R. S., Abebe, Z., Aboyans, V., Abrar, M. M., Acharya, P., … Gakidou, E. (2018). Alcohol use and burden for 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *The Lancet*, *392*(10152), 1015–1035. https://doi.org/10.1016/S0140-6736(18)31310-2

Hasin, D. S., & Grant, B. F. (2015). The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) Waves 1 and 2: Review and summary of findings. *Social Psychiatry and Psychiatric Epidemiology*, *50*(11), 1609. https://doi.org/10.1007/S00127-015-1088-0

Hermens, D. F., & Lagopoulos, J. (2018). Binge Drinking and the Young Brain : A Mini Review of the Neurobiological Underpinnings of Alcohol-Induced Blackout. *Frontiers in Psychology*, *9*(12), 1–7. https://doi.org/10.3389/fpsyg.2018.00012

Herrero-Montes, M., Alonso-Blanco, C., Paz-Zulueta, M., Sarabia-Cobo, C., Ruiz-Azcona, L., & Parás-Bravo, P. (2019). Binge Drinking in Spanish University Students: Associated Factors and Repercussions: A Preliminary Study. *International Journal of Environmental Research and Public Health Article*. https://doi.org/10.3390/ijerph16234822

Higgins-Biddle, J. C., & Babor, T. F. (2018). A review of the Alcohol Use Disorders Identification Test (AUDIT), AUDIT-C, and USAUDIT for screening in the United States: Past issues and future directions. *Https://Doi.Org/10.1080/00952990.2018.1456545*, *44*(6), 578–586. https://doi.org/10.1080/00952990.2018.1456545

Hingson, R., Zha, W., Simons-Morton, B., & White, A. (2016). Alcohol-Induced Blackouts as

Predictors of Other Drinking Related Harms Among Emerging Young Adults. *Alcoholism: Clinical and Experimental Research*, *40*(4), 776–784. https://doi.org/10.1111/acer.13010

Hull, J. G. (1981). A self-awareness model of the causes and effects of alcohol consumption. *Journal of Abnormal Psychology*, *90*(6), 586–600. https://doi.org/10.1037/0021-843X.90.6.586

IBM Corp. (2020). *IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp*.

Iranpour, A., & Nakhaee, N. (2019). A Review of Alcohol-Related Harms: A Recent Update. *Addiction & Health*, *11*(2), 129–137. https://doi.org/10.22122/ahj.v11i2.225

Jacobus, J., & Tapert, S. F. (2013). Neurotoxic Effects of Alcohol in Adolescence. *Https://Doi.Org/10.1146/Annurev-Clinpsy-050212-185610*, *9*, 703–721. https://doi.org/10.1146/ANNUREV-CLINPSY-050212-185610

Kalantar-Zadeh, K., Jafar, T. H., Nitsch, D., Neuen, B. L., & Perkovic, V. (2021). Chronic kidney disease. *The Lancet*, *398*(10302), 786–802. https://doi.org/10.1016/S0140-6736(21)00519-5

Kasolo, F. (n.d.). *Global Status on Alcohol Abuse: How is South Africa rated and the implications for policy*.

Keemink, J., Sjögren, E., Holm, R., & Bergström, C. A. S. (2019). Does the Intake of Ethanol Affect Oral Absorption of Poorly Soluble Drugs? *Journal of Pharmaceutical Sciences*, *108*(5), 1765–1771. https://doi.org/10.1016/J.XPHS.2018.12.006

Kehayes, I. L. L., Mackinnon, S. P., Sherry, S. B., Leonard, K. E., & Stewart, S. H. (2021). The Influence of Drinking Buddies: A Longitudinal Investigation of Drinking Motivations

and Drinking Behaviors in Emerging Adults. *Substance Use and Misuse*, *56*(2), 286–296. https://doi.org/10.1080/10826084.2020.1861631

Kenney, S. R., Anderson, B. J., & Stein, M. D. (2018). Drinking to cope mediates the relationship between depression and alcohol risk: Different pathways for college and non-college young adults. *Addictive Behaviors*, *80*, 116–123. https://doi.org/10.1016/J.ADDBEH.2018.01.023

Kim, J. U., Majid, A., Judge, R., Crook, P., Nathwani, R., Selvapatt, N., Lovendoski, J., Manousou, P., Thursz, M., Dhar, A., Lewis, H., Vergis, N., & Lemoine, M. (2020). Effect of COVID-19 lockdown on alcohol consumption in patients with pre-existing alcohol use disorder. *The Lancet Gastroenterology and Hepatology*, *5*(10), 886–887. https://doi.org/10.1016/S2468-1253(20)30251-X/ATTACHMENT/EF051CE7-F410-40E8-BB8E-B5A490AB9C45/MMC1.PDF

Kim, T. K. (2015). T test as a parametric statistic. *Korean Journal of Anesthesiology*, *68*(6), 540–546. https://doi.org/10.4097/KJAE.2015.68.6.540

Kokotailo, P. K., Egan, J., Gangnon, R., Brown, D., Mundt, M., & Fleming, M. (2004). Validity of the alcohol use disorders identification test in college students. *Alcoholism: Clinical and Experimental Research*, *28*(6), 914–920. https://doi.org/10.1097/01.ALC.0000128239.87611.F5

Koziolek, M., Alcaro, S., Augustijns, P., Basit, A. W., Grimm, M., Hens, B., Hoad, C. L., Jedamzik, P., Madla, C. M., Maliepaard, M., Marciani, L., Maruca, A., Parrott, N., Pávek, P., Porter, C. J. H., Reppas, C., van Riet-Nales, D., Rubbens, J., Statelova, M., … Corsetti, M. (2019). The mechanisms of pharmacokinetic food-drug interactions – A perspective from the UNGAP group. *European Journal of Pharmaceutical Sciences*, *134*, 31–59.

https://doi.org/10.1016/J.EJPS.2019.04.003

Kypri, K., Paschall, M. J., Langley, J., Baxter, J., Cashell-Smith, M., & Bourdeau, B. (2009). Drinking and alcohol-related harm among new zealand university students: Findings from a national web-based survey. *Alcoholism: Clinical and Experimental Research*, *33*(2), 307–314. https://doi.org/10.1111/j.1530-0277.2008.00834.x

Labrie, J. W., Hummer, J., Kenney, S., Lac, A., & Pedersen, E. (2011). Identifying Factors That Increase the Likelihood for Alcohol-Induced Blackouts in the Prepartying Context. *Substance Use and Misuse4*, *46*(8), 992–1002. https://doi.org/10.3109/10826084.2010.542229

Lannoy, S., Dormal, V., Billieux, J., & Maurage, P. (2019). *The American Journal of Drug and Alcohol Abuse Encompassing All Addictive Disorders Enhancement motivation to drink predicts binge drinking in adolescence: a longitudinal study in a community sample Enhancement motivation to drink predicts binge drinking in adolescence: a longitudinal study in a community sample*. https://doi.org/10.1080/00952990.2018.1550089

Lategan, B. W., du Preez, R., & Pentz, C. D. (2017). Socio-demographic insights into South African student drinking behaviour. *South African Journal of Higher Education*, *31*(5), 90–115. https://doi.org/10.20853/31-5-1512

Lemle, R. (1984). *Alcohol and Masculinity: A Review and Reformulaton of the Sex Role, Dependency, and Power Theories of Alcoholism.*

Leung, L. (2015). Validity, reliability, and generalizability in qualitative research. *Journal of Family Medicine and Primary Care*, *4*(3), 324. https://doi.org/10.4103/2249-4863.161306

Lewin, M., Ilina, M., Betz, J., Masiello, K., Hui, M., Wilson, D. A., & Saito, M. (2018).

Developmental Ethanol-Induced Sleep Fragmentation, Behavioral Hyperactivity, Cognitive Impairment and Parvalbumin Cell Loss are Prevented by Lithium Co-treatment. *Neuroscience*, *369*, 269–277. https://doi.org/10.1016/J.NEUROSCIENCE.2017.11.033

Linden-Carmichael, A. N., & Lau-Barraco, C. (2018). Daily conformity drinking motivations are associated with increased odds of consuming alcohol mixed with energy drinks. *Addictive Behaviors*, *79*, 102–106. https://doi.org/10.1016/J.ADDBEH.2017.12.016

Liu, S. Y., Tsai, I. T., & Hsu, Y. C. (2021). Alcohol-related liver disease: Basic mechanisms and clinical perspectives. *International Journal of Molecular Sciences*, *22*(10). https://doi.org/10.3390/ijms22105170

Logie, C. H., Earnshaw, V., Nyblade, L., Turan, J., Stangl, A., Poteat, T., Nelson, L. R., & Baral, S. (2021). A scoping review of the integration of empowerment-based perspectives in quantitative intersectional stigma research. *Https://Doi.Org/10.1080/17441692.2021.1934061*. https://doi.org/10.1080/17441692.2021.1934061

Lorant, V., Nicaise, P., Soto, V. E., & D'Hoore, W. (2013). Alcohol drinking among college students: College responsibility for personal troubles. *BMC Public Health*, *13*(1), 1–9. https://doi.org/10.1186/1471-2458-13-615/TABLES/2

Lotfullina, N., & Khazipov, R. (2018). Ethanol and the Developing Brain: Inhibition of Neuronal Activity and Neuroapoptosis. *Neuroscientist*, *24*(2), 130–141. https://doi.org/10.1177/1073858417712667

Lui, P. P., & Zamboanga, B. L. (2019). College alcohol belief and alcohol use: Testing moderations by cultural orientations and ethnicity Drinking Identity Project (DIP) View project Construyendo Oportunidades Para Adolescentes Latinos (COPAL) View project.

Article in Journal of Counseling Psychology. https://doi.org/10.1037/cou0000374

Makuyana, L., Mufunda, E., & Machanja[3], M. (2018). Behavioural Habits of Alcohol Abusing Students at a State University in Zimbabwe. *Journal of Advances in Medicine and Medical Research*, *26*(1), 1–9. https://doi.org/10.9734/JAMMR/2018/34607

Manthey, J., Shield, K. D., Rylett, M., Hasan, O. S. M., Probst, C., & Rehm, J. (2019). Global alcohol exposure between 1990 and 2017 and forecasts until 2030: a modelling study. *The Lancet*, *393*(10190), 2493–2502. https://doi.org/10.1016/S0140-6736(18)32744-2

Maphisa, J. M., & Young, C. (2018). Risk of alcohol use disorder among South African university students: The role of drinking motives. *Addictive Behaviors*, *82*, 44–49. https://doi.org/10.1016/j.addbeh.2018.02.016

Marino, E. N., & Fromme, K. (2015). Alcohol-induced blackouts and maternal family history of problematic alcohol use. *Addictive Behaviors*, *45*, 201–206. https://doi.org/10.1016/j.addbeh.2015.01.043

Marsden, J. F. (2018). Cerebellar ataxia. In *Handbook of Clinical Neurology* (Vol. 159, pp. 261–281). Elsevier. https://doi.org/10.1016/B978-0-444-63916-5.00017-3

Maserumule, O. M., Skaal, L., & Sithole, S. L. (2019). Alcohol use among high school learners in rural areas of Limpopo province. *South African Journal of Psychiatry*, *25*. https://doi.org/10.4102/SAJPSYCHIATRY.V25I0.1183

Matzopoulos, R. G., Truen, S., Bowman, B., & Corrigall, J. (2014). The cost of harmful alcohol use in South Africa. *South African Medical Journal*, *104*(2), 127–132. https://doi.org/10.7196/SAMJ.7644

McCrady, B. S., Epstein, E. E., & Fokas, K. F. (2020). Treatment interventions for women with

alcohol use disorder. *Alcohol Research: Current Reviews*, *40*(2), 1–18. https://doi.org/10.35946/ARCR.V40.2.08

Mereish, E. H., & Bradford, J. B. (2014). Intersecting Identities and Substance Use Problems: Sexual Orientation, Gender, Race, and Lifetime Substance Use Problems. *Journal of Studies on Alcohol and Drugs*, *75*(1), 179. https://doi.org/10.15288/JSAD.2014.75.179

Mezquita, L., Stewart, S. H., Ibáñez, M. I., Ruipérez, M. A., Villa, H., Moya, J., & Ortet, G. (2011). Drinking Motives in Clinical and General Populations. *European Addiction Research*, *17*(5), 250–261. https://doi.org/10.1159/000328510

Miller, M. B., Davis, C. N., Merrill, J. E., Dibello, A. M., Carey, K. B., Miller, M. B., Davis, C. N., Merrill, J. E., Dibello, A. M., & Carey, K. B. (2020). Intentions and Motives to Experience Alcohol-Induced Intentions and Motives to Experience Alcohol-Induced Blackout Among Young Adults in College. *Psychology of Addictive Behaviors*, *March*. https://doi.org/10.1037/adb0000572

Miller, M. B., Merrill, J. E., DiBello, A. M., & Carey, K. B. (2018). Distinctions in Alcohol-Induced Memory Impairment: A Mixed Methods Study of En Bloc Versus Fragmentary Blackouts. *Alcoholism: Clinical and Experimental Research*. https://doi.org/10.1111/acer.13850

Nekgotha, T. K., Nel, K., & Govender, S. (2020). Stress levels and alcohol use amongst beginning students at a peri-urban South African university: A brief report. *Journal of Psychology in Africa*, *30*(3), 208–210. https://doi.org/10.1080/14330237.2020.1777021

Nolen-Hoeksema, S. (2004). Gender differences in risk factors and consequences for alcohol use and problems. *Clinical Psychology Review* , 981–1010. https://doi.org/10.1016/j.cpr.2004.08.003

Oxford Dictionary of English. (2010). In A. Stevenson (Ed.), *Oxford Dictionary of English*. Oxford University Press. https://doi.org/10.1093/acref/9780199571123.001.0001

Pamplin, J. R., Susser, E. S., Factor-Litvak, P., Bruce, ·, Link, G., & Keyes, K. M. (2020). *Racial differences in alcohol and tobacco use in adolescence and mid-adulthood in a community-based sample*. *55*, 457–466. https://doi.org/10.1007/s00127-019-01777-9

Pan, C. S., Ju, T. R., Lee, C. C., Chen, Y. P., Hsu, C. Y., Hung, D. Z., Chen, W. K., & Wang, I. K. (2018). Alcohol use disorder tied to development of chronic kidney disease: A nationwide database analysis. *PLoS ONE*, *13*(9), e0203410. https://doi.org/10.1371/journal.pone.0203410

Paschall, M. J., & Freisthler, B. (2003). Does heavy drinking affect academic performance in college? Findings from a prospective study of high achievers. *Journal of Studies on Alcohol*, *64*(4), 515–519. https://doi.org/10.15288/jsa.2003.64.515

Patrick, M. E., Schulenberg, J. E., Martz, M. E., Maggs, J. L., O'Malley, P. M., & Johnston, L. D. (2013). Extreme Binge Drinking Among 12th-Grade Students in the United States: Prevalence and Predictors. *JAMA Pediatrics*, *167*(11), 1019–1025. https://doi.org/10.1001/JAMAPEDIATRICS.2013.2392

Pedersen, S. L., Molina, B. S. G., Belendiuk, K. A., & Donovan, J. E. (2012). Racial Differences in the Development of Impulsivity and Sensation Seeking from Childhood into Adolescence and Their Relation to Alcohol Use. *Alcoholism: Clinical and Experimental Research*, *36*(10), 1794–1802. https://doi.org/10.1111/J.1530-0277.2012.01797.X

Peltier, M. R., Verplaetse, T. L., Mineur, Y. S., Petrakis, I. L., Cosgrove, K. P., Picciotto, M. R., & McKee, S. A. (2019). Sex differences in stress-related alcohol use. In *Neurobiology*

of Stress (Vol. 10, p. 100149). Elsevier Inc. https://doi.org/10.1016/j.ynstr.2019.100149

Peltzer, K., Davids, A., & Njuho, P. (2011). Alcohol use and problem drinking in South Africa: findings from a national population-based survey. *African Journal of Psychiatry*, *14*(1), 30–37. https://doi.org/10.4314/ajpsy.v14i1.65466

Pengpid, S., Peltzer, K., & Van Der Heever, H. (2013). Problem alcohol use and associated factors in a sample of university students in South Africa. *Journal of Psychology in Africa*, *23*(2), 243–249. https://doi.org/10.1080/14330237.2013.10820620

Perkins, H. W. (2007). Misperceptions of peer drinking norms in Canada: Another look at the "reign of error" and its consequences among college students. *Addictive Behaviors*, *32*(11), 2645–2656. https://doi.org/10.1016/j.addbeh.2007.07.007

Pham, D. B., Clough, A. R., Nguyen, H. V., Kim, G. B., & Buettner, P. G. (2010). Alcohol consumption and alcohol-related problems among Vietnamese medical students. *Drug and Alcohol Review*, *29*(2), 219–226. https://doi.org/10.1111/J.1465-3362.2009.00094.X

Ployhart, R. E., & Vandenberg, R. J. (2009). Longitudinal Research: The Theory, Design, and Analysis of Change: *Https://Doi.Org/10.1177/0149206309352110*, *36*(1), 94–120. https://doi.org/10.1177/0149206309352110

Pollard, M. S., Tucker, J. S., & Green, H. D. (2020). Changes in Adult Alcohol Use and Consequences During the COVID-19 Pandemic in the US. *JAMA Network Open*, *3*(9), e2022942–e2022942. https://doi.org/10.1001/JAMANETWORKOPEN.2020.22942

Quinn, K., Bowleg, L., & Dickson-Gomez, J. (2019). "The fear of being Black plus the fear of being gay": The effects of intersectional stigma on PrEP use among young Black gay, bisexual, and other men who have sex with men. *Social Science & Medicine (1982)*, *232*, 86. https://doi.org/10.1016/J.SOCSCIMED.2019.04.042

Quirk, T. J. (2012). One-Way Analysis of Variance (ANOVA). *Excel 2007 for Educational and Psychological Statistics*, 163–179. https://doi.org/10.1007/978-1-4614-3725-3_8

Rang, H., Dale, M., Ritter, J., Flower, R., & Henderson, G. (2012). Rang and Dale's Pharmacology (Seventh ed.). In *London: Churchill Livingstone Elsevier* (7th ed.). London: Chiurchill Livingstone. https://doi.org/10.1007/s13398-014-0173-7.2

Ray, A. E., Stapleton, J. L., Turrisi, R., & Mun, E. Y. (2014). Drinking game play among first-year college student drinkers: An event-specific analysis of the risk for alcohol use and problems. *American Journal of Drug and Alcohol Abuse*, *40*(5), 353–358. https://doi.org/10.3109/00952990.2014.930151

Read, J. P., Beattie, M., Chamberlain, R., & Merrill, J. E. (2008). Beyond the "Binge" threshold: Heavy drinking patterns and their association with alcohol involvement indices in college students. *Addictive Behaviors*, *33*(2), 225–234. https://doi.org/10.1016/J.ADDBEH.2007.09.001

Rehm, J., Kailasapillai, S., Larsen, E., Rehm, M. X., Samokhvalov, A. V., Shield, K. D., Roerecke, M., & Lachenmeier, D. W. (2014). A systematic review of the epidemiology of unrecorded alcohol consumption and the chemical composition of unrecorded alcohol. *Addiction*, *109*(6), 880–893. https://doi.org/10.1111/add.12498

Rehm, J., Mathers, C., Popova, S., Thavorncharoensap, M., Teerawattananon, Y., & Patra, J. (2009). Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *The Lancet*, *373*(9682), 2223–2233. https://doi.org/10.1016/S0140-6736(09)60746-7

Rehm, J., & Shield, K. D. (2019). Global Burden of Alcohol Use Disorders and Alcohol Liver Disease. *Biomedicines*, *7*, 99. https://doi.org/10.3390/BIOMEDICINES7040099

Reinert, D. F., & Allen, J. P. (2007). The alcohol use disorders identification test: An update of research findings. *Alcoholism: Clinical and Experimental Research*, *31*(2), 185–199. https://doi.org/10.1111/j.1530-0277.2006.00295.x

Rice, C., Harrison, E., & Friedman, M. (2019). Doing Justice to Intersectionality in Research. *Cultural Studies - Critical Methodologies*, *19*(6), 409–420. https://doi.org/10.1177/1532708619829779

SACENDU. (2024). *SOUTH AFRICAN COMMUNITY EPIDEMIOLOGY NETWORK ON DRUG USE (SACENDU) Research Update (September 2024)*. https://www.samrc.ac.za/sites/default/files/attachments/2024-10/Sacendu update_V3.pdf

Sachdeva, A., Chandra, M., Choudhary, M., Dayal, P., & Anand, K. S. (2016). Alcohol-related dementia and neurocognitive impairment: A review study. *International Journal of High Risk Behaviors and Addiction*, *5*(3). https://doi.org/10.5812/ijhrba.27976

SAMRC. (2020). *Creating a safer drinking environment | SAMRC*. https://www.samrc.ac.za/news/creating-safer-drinking-environment

Santos, M. G. R., Sanchez, Z. M., Hughes, K., Gee, I., & Quigg, Z. (2022). Pre-drinking, alcohol consumption and related harms amongst Brazilian and British university students. *PLOS ONE*, *17*(3), e0264842. https://doi.org/10.1371/JOURNAL.PONE.0264842

Saquib, N., Rajab, A. M., Saquib, J., & Almazrou, A. R. (2020). Substance use disorders in Saudi Arabia: A scoping review. *Substance Abuse: Treatment, Prevention, and Policy*, *15*(1). https://doi.org/10.1186/S13011-020-00285-3

Sarstedt, M., & Mooi, E. (2019). Regression Analysis. *Springer Texts in Business and Economics*, 209–256. https://doi.org/10.1007/978-3-662-56707-4_7

Saunders, J. B., Aasland,', O. G., Babor,', T. F., De, J. R., Fuente', L. A., & Grant', M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption-II. *Addiction*, *88*, 791–804.

Seggie, J. (2012). Alcohol and South Africa's youth. *South African Medical Journal*, *102*(7), 587. https://doi.org/10.1001/jama.1970.03170260126060

Seidl, S., Jensen, U., & Alt, A. (2000). The calculation of blood ethanol concentrations in males and females. *International Journal of Legal Medicine*, *114*(1–2), 71–77. https://doi.org/10.1007/S004140000154

Settles, I. H., Warner, L. R., Buchanan, N. C. T., & Jones, M. K. (2020). Understanding psychology's resistance to intersectionality theory using a framework of epistemic exclusion and invisibility. *Journal of Social Issues*, *76*(4), 796–813. https://doi.org/10.1111/JOSI.12403

Simbayi, L. C., Kalichman, S. C., Cain, D., Cherry, C., Jooste, S., & Mathiti, V. (2007). Alcohol and risks for HIV/AIDS among sexually transmitted infection clinic patients in Cape Town, South Africa. *Substance Abuse*, *27*(4), 37–43. https://doi.org/10.1300/J465v27n04_05

Simpson, R. F., Hermon, C., Liu, B., Green, J., Reeves, G. K., Beral, V., & Floud, S. (2019). Alcohol drinking patterns and liver cirrhosis risk: analysis of the prospective UK Million Women Study. *The Lancet Public Health*, *4*(1), e41–e48. https://doi.org/10.1016/S2468-2667(18)30230-5

Squeglia, L. M., Boissoneault, J., Van Skike, C. E., Nixon, S. J., & Matthews, D. B. (2014). Age-Related Effects of Alcohol from Adolescent, Adult, and Aged Populations Using

Human and Animal Models. *Alcoholism: Clinical and Experimental Research*, *38*(10), 2509–2516. https://doi.org/10.1111/acer.12531

Sriken, J., Sherman, M. F., Erford, B. T., MacInerney, E., Zhou, A., & Smith, H. (2023). Psychometric Analysis of Scores on the Alcohol Use Disorders Identification Test (AUDIT) with a University Sample. *Https://Doi.Org/10.1080/07481756.2022.2160355*. https://doi.org/10.1080/07481756.2022.2160355

Stein, D. J., Seedat, S., Herman, A., Moomal, H., Heeringa, S. G., Kessler, R. C., & Williams, D. R. (2008). Lifetime prevalence of psychiatric disorders in South Africa. *The British Journal of Psychiatry*, *192*(2), 112–117. https://doi.org/10.1192/BJP.BP.106.029280

Stewart-Brown, S., Evans, J., Patterson, J., Petersen, S., Doll, H., Balding, J., & Regis, D. (2000). The health of students in institutes of higher education: An important and neglected public health problem? *Journal of Public Health Medicine*, *22*(4), 492–499. https://doi.org/10.1093/pubmed/22.4.492

Stockwell, T., Andreasson, S., Cherpitel, C., Chikritzhs, T., Dangardt, F., Holder, H., Naimi, T., & Sherk, A. (2021). The burden of alcohol on health care during COVID-19. *Drug and Alcohol Review*, *40*(1), 3–7. https://doi.org/10.1111/DAR.13143

Substance Abuse and Mental Health Services Administration. (2014). *Results from the 2013 National Survey on Drug Use and Health : Summary of National Findings*. http://store.samhsa.gov/home.

Swahn, M. H., Ali, B., Palmier, J. B., Sikazwe, G., & Mayeya, J. (2011). Alcohol Marketing, Drunkenness, and Problem Drinking among Zambian Youth: Findings from the 2004 Global School-Based Student Health Survey. *Journal of Environmental and Public Health*, *2011*. https://doi.org/10.1155/2011/497827

Tang, Y. L., Xiang, X. J., Wang, X. Y., Cubells, J. F., Babor, T. F., & Hao, W. (2013). Alcohol and alcohol-related harm in China: policy chenges needed. *Bulletin of the World Health Organization*, *91*(4), 270–276. https://doi.org/10.2471/BLT.12.107318

Tawa, E. A., Hall, S. D., & Lohoff, F. W. (2016). Overview of the Genetics of Alcohol Use Disorder. *Alcohol and Alcoholism*, *51*(5), 507–514. https://doi.org/10.1093/ALCALC/AGW046

Thoma, R. J., Monnig, M. A., Lysne, P. A., Ruhl, D. A., Pommy, J. A., Bogenschutz, M., Tonigan, J. S., & Yeo, R. A. (2011). Adolescent Substance Abuse: The Effects of Alcohol and Marijuana on Neuropsychological Performance. *Alcoholism: Clinical and Experimental Research*, *35*(1), 39–46. https://doi.org/10.1111/j.1530-0277.2010.01320.x

Vale, A. (2007). Ethanol. In *Medicine* (Vol. 35, Issue 11, pp. 615–616). Elsevier. https://doi.org/10.1016/j.mpmed.2007.08.015

Van Damme, J., Maes, L., Clays, E., Rosiers, J. F. M. T., Van Hal, G., & Hublet, A. (2013). Social motives for drinking in students should not be neglected in efforts to decrease problematic drinking. *Health Education Research*, *28*(4), 640–650. https://doi.org/10.1093/her/cyt036

Van Lier, P. A. C., Vitaro, F., Barker, E. D., Koot, H. M., & Tremblay, R. E. (2009). Developmental links between trajectories of physical violence, vandalism, theft, and alcohol-drug use from childhood to adolescence. *Journal of Abnormal Child Psychology*, *37*(4), 481–492. https://doi.org/10.1007/s10802-008-9289-6

Vellios, N. G., & Van Walbeek, C. P. (2018). Self-reported alcohol use and binge drinking in South Africa: Evidence from the National Income Dynamics Study, 2014 - 2015. *South African Medical Journal = Suid-Afrikaanse Tydskrif Vir Geneeskunde*, *108*(1), 33–39.

https://doi.org/10.7196/SAMJ.2017.V108I1.12615

Vorster, A., Gerber, A. M., van der Merwe, L. J., & van Zyl, S. (2019). Second and third year medical students' self-reported alcohol and substance use, smoking habits and academic performance at a south african medical school. *Health SA Gesondheid*, *24*. https://doi.org/10.4102/hsag.v24i0.1041

Vu, M., Li, J., Haardörfer, R., Windle, M., & Berg, C. J. (2019). Mental health and substance use among women and men at the intersections of identities and experiences of discrimination: Insights from the intersectionality framework. *BMC Public Health*, *19*(1), 1–13. https://doi.org/10.1186/S12889-019-6430-0/TABLES/5

Wadd, S., & Papadopoulos, C. (2014). Drinking behaviour and alcohol-related harm amongst older adults: Analysis of existing UK datasets. *BMC Research Notes*, *7*(1), 1–9. https://doi.org/10.1186/1756-0500-7-741/TABLES/2

Waller, S., & Day Lorch, B. (1977). First Drinking Experiences and Present Drinking Patterns: A Male-Female Comparison. *The American Journal of Drug and Alcohol Abuse*, *4*(1), 109–121. https://doi.org/10.3109/00952997709002752

Walls, H., Cook, S., Matzopoulos, R., & London, L. (2020). Advancing alcohol research in low-income and middle-income countries: A global alcohol environment framework. *BMJ Global Health*, *5*(4). https://doi.org/10.1136/bmjgh-2019-001958

Ward, R. M., & Guo, Y. (2020). Examining the relationship between social norms, alcohol-induced blackouts, and intentions to blackout among college students. *Alcohol*, *86*, 35–41. https://doi.org/10.1016/J.ALCOHOL.2020.03.008

Wardell, J. D., Kempe, T., Rapinda, K. K., Single, A., Bilevicius, E., Frohlich, J. R., Hendershot, C. S., & Keough, M. T. (2020). Drinking to Cope During COVID-19

Pandemic: The Role of External and Internal Factors in Coping Motive Pathways to Alcohol Use, Solitary Drinking, and Alcohol Problems. *Alcoholism: Clinical and Experimental Research*, *44*(10), 2073–2083. https://doi.org/10.1111/ACER.14425

Wechsler, H., Lee, J. E., Nelson, T. F., & Kuo, M. (2002). Underage college students' drinking behavior, access to alcohol, and the influence of deterrence policies: Findings from the harvard school of public health college alcohol study. *Journal of the American College Health Association*, *50*(5), 223–236. https://doi.org/10.1080/07448480209595714

Wemrell, M. (2017). *An intersectional approach to multilevel analysis of individual heterogeneity (MAIH) and discriminatory accuracy Cont emporary Epidemiology: A Review of Crit ical Discussions Wit hin t he Discipline and A Call for Furt h…*. https://doi.org/10.1016/j.socscimed.2017.01.050

White, A., Castle, I.-J. P., Chen, C. M., Shirley, M., Roach, D., & Hingson, R. (2015). Converging Patterns of Alcohol Use and Related Outcomes Among Females and Males in the United States, 2002 to 2012. *Alcoholism: Clinical and Experimental Research*, *39*(9), 1712–1726. https://doi.org/10.1111/acer.12815

White, A. M. (2003). What Happened ? Alcohol , Memory Blackouts , and the Brain. *Alcohol Research and Health*, *27*(2), 186–196.

White, A. M. (2020). Gender Differences in the Epidemiology of Alcohol Use and Related Harms in the United States. *Alcohol Research : Current Reviews*, *40*(2), 1–13. https://doi.org/10.35946/ARCR.V40.2.01

White, A. M., Jamieson-drake, D. W., & Swartzweider, H. S. (2002). Prevalence and Correlates of Alcohol-Induced Blackouts Among College Students: Results of an E-Mail Survey. *Journal of American College Health*, *51*(3), 117–131.

Wilsnack, S. C., Wilsnack, R. W., & Kantor, L. W. (2013). Focus on: Women and the costs of alcohol use. - PsycNET. *Alcohol Research: Current Reviews*, *35*(2), 219–228. https://psycnet.apa.org/record/2014-07285-013

Witkiewitz, K., Litten, R. Z., & Leggio, L. (2019). Advances in the science and treatment of alcohol use disorder. *Science Advances*, *5*(9). https://doi.org/10.1126/SCIADV.AAX4043/ASSET/D9BBBFA4-87BD-48D6-B3D0-569E1F4D7AF4/ASSETS/GRAPHIC/AAX4043-F1.JPEG

World Health Organisation. (2011). Global status report on alcohol and health. *World Health Organization*, *122*(December 1994), 1–85.

World Health Organization. (2018a). *Global Status Report on Alcohol and Health 2018 - World Health Organization - Google Books*. https://books.google.co.za/books?hl=en&lr=&id=qnOyDwAAQBAJ&oi=fnd&pg=PR7&dq=World+Health+Organization.+Global+status+report+on+alcohol+and+health+2018+%5BOnline%5D.&ots=a1lpNGpgcp&sig=ej98tMZjM1Xt21Lzh3ROuT0w8NA&redir_esc=y#v=onepage&q=World Health Organization. Global status report on alcohol and health 2018 %5BOnline%5D.&f=false

World Health Organization. (2018b). *South Africa. Alcohol Consumption: Levels and Patterns*.

World Health Organization. (2019). *Global status report on alcohol and health 2018.* World Health Organization.

You, M., & Arteel, G. E. (2019). Effect of ethanol on lipid metabolism. *Journal of Hepatology*, *70*(2), 237–248. https://doi.org/10.1016/J.JHEP.2018.10.037

Young, C., & de Klerk, V. (2012). Correlates of heavy alcohol consumption at Rhodes University Correlates of heavy alcohol consumption at Rhodes. *Journal of Child &*

Adolescent Mental Health, *24*(1), 37–41.

Young, C., & De Klerk, V. (2008). Patterns of alcohol use on a South African university campus: the findings of two annual drinking surveys. *African Journal of Drug and Alcohol Studies*, *7*(2), 101–112. https://doi.org/10.4314/ajdas.v7i2.46367

Young, C., & De Klerk, V. (2012). Correlates of heavy alcohol consumption at Rhodes University. *Journal of Child and Adolescent Mental Health*, *24*(1), 37–44. https://doi.org/10.2989/17280583.2011.639776

Young, C., & Mayson, T. (2010). The Alcohol Use Disorders Identification Scale (AUDIT) normative scores for a multiracial sample of Rhodes University residence students. *Journal of Child and Adolescent Mental Health*, *22*(1), 15–23. https://doi.org/10.2989/17280583.2010.493659

Zakletskaia, L. I., Mundt, M. P., Balousek, S. L., Wilson, E. L., & Fleming, M. F. (2009). Alcohol-impaired driving behavior and sensation-seeking disposition in a college population receiving routine care at campus health services centers. *Accident Analysis and Prevention*, *41*(3), 380–386. https://doi.org/10.1016/J.AAP.2008.12.006

Zamboanga, B. L., Newins, A. R., & Cook, M. A. (2021). A meta-analysis of drinking game participation and alcohol-related outcomes. *Psychology of Addictive Behaviors*, *35*(3), 263–273. https://doi.org/10.1037/ADB0000670

Zamboanga, B. L., Schwartz, S. J., Van Tyne, K., Ham, L. S., Olthuis, J. V, Huang, S., Kim, S. Y., Hudson, M., Forthun, L. F., Bersamin, M., & Weisskirch, R. (2010). Drinking game behaviors among college students: How often and how much. *American Journal of Drug and Alcohol Abuse*, *36*(3), 175–179. https://doi.org/10.3109/00952991003793869

Zeigler, D. W., Wang, C. C., Yoast, R. A., Dickinson, B. D., McCaffree, M. A., Robinowitz,

C. B., & Sterling, M. L. (2005). The neurocognitive effects of alcohol on adolescents and college students. *Preventive Medicine*, *40*(1), 23–32. https://doi.org/10.1016/j.ypmed.2004.04.044

Appendix A: Features of ethanol intoxication

Ethanol/blood ratio	Level of poisoning	Features
<500mg/L	Mild inebriation	Talkativeness Feelings of great well-being
500-1500mg/L	Mild Poisoning	Emotional lability and slurred speech Mild impairments (visual, muscular coordination and reaction time)
1500-3000mg/L	Moderate Poisoning	Blurred vision Loss of sensory perception Loss of coordination Ataxia Slowed reaction time
3000-5000mg/L	Severe Poisoning	Marked incoordination. Blurred or double vision Coma and hypothermia (sometimes) Hypoglycaemia and convulsions (occasionally)
≥ 5000mg/L	Very Severe Poisoning	Coma Respiratory depression Depressed reflexes Hypotension and hypothermia Death as a result of respiratory or circulatory failure, aspiration of stomach contents in the absence of a gag reflex.

Appendix B: The Alcohol Use Disorders Identification Test (AUDIT)

1. How often do you have a drink containing alcohol?

(0) Never (Skip to Questions 9-10)

(1) Monthly or less

(2) 2 to 4 times a month

(3) 2 to 3 times a week

(4) 4 or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?

(0) 1 or 2

(1) 3 or 4

(2) 5 or 6

(3) 7, 8, or 9

(4) 10 or more

3. How often do you have six or more drinks on one occasion?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

4. How often during the last year have you found that you were not able to stop drinking once you had

started?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

5. How often during the last year have you failed to do what was normally expected from you because of

drinking?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

6. How often during the last year have you been unable to remember what happened the night before

because you had been drinking?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

7. How often during the last year have you needed an alcoholic drink first thing in the morning to get

yourself going after a night of heavy drinking?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

8. How often during the last year have you had a feeling of guilt or remorse after drinking?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

9. Have you or someone else been injured as a result of your drinking?

(0) No

(2) Yes, but not in the last year

(4) Yes, during the last year

10. Has a relative, friend, doctor, or another health professional expressed concern about your drinking or

suggested you cut down?

(0) No

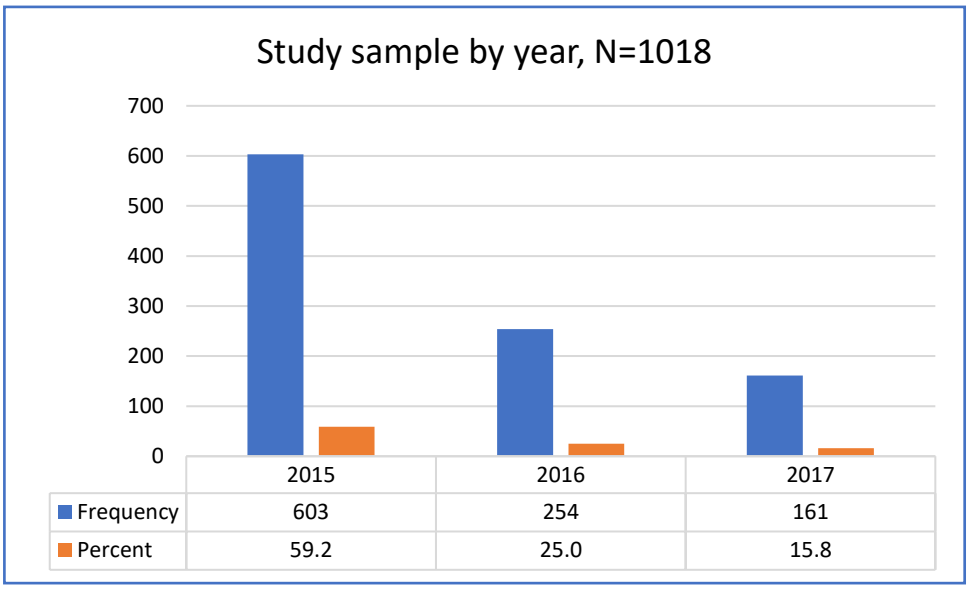
(2) Yes, but not in the last year

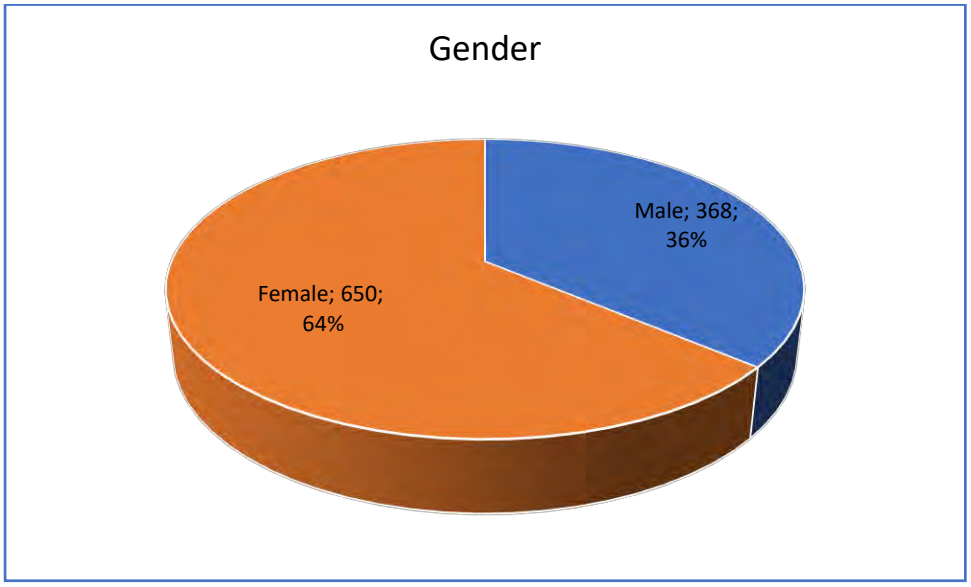
(4) Yes, during the last year

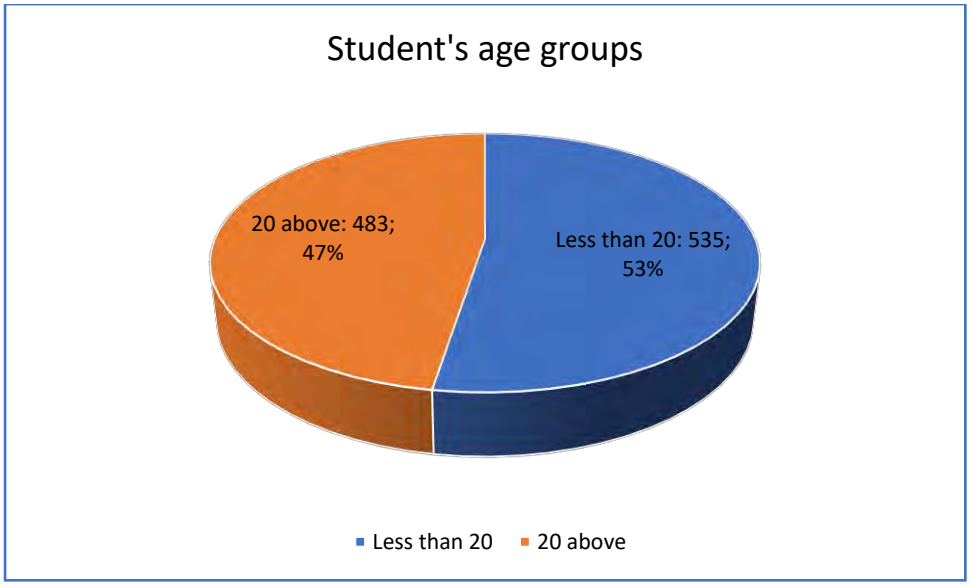
The World Health Organization developed the Alcohol Use Disorders Identification Test (AUDIT) in 1982.The AUDIT has proven to be accurate across all ethnic and gender groups and is one of the most accurate alcohol screening tests available (92% effective) in detecting hazardous or harmful drinking.

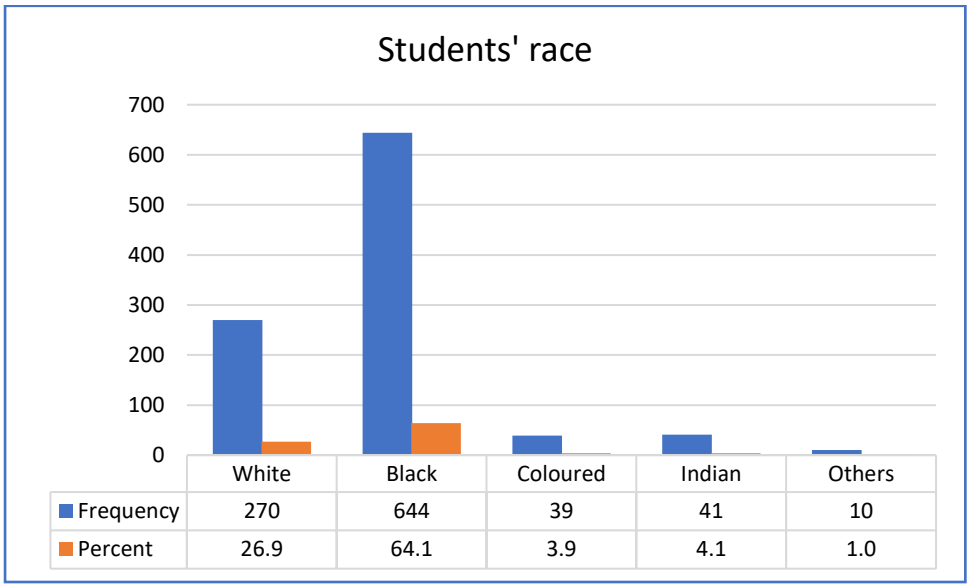
Appendix C: Alcohol Measurements

Appendix D: Participants demographics.









	White	Black	Coloured	Indian	Others
Frequency	270	644	39	41	10
Percent	26.9	64.1	3.9	4.1	1.0

Appendix E: AUDIT Item Frequencies

		Frequency	Percent	Valid Percent
1. How often do you have a drink containing alcohol?	Never	247	24,3	24,4
	Monthly or less	267	26,2	26,4
	2-3times a month	292	28,7	28,9
	2-3times a week	187	18,4	18,5
	4 or more times a week	19	1,9	1,9
	Total	1012	99,4	100,0
	Missing	6	0,6	
2. How many drinks containing alcohol do you have on a typical day when you are drinking?	1 or 2	161	15,8	21,5
	3 or 4	251	24,7	33,5
	5 or 6	212	20,8	28,3
	7 to 9	84	8,3	11,2
	10 or more	41	4,0	5,5
	Total	749	73,6	100,0
	Missing	269	26,4	
3. How often do you have six or more drinks on one occasion?	Never	213	20,9	28,3
	Less than Monthly	229	22,5	30,4
	Monthly	201	19,7	26,7
	Weekly	103	10,1	13,7
	Daily or mostly	7	0,7	0,9
	Total	753	74,0	100,0
	Missing	265	26,0	
4. How often during the last year have you found that you were not able to stop drinking once you had started	Never	552	54,2	73,5
	Less than Monthly	101	9,9	13,4
	Monthly	65	6,4	8,7
	Weekly	31	3,0	4,1
	Daily or mostly	2	0,2	0,3
	Total	751	73,8	100,0
	Missing	267	26,2	
5. How often during the last year have you failed to do what was normally expected from you because of drinking	Never	509	50,0	67,4
	Less than Monthly	178	17,5	23,6
	Monthly	48	4,7	6,4
	Weekly	18	1,8	2,4
	Daily or mostly	2	0,2	0,3
	Total	755	74,2	100,0
	Missing	263	25,8	
6. How often during the last year have you needed a first drink in the morning to get	Never	701	68,9	92,8
	Less than Monthly	29	2,8	3,8
	Monthly	15	1,5	2,0

yourself going after a heavy drinking season?”	Weekly	7	0,7	0,9
	Daily or mostly	3	0,3	0,4
	Total	755	74,2	100,0
	Missing	263	25,8	
7. How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	368	36,1	48,7
	Less than Monthly	266	26,1	35,2
	Monthly	85	8,3	11,2
	Weekly	22	2,2	2,9
	Daily or mostly	15	1,5	2,0
	Total	756	74,3	100,0
	Missing	262	25,7	
8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?”	Never	381	37,4	50,5
	Less than Monthly	253	24,9	33,5
	Monthly	93	9,1	12,3
	Weekly	21	2,1	2,8
	Daily or mostly	7	0,7	0,9
	Total	755	74,2	100,0
	Missing	263	25,8	
9. Have you or someone else been injured as a result of your drinking?	No	651	63,9	77,7
	Yes, but not in the last year	79	7,8	9,4
	Yes, during the last year	108	10,6	12,9
	Total	838	82,3	100,0
	Missing	180	17,7	
10. Has a relative, friend, doctor, or another health professional expressed concern about your drinking or suggested that you cut down	No	771	75,7	91,6
	Yes, but not in the last year	27	2,7	3,2
	Yes, during the last year	44	4,3	5,2
	Total	842	82,7	100,0
	Missing	176	17,3	
Total		1018	100,0	

Appendix F: Ethics Approval

Rhodes University Human Ethics Committee
PO Box 94, Makhanda, 6140, South Africa
t: +27 (0) 46 603 7727
f: +27 (0) 46 603 8822
e: s.manqele@ru.ac.za
NHREC Registration number: RC-241114-045

https://www.ru.ac.za/researchgateway/ethics/

28/01/2021

Tatenda Chakabuda

Email: g16c2223@campus.ru.ac.za

Review Reference: 2020-2719-4871

Dear Mr., Sizwe Zondo

Title: Alcohol-related harm in relation to demographic factors: A longitudinal study of South African University students.

Principal Investigator: Mr Sizwe Zondo

Collaborators: Miss Tatenda Chakabuda, Prof Charles Young

This letter confirms that the above research proposal has been reviewed and **APPROVED** by the Rhodes University Human Ethics Committee (RU-HEC). Your
Approval number is: 2020-2719-4871

Approval has been granted for 1 year. An annual progress report will be required in order to renew approval for an additional period. You will receive an email notifying when the annual report is due.

Please ensure that the ethical standards committee is notified should any substantive change(s) be made, for whatever reason, during the research process. This includes changes in investigators. Please also ensure that a brief report is submitted to the ethics committee on the completion of the research. The purpose of this report is to indicate whether the research was conducted successfully, if any aspects could not be completed, or if any problems arose that the ethical standards committee should be aware of. If a thesis or dissertation arising from this research is submitted to the library's electronic theses and dissertations (ETD) repository, please notify the committee of the date of submission and/or any reference or cataloging number allocated.

Sincerely,

Prof Arthur Webb

Chair: Rhodes University Human Ethics Committee, RU-HEC cc: Mr. Siyanda Manqele - Ethics Coordinator