THE RELATIONSHIP BETWEEN DEPRESSION, ANXIETY, AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AMONG MEDICAL STUDENTS IN A TERTIARY INSTITUTION.

BY

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DECLARATION

I, Margaret Zawadi Kimari, do hereby declare that this is my original work carried out in fulfillment of the requirement of the degree of Masters of Science in Clinical Psychology, Department of Psychiatry, and the University of Nairobi. I further declare that it has not been presented for the award of any other degree or to any other University.

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DEDICATION

This is to all who have lived through the system struggling with something they know not, to those inconsistently consistent in a consistent way.

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ABBREVIATIONS

ADHD	Attention-Deficit/Hyperactivity Disorder.
ASRS	Adult ADHD Self-Report Scale.
KNH	Kenyatta National Hospital.
PLWH	People living with HIV
UoN	University of Nairobi.

ABSTRACT

Background: In sub-Saharan Africa, diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) is commonly made in childhood with many cases going undiagnosed and unrecognized. The nature of ADHD symptoms is highly disruptive to the individual therefore by the time an adult diagnosis is made the impact on their wellbeing is quite significant. This study aimed at looking into the association between depression, anxiety, and ADHD among University of Nairobi medical students.

Objectives: The broad objective of this study was to investigate the association between depression, anxiety, and ADHD among medical students at the University of Nairobi.

Methodology: The study employed the use of a quantitative cross-sectional study design in which data was collected in the space of two weeks. A sample of 335 University of Nairobi students was assessed for adult ADHD, Depression, and Anxiety. A systematic sampling technique was used to recruit eligible study participants who were informed about the study through their respective class representatives. After contact was established a link with an online consent form was shared. The objective of the study was outlined by the researcher as well as the ethical considerations which included and was not limited to the consent form, confidentiality, benefits and risks as well as the right to decline or withdraw at any point during the exercise. Having consented, socio-demographic questionnaire, PHQ 9, GAD 7 and the ASRS v1.1 tools were self-administered , to assess depression, anxiety, and ADHD.. Those with a positive ADHD score and had opted for a call back were contacted and notified of their outcomes. They were taken through the referral process to receive further assistance. Recruitment was done during the normal school days and those who met the inclusion criteria were enrolled within the sample frame until the desired sample size of 335 was achieved.

Data Collection & Analysis: Data was collected through Kobo Collect online questionnaire. The raw data was cleaned for errors and any inconsistencies in responses. Stata v14.2 was used for statistical analysis of the data. The quantitative data was analyzed using both descriptive analysis techniques as well as inferential statistics. Moreover, means and frequencies were also determined for the socio-demographic factors. In addition, Bivariate and Multivariate logistic regression analyses were used to establish the association between the variables under investigation and highlighted their levels of significance.

Results: Three hundred and thirty-five (335) respondents were recruited into the study with 173 (51.64%) being females and 162 (48.35%) males. Those aged 18-22 comprised majority of the participants, being 211 (62.99%) of the group, followed by those aged 23-26 years 93 (27.76%), 27-30years 27 (8.06%), above 30 years 4(<2%). Presence and severity of ADHD were assessed using the WHO ASRS v1.1. with the screener, the prevalence of ADHD was 32.54%. Presence and severity of depression were assessed using the PhQ-9. 183 (54%) of the participants reported some form of depression ranging from moderate to severe levels. Participants with moderate depression were 87 (25.97%), moderately severe were 58 (17.31%) and those severely depressed were 38 (11%). In addition, presence and severity of anxiety were assessed using the GAD-7. Participants who reported moderate to severe symptoms of anxiety were 145 (43%) of the total sample. Minimal to no anxiety was reported by 109 (32.54%), 81 (24.18%) participants reported mild anxiety, 86 (25.67%) moderate anxiety with 59 (17.6%) showing severe symptoms of anxiety. Moreover, the association between ADHD, depression and anxiety was also analyzed drawing the

following findings. Ordinal logistic regression showed that students who exhibit ADHD symptoms were 9.28 times significantly more likely to develop anxiety compared to those who don't, p = 0.000; and 8.63 times significantly more likely to develop depression severity, p= 0. 000.

Conclusion and Recommendations: This study illuminates and adds onto the body of scientific knowledge on the general canvas around adult ADHD and the relationship it bears with anxiety and depression among university students pursuing medicine. The prevalence rates reported are significantly higher than those in other similar studies across the world. Consequently pushing the agenda on attempting to understand risk factors towards the development of depression and anxiety as well as adult ADHD within the college of health sciences.

Mental wellness programs, additional academic support programs, mental wellness programs and mentorship should be set in place to help alleviate emotional distress among students of higher learning. On the other hand those who present with academic and interpersonal difficulties should be taken through psychological assessment as part of the investigations on help inform interventions that would be deployed to them.

CHAPTER ONE

BACKGROUND

1.1 Introduction on ADHD

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that adversely affects an individual's executive function (Barkley, 2008). This condition occurs with three main presentations. The predominantly hyperactive/impulse type is patterned with overt increased levels of activity and excitability such as fidgeting, inability to remain contained in situations that demand restraint in action like movement or speech, waiting for one's turn, or partaking in leisure activities quietly. The predominantly inattentive presentation is characterized by more internalization of over activity. This covert over activity results in difficulties in sustained attention which is seen through difficulties focusing on tasks, poor organization skills, forgetfulness, and failure to give attention to details The third presentation is a combined type- one experiences both the inattentive and hyperactive/ impulsive symptom (American Psychiatric Association, 2013).

Works from the earliest descriptions of ADHD by Melchior Adam Weikard (1975) and later works by Sir George Still (1902) portray it as a neurodevelopmental disorder whose symptoms must be evident from childhood. The implications of ADHD in this developmental phase were depicted- the inability to consistently sustain attention and regulate behavior in children resulting in significant distinct behavioral problems. However, these pioneers also reported ADHD to have a benign course remitting with age (Asherson & Agnew-Blais, 2019). Consequently, the traditional position in the management of ADHD has always held the view that the symptoms remit before adulthood rendering treatment redundant beyond the adolescence phase of development.

This inaccurate position resulted in ignorance towards the numerous adults who continue to meet sub-syndromic and full criterion of symptoms of ADHD highlighting the lifelong course of the disorder (Barkley, 2008). Recent research also found several cases in which symptom presentation of ADHD emerges later than the age of 12 or does not meet the criterion of children (Asherson & Agnew-Blais, 2019). This has generated a great debate as to whether ADHD can have a later onset in adulthood. All of these developments fuel the need to conceptualize the gravity of this disorder in terms of the course, prognosis, and implications in an individual's life (Harpin, 2005). The method of the diagnostic process is also put to the test by these new discoveries.

1.2 Introduction on Depression and Anxiety

According to the Global Burden of Disease, Injuries and Risk Factors Study of 2019, depression and anxiety were found to be the two main mental health contributors of the global health related burden (Collaborators, 2020). With the COVID 19 pandemic, there was a marked increase in the prevalence of both these conditions across the general population. The environmental changes that followed the pandemic perpetuated and exacerbated poor mental health (D. F. Santomauoro, 2021). Medics are not insulated from this situation. On the contrary, they have been found to have higher susceptibility towards psychological distress than the general population even before the emergence of the pandemic (P Arun, 2021).

1.2.1 Depression

Depression is one of the earliest recognized mental health challenges with its history dating back to Mesopotamian writing offering rudimentary understanding of the condition. During this historical development of mental health conditions, in ancient Greece, works by Hippocrates, to attempt to understand variances in human illness

inclusive of those of the mind, resulted in the discovery of melancholia- all forms of quiet insanity compounded by long term fears. After a lengthy history of studying this condition, the term depression came to be in the 14th century. In the 19th century, Kraeplin discovered various forms of melancholia officially using the term-depressive states. He classified these states as maniac depression and dementia praecox. The modern day definition of depression emerged as a melting pot of various theoretic perspectives in the 19th century. These include and are not limited to psychiatric doctors, psychoanalysts, cognitive theorists and behavioral theorists (Trans: W D Smith, 1994; Paykel, 2008).

Through consensus of various specialists and stakeholders diagnostic criterions were developed by both the International Statistical Classification of Diseases, Injuries and Causes of Death (ICD) and the Diagnostic and Statistical Manual of Mental Disorders (DSM). The first ones emerging in the 19th century. Following these official classification bodies, depression in modern times is summarized as a clinical syndrome determined by the presence of a number of symptom patterns. It is not bound to a particular etiology as there are different bio-psychosocial-spiritual determinants that may result in symptom presentation (Paykel, 2008). Impairments and challenges in how one perceives and processes rewards have been linked to increased morbidity and risks such as the risk for suicide (CJ Funkhouser, 2021).

Depression is defined as an affective disorder characterized by persistent low moods and loss of interest. These hallmark symptoms are accompanied by feelings of emptiness-(hopelessness and worthlessness) or irritability (sometimes with internal or external bouts of anger), alterations in cognitive patterns and somatization (American Psychiatric Association, 2013). The totality of these adversely impacts ones functioning cutting across various aspects of the human life (J. Ormel, 2019). The

DSM-5 classifies it into 5 disorders: disruptive mood dysregulation disorder, major depressive disorder, dysthymia, premenstrual dysphoric disorder and those depressive ailments caused by other medical conditions (American Psychiatric Association, 2013).

Like depression, the nosology of anxiety conditions has a long history dating back to the Greeks and Latin philosophers and physicians. These conditions were even at this early phases of the development of psychiatry and psychology recognized as medical conditions and separated from other forms of affective disorders (Trans: W D Smith, 1994) (RB Cattell, 1960).

The period between classic antiquity and modern psychiatry was characterized by slow progression in the understanding of anxiety as an illness. It is in 1980 that the American Psychiatric Association that anxiety disorders were recognized in the DSM III. Anxiety disorders were defined as a syndrome (constellation of symptoms) that were present to the individual (Horwitz, 2013). These symptoms are surrounded by intense thoughts of worry, physiological tension and alterations (American Psychiatric Association, 2013).

Aside from abnormal anxious reactions resulting in disordered experiences, anxiety bears significant evolutionary utility within normal human experiences. This reaction, homologues to other creatures supports safety through the detection and planning on mitigating threats. This means that the individual's reaction should be in relation to a direct possibility of a threat (probability) that they deem themselves unable to navigate (vulnerability). With increase in the either of these variables, then the individual hold more likelihood of false alarm. To this effect the production of anxiety

disorders becomes a misappraisal of either probability of a perceived threat versus their perception of vulnerability towards mitigating these threats (M. Bateson, 2011).

The DSM V describes anxiety disorders as characterized by excessive apprehensive expectation over a period of 6 months with difficulty to regulate these thoughts and reactions across diverse or at times very specific situations. These are associated with restlessness, fatigue, concentration impairment, elevated irritability and sleep disturbance. Anxiety disorders are classified into 3 broad categorizations: anxiety, trauma-related and obsessive-compulsive disorders (American Psychiatric Association, 2013).

1.3 Background of the Study

Attention Deficit Hyperactivity Disorder (ADHD) as described by the DSM V is characterized by pervasive and persistent patterns of inattention and/or hyperactivity which adversely impacts the executive functioning and consequently the psychosocial development of an individual (American Psychiatric Association, 2013). The pervasive and persistent nature of ADHD means that the hallmark symptoms, though with deviations in the presentation, endure throughout the lifetime (S. Raveendran, 2023). This is contrary to the traditional viewpoint of ADHD as a pure childhood disorder. There is significant scientific research that confirms its persistence throughout life with 50 % to 65% of childhood cases presenting through into adulthood (Pallanti & Salerno, 2020).

The clinical presentation of adult ADHD is more often than not characterized by disorganization, poor productivity, turbulent relationships, misconstrued sense of self, low academic qualifications, instability in career and employment (Hechtman, 2017). With the tendencies towards thrill seeking behaviors as a consequence of difficulty in impulse regulation, increased incidences of accidents, substance abuse and other

unhealthy behaviors as well as forensic activity is highly common among adults with ADHD (Hechtman, 2017; S. Raveendran, 2023). Consequently, it goes without saying that as with all other neurodevelopmental disorders, ADHD tends to affect the individual's overall quality of life.

In addition to the general direct implications of these symptoms to the individual, recent research has found that ADHD in adults is highly linked to several physical illnesses with the strongest associations being with conditions of the nervous, respiratory, musculoskeletal and metabolic system (E. Du Riets, 2021). Part of the etiological factors related to ADHD are shared to some of these conditions for example: respiratory and liver illnesses. These etiological factors include genetic predisposition which are then further perpetuated and precipitated by high risk behaviors such as substance abuse. In addition to these associations to physical ailments, ADHD shares genetic basis and high comorbidity with other psychiatric disorders (E. Pettersson, 2016). With this in mind, it becomes a matter of scientific interest to look into the relationship between ADHD and other comorbid conditions cutting across from physical to psychiatric.

The mental wellbeing of medical students has been a subject of great discussion. In a recent article in the British Medical Journal, it was exposed that medical students are highly susceptible to a wide range of psychiatric conditions such as and not limited to burnout, depression, anxiety, anorexia, obsessive compulsive symptoms as well as somatization (Wilkinson, 2023). Findings from studies in the past 10 years have equally found higher prevalence of ADHD among this population group (D. S. Im, 2023).

The general view point is that towards the start of medicine school, the students' mental wellness status is similar to their counterparts pursuing other interests and academic ventures. However it is in the course of their training that their psychological wellness is adversely threatened. This then generates questions as to whether it is the environment and experiences in the programs that test medical student's psychological health. Another question that comes into mind is the general psychological wellbeing of students who end up in pursuit of medicine. The implications of the answers to these questions are equally worrying given the responsibility they are charged with to facilitate healthcare for the larger national and international population (Ct Sreeramareddy, 2007) (Lins, 2015).

Several studies have explored this phenomenon in the last decade resulting in several psychological conditions being studied among this population group. These include and are not limited to studies on the presence and prevalence of ADHD (N. Jafari, 2012), depression (Kebede, 2019) (D. S. Im, 2023), anxiety and burn out (Quek TT, 2019).

In the local context, very little has been done to understand the implications of adult ADHD among this group. The only literature is a local study conducted at Moi University, Eldoret, under Prof Atwoli (L. Atwoli, 2010). The prevalence rate of self-reported ADHD symptoms stood at 21.8%. It was significantly associated with belonging to a younger age group (17-20 years) compared to the older age groups ($p<0.05$). The prevalence was higher among females (25.2%) than among males (18.6%) (L. Atwoli, 2010).

To this effect, this study sought to find the psychological implications of adult ADHD among medical students at the University of Nairobi in terms of the relationship between ADHD, depression and anxiety.

1.4 Statement of the Problem

It is the great paucity[1] of scientific information on the epidemiology of adult ADHD both internationally and in the Kenyan context that continues to be felt as clinicians continue to observe the silent blind spot towards remission of other psychiatric conditions, medical diseases, and the general overall functionality of individuals which is curtailed by undiagnosed and untreated adult ADHD (R Jenkins, 2015). Not only does this condition affect treatment and care of these conditions, it also has implications on the general life of the individual (Lins, 2015).

The challenges of higher learning are realities for most individuals. Training in the profession of medicine is one of the most difficult placing intense demands on the individual's capacity cutting across from intelligence, resilience and executive functionality. These difficulties become more pronounced when the individual in question has sub-optimal executive function (Dorr & Armstrong, 2019). To this effect, it can be almost correctly assumed that individuals with neurodevelopmental disorder would be a rare sight in institutions of higher learning and even so they would face more challenges than the neuro-typical counterparts. It would be even harder to have these individuals pursing a course of medicine which only picks those at the top tier of academia in the lower levels of education. This study sought to fill these scientific gaps by questioning this traditional mindset that symptom

[1] Paucity- the presence of something in only small or insufficient quantities or amounts. "a paucity of information".

manifestation of ADHD and functional requirements of a rigorous training program would be mutually exclusive.

Most similar studies done to assess the prevalence of ADHD in university students only covered this aspect and set aside the exploration of psychosocial difficulties associated with the condition and the impact on the quality of life. This study followed up on this. It sought to not only looking at the prevalence and presence of ADHD but also its relationship to depression and anxiety comparing the findings with students who self-reported no signs of ADHD.

CHAPTER TWO: LITERATURE REVIEW

2.1 Prevalence of ADHD

2.1.1 Global Trends

Findings from a global systemic study on prevalence of symptomatic adult ADHD regardless of the age of onset found the figures to stand at 6.76% (P. Song, 2021). In a 2016 study by Fayyad et al, adult ADHD was found to have a worldwide prevalence rate of 2.8% (Fayyad., 2017). In an earlier study conducted by Fayyad et al. in 2007, an estimated prevalence range of 3.4%- 1.2 % among the economically developing nations and 7.3% -3.1% the high-income economies was found. This study looked into countries in the Americas, Middle East, and Europe (Fayyad, Graaf, & Kessler, 2007). Later studies correspond to these findings with the figures ranging between 3-5% (Matte et al., 2015) (Barkley, 2008). Findings from a meta-analysis of 175 worldwide ADHD prevalence studies found the rate of prevalence globally stands at an estimated 7.2 % among children, with the average estimated to be at 5 % (K. Sayal, 2018). The estimated prevalence rate has been gradually increasing over time regardless of ADHD being grossly under-recognized and underdiagnosed in many countries Kenya being one of them (W. Chung, 2019).

In the USA the prevalence and incidence rates vary. According to a study by Kessler et al in 2006 the rates stood at 5.4% in men versus 3.2% for women (Kessler, 2006). In UK and Canada, the figures stand at 3%. In Asia, the Middle East, North and South America, and Europe the mean prevalence is approximately 2.8% (Fayyad J. S.-G.-H.-M., 2017). France, Australia, and Lebanon stand at 7.3%, 1.1%, and 1.8% respectively (N. Alrahili, 2019). By specific regions of Asia, the prevalence of adult ADHD in China is 1.8%, (J. Fayyad, 2017).

However, even with these figures, the exact prevalence rate is quite elusive due to several variables which include and are not limited to: varying definitions of adult ADHD across various works of research (B. Franke, 2018), differences in the diagnostic title of the condition, population, and environmental and cultural differences which result in variations in the presentation as well as interpretations of experiences as symptoms of ADHD (Skounti, Philalithis, & Galanakis, 2007). In addition to these limitations, for adult ADHD, there is a reliance on self-evaluation and description of the presence of ADHD symptoms in childhood. This reliance on memory can also provide inaccurate data. Consequently, changes in the prevalence of adult ADHD remain uncertain with the limitations in research (M. Vos, 2022).

With the limited information on adult ADHD, there is an increased possibility that many people are undergoing ADHD-related difficulties without insight in their condition. On the other hand, others may be obtaining a false positive read attributed to the similarities in symptoms of ADHD and other conditions such as bipolar mood disorder. At the end of the day, the main question is: Is adult ADHD under recognized following limited scientific understanding of this phenomenon or is it the variations in cultural interpretations of symptoms?

2.1.2 Trends in African Continent

In 2015, a triangulated study conducted in South Africa found 3% -5% prevalence rate among adults of the age ranging 20-50 years. The population prevalence stood at 1.09% whereas in clinical psychiatric settings 52.5% whereby 13.68% were new diagnosis (Schoeman R. , A funding model proposal for private health insurance for adult ADHD in South African context, 2017). An epidemiological survey on adult ADHD in Nigeria fount the population prevalence to be 12.2% (AS Okhakhume, 2014).

However, most studies on the population prevalence in Africa are conducted for children and adolescence. However some works have been done on specific population groups to explore this phenomenon. Case in point is the study done in Egypt to explore the relationship between substance use disorders and ADHD whose outcome portrayed positive co-relation between substance abuse disorders and ADHD with prevalence outcomes of 17.6% (S.Effat, 2022).A similar study conducted in South Africa found the prevalence to stand at 36.6% with only 14.6% being diagnosed before admission and 68.5% having no ADHD diagnosis yet but with symptoms of the condition (C. Coetzee, 2020).

A web-based cross-sectional study was conducted among medical students in Cameroon proposing that ADHD may be a highly prevalent mental disorder among medical students. A high association was found between ADHD and severe depression, anxiety disorders, and chronic diseases (Njuwa, 2020).

2.1.3 Adult ADHD Trends in Kenya

A household survey of Adult ADHD conducted by Jenkins et al found the overall prevalence based on the Adult ADHD Self-Report Scale v1.1 to be 13.1% (R Jenkins, 2015). Atwoli et al., 2010 in their study at Moi University found a prevalence of 23.7% among medical students with 8.7% meeting the DSM-IV criterion for a diagnosis (L. Atwoli, 2010). They posed the possibility of a higher prevalence rate among developing countries. This possibility has been further propagated by studies done by Eisenberg who points out that ADHD symptoms may have evolutionary supremacy in nomadic tribes (Eisenberg & Campbell, 2011).

Findings from the household survey did not find differences in gender presentation and education level. However, the figures were higher among the self-employed as well as those with higher assets (R Jenkins, 2015). This withstanding there is very limited scientific information on adult ADHD in the Kenyan context and the larger region of Africa. To this effect, this study seeks to help increase the body of knowledge on this subject matter.

2.1.4 General Prevalence Dynamics

Globally, prevalence rate of adult ADHD has been found to be significantly lower than that of children and adolescents; with an increased decline of presentation as age increases (Asherson & Agnew-Blais, 2019). Interestingly, in the USA adult diagnosis is increasing at the rate of four times that of children (W. Chung, 2019). This withstanding, many researchers and practitioners agree that adult ADHD is often underdiagnosed, unrecognized, and mislabeled as other psychiatric conditions, personality defects, or completely missed due to the diagnostic criterion in the DSM IV and V (Geffen & Forster, 2018).

Variability in individual development and other prognosticating factors such as sex, socio-economic factors influence the course and outcome of the condition (Hechtman, 2017). ADHD in adults is more common among males with a ratio of one point six males to one female. Females are observed to present with an inattentive type of ADHD therefore this could explain the reason behind their under-diagnosis (American Psychiatric Association, 2013). This particular phenomenon and alternation in presentation results in a big research gap in understanding the true outcome and course of ADHD (Ramos-Quiroga, 2014).

2.2 Prevalence of Depression

2.2.1 Global trends

According to World Health Organization, depression has been found to be the greatest contributor to global disability. It affects approximately 322 million people, 3.8% of the global population. This figures are distributed to impact 5% of the adult population; 5.7% of geriatric population (WHO, 2023) In 2014, WHO had predicted that by the year 2020 depression would be the leading cause of disability world-wide. This prediction was further heightened into becoming the reality following the COVID 19 pandemic with a 25% increase in the prevalence rates globally. In a study done by the Lancet, the condition was found to affect an estimated 49.4 million people after adjusting for the impacts of COVID 19. It was estimated that an added population of 10.7 million people developed depression in the course of the pandemic period (Collaborators C. 1., 2021).

According to the CDC, 1 in 5 adults in the US have a diagnosis of depression, with 18.4% having ever had a diagnosis in the course of their life (B. Lee, 2020). In a study exploring the epidemiology of depression among 27 countries in Europe, the overall prevalence was 6.38%. The highest prevalence of 10.33% was Iceland with the lowest- Czech having a prevalence of 2.58% (J.A. Torre, 2021). The Australian Mental Health Survey covering on both New Zealand and Australia reported a prevalence of 4.6% (Statistics, 2020-2021). In United Arab Emirates the prevalence of depression varies between 12.5% to 28.6% (H.A. Razzak, 2019). In the Middle East it is estimated that 30% experience depressive episodes with the numbers being higher in Iraq, Tunisia and Palestine (Barometer, 2020). 86 million people within the South Asia region are living with depression according to a WHO report, marking it the region with the highest depression population. This withstanding states within Asia

such as Bangladesh, Maldives, Bhutan, Sri Lanka and Indonesia have consequently made mental health a national priority resulting in policies that are geared towards fostering mental wellness (WHO, Talk about depression, strngthen depression related services:WHO, 2017).

Depression being one of the most common mental health challenges in the current times has been studied extensively across multiple comorbidities, populations and circumstances. With this being the position, there has been mixed evidence pertaining the alternations in the population prevalence over different periods of time. Recent findings have been highlighting the increase in prevalence of depression among the general population. These outcomes however may have other explanations away from it being the change in epidemiology over time. It may be a consequence of better understanding, diagnostic methodology, treatment interventions and awareness on the subject. The variance in the population group under study, differences in depression operationalization and definition, reporting estimates- (by the lifetime experience of depression or having experienced the condition over a spell of 12 months, 1 month prevalence), study methods including the tools used, cultural definitions of terms may result in differences of prevalence rates (D Moreno-Agostino, 2021). Findings from works by Moreno et al exploring this found that indeed there has been significant increase in the prevalence and incidence of depressive disorders that can be attributed to several factors. These includes the pressures of modernization, new technological advancements and changes in the way of life. On the other hand, there has been increasingly better mechanisms of ascertaining depression rates, increased help-seeking behavior with the increased awareness about this condition as well as increase vigilance of healthcare providers towards the identification, diagnosis and treatment of depression over time (D Moreno-Agostino, 2021). All these factors generate hope

in mitigating the implication of this major mental health problem that impacts a huge section of the world's population.

2.2.2 Trends across Africa

Despite disorders of affect being common in Sub-Saharan Africa, they often go unrecognized, undiagnosed and untreated. In the same breath, there is increased paucity of prevalence data on depression. The few studies that have shared some reports on this bear methodological inconsistencies, variability across the countries or point prevalence that would not help inform on the larger population. This then generates difficulty in synthesizing and harmonizing the data across studies to have a collective picture of the situation (O. Esan, 2016) (I T Gbadamosi, 2022).

Nevertheless, from the prevalence reports of the countries that have been able to produce data the ranges stands between 3.5% and 4.9%. The country with the least report being Chad and that with the highest is Cape Verde (WHO, Depression and other common mentla health disorder global estimates, 2015). 9% of the 322 million people who struggle with depression are found in Africa with over 3.9% of the total global population in Nigeria alone. South Africa reports 4.6 % of their population to have experienced depression at some point in their lifetime (I T Gbadamosi, 2022). DRC bears 2.9 million cases of depression.

The rates reported for the general population in Uganda were found to be 29.3% (E Kinyanda, 2011). Ethiopia depending on the population under study reported a prevalence range between 11% and 38% (Bitew, 2014). It is one of the countries with the highest levels of depression case accounting for 4.5 million people in SSA (Duko, 2018).

Several risk factors have been established as determinants towards depression in SSA such as conflicts and political instability, HIV/AIDs, complications arising from poverty, maternal health and postpartum complications, physiological illnesses such as cardiovascular diseases, substance abuse, crime and ageing (I T Gbadamosi, 2022). With this, Africa represents 5.4% of the global burden of depression according to a recent WHO report (I T Gbadamosi, 2022).

This withstanding, data established does not provide a proper estimation of the situation in SSA. This is due to the fact that majority of the population remain undiagnosed with their symptoms being misattributed. Only those with severe manifestations and/or comorbidities report to the health care systems for help. Some of the measures of assessments are not very cultural sensitive therefore the outcome may misrepresent the actual figures. To this effect, standardization of these tools should be put into consideration to best help serve diverse cultural populations as present in this region.

2.2.3 Depressive disorder trends in Kenya

A WHO report of 2017 ranked Kenya as the fifth leading country in Africa with depression cases. The global statistics of Kenya stand at an estimated two million people (P Memiah, 2022). This withstanding there are still numerous cases that remain under-detected therefore under or untreated. These trends have escalated significantly over time with one in four people reported to have experienced mental health difficulties in their lifetime. In addition to these figures, the suicide rates in Kenya stand at 6.5 per 100 000 according to the World population Review report (Misogo, 2021). Many studies have been done in Kenya on depression focusing on various populations of interest such as PLWH, the youth, cancer patients, patients with physiological illnesses like diabetes and cardiac conditions in an attempt to

understand further this significant mental health burden and its relationship to other physiological and public health concern.

This withstanding, there are major mental health gaps such as funding for individuals to obtain proper interventions and treatment due to the paucity of data and statistical evidence. Consequently the infrastructure necessary to facilitate both care remain under equipped, underfunded and poorly staffed. The national health budget allocation to mental health was 0.01% as at 2020. According to the Mental Health Taskforce of 2020, stigma and poor mental health literacy also pose a big risk factor towards help seeking for those who are undergoing any form of mental health challenge. With this therefore, individuals struggling with depressive episodes are more likely to then suffer in silence than attempt to get help (Ministry of Health, 2020).

In an attempt to navigate these challenges the Kenya Mental Health Policy (2015-2030) was formed to provide guidelines towards nationwide mental health reforms. The main aim is to facilitate promotive, preventative and curative/rehabilitative interventions through comprehensive and integrated healthcare and wellness across all levels (P Memiah, 2022).

2.2.4 General prevalence dynamics

Depression can affect individuals across all age groups. Studies have found that prevalence and onset of depression begin and rise significantly in adolescence with it occurring more in girls than boys (Nolen-Hoeksema, 2001) (D M Sloan, 2006) (American Psychiatric Association, 2013). The earlier the onset of pubertal changes in females the higher the risk of experiencing depression. However this is also dependent on other variables such as history of anxiety, familial history of depression

and anxiety as well as the familial environment including and not limited to the parent rearing behaviors, socio-economic states. Individuals with a family history of depressive illness have a 3 to 5 times likelihood of developing depression (M M Weissman, 2006). A history of having a diagnosis of depression increases likelihood of having another depressive episode by approximately 70 % (CJ Funkhouser, 2021).

Females are twice as likely to develop depressive illnesses with a lifetime prevalence of approximately 21% in women while an estimates 12% for men (Kessler R. , 2003). Studies have found that genetic vulnerability, biological difference and environmental variables to explain these gender differences in prevalence rates. Females have higher likelihood to experience more and significantly more severe life events. Researchers have found that sex hormones affect neurochemistry that inform on the affective and mood states. The specific variables that inform this phenomenon have yet to be explored.

In addition to this, the changes in mood that impact some females during phases of hormonal changes such as during childbirth and menopause have not been linked to be a direct consequence of hormonal changes of mood and these episodes do not in any way explain the disparities in women in their lifetime prevalence statistics (Nolen-Hoeksema, 2001) (D M Sloan, 2006).

2.3 Prevalence of Anxiety Disorder

2.3.1 Global trends

1 in 8 people globally live with a mental health conditions with depression and anxiety being the most common. Coming closely second to depression, anxiety affects an estimated 301 million people inclusive of 58 million teens and children (WHO, Mental Disorders, 2022). This translates to an estimated 4.05% of the world

population. The prevalence reports amid and post the COVID 19 pandemic were higher than previous reports before the outbreak with the rates increasing gradually as well as the disability adjusted life years (DALYs) according to a study done on 204 countries (S.F Javid, 2023). According to the WHO, with the COVID 19 pandemic, the there was a sharp increase of 25 % in the prevalence of anxiety globally (Collaborators C. 1., 2021). A study done by Lancet found that after adjustment for impact of the pandemic an estimated 374 people in the world were living with some form of anxiety with 76.2 million having developed anxiety resulting from COVID 19 (Collaborators C. 1., 2021).

The highest rates of anxiety are reported to be among high economically developed parts of North America and Western Europe as well as Latin America and the Caribbean areas. On the other hand the lowest ranking regions were South Asia and Sub Saharan Africa. That withstanding the countries with the highest burden were (in descending order): China, India, US, Brazil and Indonesia (S.F Javid, 2023). A report by Statistica indicated that 28% of adults in the US reported symptoms of anxiety in mid-2023. A household survey done in 2019 found 8.1% adults had some levels of anxiety (Statistica, 2023). In 2018, anxiety was noted as the most common mental health condition affecting approximately 5.4% of the population in Europe (2018, 2018). In South Asia, despite lower prevalence rates, the territories with high prevalence were: Bangladesh (52.3%), Pakistan (50.4%), Nepal (49.6%) and India (34.7%) . Anxiety as reported by healthcare facilities and service providers stood at 43.6% while the general population had 40.7% in a study done in 2021 (M.M. Hossain, 2021).

2.3.2 Trends across Africa

In the African setting, there is limited information on their prevalence and incidence studies of mental health conditions. This statements holds true for both health care informed data collection and national surveys. To this effect especially those territories with less developed medical infrastructure remain grossly underrepresented and understudied. Nevertheless, she has continued to draw concern due to her increasing burden of mental health difficulties with the most attention being to the child and adolescent population. With this grim reality coupled by other bottlenecks towards the access to mental health care, WHO has worked closely with several countries including, Ethiopia, Kenya and Ghana towards bridging this gap.

A study exploring the general population in Africa during the 2019 pandemic, shed significant information in this region. The western region of Africa had a prevalence rate of 47% which is relatively lower to other regions within the continent. The lowest prevalence was found in middle Africa (42%) with East Africa having the highest level of anxiety (49%) (UM Bello, 2022). Pre-COVID, Africa had one of the lowest prevalence of anxiety (5.3%) compared to other continents. However, with the pandemic this numbers have drastically changed with a world global health burden of illness standing at 3.2% (IT Gdabamosi, 2022).

In South Africa, the rates of mental illness double those of Brazil with both the 12 month and life time reported anxiety being the highest. In Egypt, the prevalence of anxiety following findings from a national survey was 6.43% (M. Ghanem, 2009).

2.3.3 Trends of anxiety disorders in Kenya

Majority of the studies conducted in Kenya to explored anxiety disorders are conducted among homogenous sub groups of populations in urban centers whereby the participants commonly would have co-occurring conditions cutting across from psychiatric to physiological.

In a school survey conducted in Kenya it was found that 12.9% of the students experienced anxiety with more than 75% having fear of being harmed and social anxiety (N., 2018). This can be explained in this population group due to the incidences of bullying that were observed within those schools at the time. 85% of children and adolescents were found to experience generalized anxiety attributed to among other things the fear of failure (D. M. Ndetei, 2011).

In the adult population, anxiety disorders are found misattributed and presented to general hospital facilities as physiological ailments. Several studies have been conducted on anxiety associated to other chronic physical conditions such as cancer, HIV and diabetes. The severity of the anxiety was associated to the chronic aspects of the medical condition. A meta-analysis of prevalence rates of anxiety disorders in Kenya from 2000-2018 showed prevalence of 25.12% (p=0.95) (Ministry of Health, 2020).This figure has since changed with the multi-dimensional developments as well the implications of COVID 19 on the population. A community survey from the taskforce on mental health reported that 15.7% of 420 people presented with some form of anxiety disorder (Ministry of Health, 2020). Among patients in Mathari hospital, generalized anxiety disorder is the fourth leading conditions at 20.8% (A., 2008).

In spite of the high reported prevalence in many sub-groups and regional studies, a general population study on the prevalence of anxiety is yet to be established for Kenya.

2.3.4 General prevalence dynamics

Majority of the anxiety disorders occur commonly among females than men with the lifetime prevalence being 6.6% and 3.6% respectively in generalized anxiety disorder (GAD) (Mohammad Reza Mohammadi, 2020). Individuals with externalized symptomatology of psychological conditions such as substance abuse or kin relations struggling with anxious distress may have an increased likelihood of having an anxiety disorder such as GAD (P Wu, 2010).

2.4 The lifespan

2.4.1 ADHD across the Lifespan

The traditional viewpoint required that for an adult to meet the diagnostic criterion they would fall in the 99^{th} percentile whereas in other conditions a 93^{rd} percentile presentation of symptoms can suffice for a diagnosis (Hechtman, 2017). This diagnostic rule largely affected the understanding of ADHD as a neurodevelopmental disorder that cuts across the lifetime. To remedy this error, the DSM 5 changes facilitated the recognition of adult ADHD by lowering the symptom criterion from six out of nine to five out of nine for individuals above 17 years of age (American Psychiatric Association, 2013). Nevertheless, it is worth emphasizing that in some cases children with a diagnosis of ADHD hit complete remission with unimpaired functionality synonymous to a neuro-typical. This would then suggest that particular individuals do in fact outgrow ADHD (Hechtman, 2017).

In young adults, it has been observed that the intensity of hyperactivity previously experienced in childhood significantly decreases with an increase in internal presentation of symptoms characterized by inattention, inner restlessness, and emotional dysregulation. Impulsivity may continue to be present and problematic through adult life (American Psychiatric Association, 2013) (Hechtman, 2017).

Among the elderly population, ADHD has been implicated in susceptibility to increased cognitive function impairments (Maja Dobrosavljevic, 2020). Traditionally regarded as a childhood disorder, early diagnosis occurs from a referral from teachers and parents who note and report hyperactive and impulsive (disruptive behavior). This would be more commonly placed among males. It is also worth noting that the symptoms would be significantly severe to attract this attention in the local Kenyan setting. Females on the other hand receive a late diagnosis as they experience internalized symptoms and patterns of inattention (American Psychiatric Association, 2013). This subjects females to be more prone to mood-related complications as well as the development of low self-esteem (Barkley, 2008).

ADHD affects the executive function of the brain resulting in its classical neuropsychological symptoms. These include deficiencies in inhibition, emotional regulation, memory, attention (both focused and sustained) decision making, self-evaluation, and motivation (Hechtman, 2017).The disruptive nature of the symptomatology of ADHD across the lifespan results in significant emotional distress (Pallanti & Salerno, 2020). Some of the great risk factors that have been attributed to undiagnosed ADHD into adult life include and are not limited to vulnerability to comorbid mental and physical health conditions as well as academic, career, and relational/social underachievement (Harpin, 2005) (Faraone, 2021).

A longitudinal study found the following variables to be predictors of persistence of ADHD into adulthood: comorbidities presenting with disruptive mood and anxiety conditions, familial genetic history of ADHD, personality such as the IQ, aggressive tendencies, social parameters cutting across from school and home(parenting practices, parental stability, the socio economic situation, parental mental health) and having undergone psychosocial adverse events (M. Uchida, 2017) (Hechtman, 2017). On the other hand, less severe presentations and high IQ in childhood often serve as predictors of better outcomes. (Hechtman, 2017).

It is worth noting that functional difficulties often co-evolve over the course of life with the changes that occur through the phases. In children, behavioral problems tend to be the biggest challenge in functionality. During adolescence stage, academic and self-esteem problems begin to develop with some cognitive function challenges that tend to persist through other phases of development. With significant effort some however are able to navigate through the demands placed on them at this phase. The major persisting functional impairment then evolves into social situation both socially and in work/professional situations with the self-esteem issues persisting into early adulthood (B. Franke, 2018) (Hechtman, 2017).

2.4.2 Anxiety and Depression across the lifespan

Depression and anxiety have the capability to impact and affect an individual at any phase/age in the course of their life. Both of these conditions have their onset at the critical phases of development- childhood, adolescence and early adulthood. A census household pulse survey done in the US found that an estimated 50% of 18–24-year-old people experienced symptoms of anxiety and depression (Nirmita Panchal, 2023). These findings only emphasize and illustrate the point that young adults have a higher likelihood to experience mental health challenges than adults in other age brackets.

Anxiety disorders are known to have an early age of onset depending on the specific disorder. Separation anxiety, social phobias and specific phobias have an earlier presentation- before 15 years. Other anxiety disorders have a mean age of onset of 30 years (Lijster JM de, 2017). There is no variations across the genders in regards to the onset of anxiety symptoms. This withstanding, the overreliance on recall from the individual as to when they first noted symptom patterns generates in itself a limitation to the actual onset. Early onset is associated with higher severity, increased likelihood for comorbidity, increased behaviors that sustain avoidance and higher rates of suicidality (Tibi L, 2013).

With the overlap of symptom patterns between depression/mood disorders and anxiety ascertaining the age of onset as well as the implications especially when they co-occur becomes difficult. That withstanding, 85% of adolescents who later develop depressive illnesses have a childhood history of an anxiety disorder. A study done by Gaber also found that with proper treatment of anxiety in childhood decreases the possibility of development of a depressive illness in teenage years. These negative emotional states propagate possibility of further mental health difficulty in adulthood (J. Garber, 2011). Signs of depression vary form one person to another especially considering their age group. 20% of children and teenagers experience a lifetime of depression before with onset before adulthood. However, 30% -50 % of these cases remain unrecognized when presented to general physicians. With this then the condition stands a higher chance of persistence or re-occurring if the symptoms dissipate (V Bansal, 2009).

In children, signs of depression may occur with anxious distress which is commonly accompanied by somatic features. In early adulthood, the symptoms of depression are at their highest declining over time into mid adulthood. In older adult population there is then a sharp increase in symptoms of depression again accompanied by somatization (Angelina R. Sutin & Yang An, 2013).

Depression and anxiety among the youth is associated with several adverse outcome which include and are not limited to possibility of recurrence, protracted impairments in academia, occupational accomplishments, interpersonal relations as well as vulnerability to develop other mental health difficulties (A. Thapar, 2022). Where the two conditions are comorbid, the prognosis is worse with increased rates of relapse, treatment-resistance, greater impairment increased suicide risk and lower quality of life (A. Thapar, 2022).

2.5 Quality of Life

2.5.1 Impact of ADHD on the Quality of Life

By virtue of the chronicity of neurodevelopmental disorders, they are often associated with poorer life outcomes cutting across from personal, social, professional, cognitive, physical, and emotional/psychological aspects of living. This impacts not only the quality of life of the individual but also their families (Schoeman & Klerk, 2017).

Despite the reports that relay some adaptive traits in the ADHD symptomatology such as hyper-focus, the detrimental implications of a late diagnosis of adult ADHD are far-stretching. Late diagnosis increases the chance of developmental masking strategies to mitigate the impact or to explain the core symptoms the individual struggles with. These masking strategies tend to result in other physiological and psychiatric conditions such as obesity, substance use, and mood and anxiety disorders

(Katzman, Bilkey, Chokka, Fallu, & Klassen, 2017) (W. Chung, 2019). ADHD is associated with academic challenges. Therefore, the individual is likely to need additional support, retaking tests and classes, extra tuition, and indiscipline issues that may result in suspension, expulsion, and dropout. In children, low self-esteem may place them vulnerable to peer pressure and influence. This coupled with an inability to regulate inhibition and impulses may result in the introduction of risky behavior such as early experiences in sexual activity, substance use and self harm with high risk for suicidality. In college, they may graduate with lower points or fail altogether. Some experience transferring from course to course due to boredom, failure and frustration with intense mental demands being placed beyond their capabilities. In adulthood, disorganization and poor self-regulation may impact professional and social life. Adult ADHD is associated with more road accidents, hospital visits, divorce and separation, incarceration, and lower life expectancy (Hechtman, 2017) (Katzman, Bilkey, Chokka, Fallu, & Klassen, 2017). As a result of all the difficulties faced by adults with ADHD throughout their lives, they tend to experience a lower life satisfaction in juxtaposition to people who do not experience ADHD.

2.5.2 Impact of Depression and Anxiety on Quality of life

Few studies have been done on examining the implications of the symptoms of anxiety and depression on the quality of life without including other conditions. It goes without saying that the more severe the symptom manifestation the lower the quality of life one has. This in itself become an infinity circle wherein the lower the quality of life the higher the severity of symptoms as well decreased likelihood for remission further causing lower quality of life (H. Jia, 2017).

Some of the implications of depression and anxiety are quite intangible and immeasurable by both clinicians and those affect by it. These conditions have increasingly insidious implications that cut across all areas of ones well-being such as sleep and feeding patterns, mental and physical health, self-concept and self-perception, interpersonal engagements, academia and professionally. Consequently causing disruptions in meeting daily demands, familial and martial expectations, employment and academic obligations, low living standards to the extremities of homelessness which is not only costly to the directly affected individual but also to their family, caregivers and other stakeholders (C. Thomas, 2003).

Individuals undergoing anxiety tend to develop avoidant behavior as they perceive neutral stimulus as threatening. This then makes it difficult for them to engage with new experiences as well as have an irrationally high level of fear associated to even familiar situations. Among some individuals subtle avoidance tendencies develop in the form of safety behaviors. This phenomenon is fed by both the irrational fear of stimuli but also anxiety sensitivity. The fear of experiencing physiological symptoms with the belief that it would affect the individual adversely is linked to heightened anxiety sensitivity, disability in the long term and lower tolerance of distress (M. T. Wilmer, 2021).Recent studies have shown that higher distress tolerance is associated positively with lower symptomatology therefore higher quality of life (P L Rosencrans, 2017).

Courtesy to the lack of interest and low motivation associated with depression, compounded with the sense of chronic fatigue, depression is linked to high absenteeism at work and loss of productive hours affecting the output of the individual. In some cases the individual would lose their job. Even in the most supportive of organizations, there is increased worry of stigma and feelings of

inadequacy by the individual affecting their general interpersonal and intrapersonal relations at the workplace (Alliance).

Away from the direct symptom implications on the quality of life, the general subjective perception of the person's quality of life, their self-efficacy and self-esteem has been found to be significantly high even during remission (Y Cho, 2019). Deficits in processing of emotions such as elevated negative emotional states which are the hallmark components of anxious and depressive illnesses affect the quality of life. The higher the negative affect before treatment, the more difficult it is for them to benefit from Cognitive Behavioral Therapies effectively (M. T. Wilmer, 2021). The presentation of depression in later life is linked to greater susceptibility to mortality and morbidity, cognitive alterations, somatization and passive to active inclinations of suicidal ideation. (Y Cho, 2019).

Research has confirmed that with proper treatment and symptom reduction/amelioration of symptoms there is marked improvements in the quality of life not only for the individual but also for all stakeholder such as spouses and caregivers (WW IsHak, 2015).

2.6 Link between ADHD and Mood Difficulties

About 80% of adult ADHD cases present with at least one psychiatric comorbidity. This comorbidity includes and is not limited to: other neurodevelopmental conditions, mood and anxiety disorders, substance use disorders, personality disorders, and psychotic disorders. (Katzman, Bilkey, Chokka, Fallu, & Klassen, 2017). The National Comorbidity Survey conducted in 2006 in the USA found three times the likelihood of adults with ADHD developing a major depressive disorder, six times the likelihood to develop dysthymia, and four times of developing other mood-

related conditions. (Kessler, 2006). Approximately 20-30 % of adults living with ADHD experience mood lability both externally triggered and autonomous. This presents a significant predisposing factor in mood difficulties and comorbidities. In fact, to a large extent, this tends to not only influence mood patterns but also drive and aggravate the traditional ADHD symptomatology of inattentiveness, hyperactivity, and impulsivity (Steinberg & Drabick, 2015). The nature of its symptoms and by extension the accompanying functional limitations generate a clear association between ADHD and mood symptoms (Mohamed, 2021) For example, the executive function deficits tied to organization and motivation have been linked to low daily life function and academic underachievement which in turn results in mood difficulties such as the development of depressive and anxiety states (Dorr & Armstrong, 2019).

A study conducted by Mohammed et al. among undergraduate students at the University of Groningen, 2020 found an increased presentation of mood symptoms among this cohort. These findings were related to the daily functional impairment and executive function difficulties that arise from coping with elevated severity of ADHD symptomatology heightened by the environmental context of university life. He further elucidates that the psychological implications of adjustment to university life with all the various changes in the role can in itself precipitate or aggravate ADHD-type symptoms such as low concentration and impulsivity (Mohamed, 2021).

Scientists have agreed that in different forms sheltered structure that exists both at home and in lower levels of studies provide insulation for the presentation of ADHD symptoms. This means that those with mild to moderate symptoms would portray sub syndromatic presentation and even then with many of their challenges appearing to be within manageable range. In institutions of higher learning individuals are placed in generally less structured and more mentally strenuous contexts thus placing

significant levels of burden on students with ADHD (Weyandt, 2017). This observation is typical of neurodevelopmental disorders that by definition on the DSM V are highly dependent on severity and the extent to which environmental demands are placed on the individual's capacity (American Psychiatric Association, 2013). With the more demands being placed on the person, the higher for the development of mood and anxiety conditions. The complexity of this is that as the emotional difficulties emerge then they further aggravate the ADHD symptoms making them more pronounced and harder to manage (B. Franke, 2018).

2.7. The Medical Student

The age ranging between18-24 are also linked to higher vulnerability of mental health challenges with it being the average onset of several disorders (American Psychiatric Association, 2013). Therefore, the overall concern over the psychological wellbeing among students in tertiary institutions in the recent past has been in the gradual increase. There have been high numbers of mental health distress among this population group juxtaposed to people in other environments. Precipitating and perpetuating factors informing this situation include: the adjustments resulting from the changes into university life, culture shock, loss of structured environment enjoyed from the comforts of home, limited social support, academic expectations especially when one did was not as interested in the field under study and financial stressors (B.A. Dachew, 2019) (Ct Sreeramareddy, 2007). Many students, however; due to various reasons including the fear of stigma, limitations of time, finances, will or support; do not seek help rather attempt to manage on their own. This eventually compounds their distress, opening vulnerability to further adverse situations (JJ Sijsema, 2014) (P Limone, 2022).

The student pursuing medicine experiences are very uniquely different to the other students pursuing other fields of study. The medical student is expected to be intelligent, highly motivated, emotionally stable, resilient and dependable. They are perceived to be able to exercise restraint in emotion both in terms of their subjective feelings and objective behavior with mannerisms. To this effect both subjectively and in interactions with others, affective reactions are regarded mutually exclusive to a medical student. All these qualities are to help them navigate the arduous curriculum in training and the responsibilities that follow post graduating as a medical doctor.

With more rigorous schedules and high numbers of clinical practice resulting in many hours spent with their course facilitators and fellow colleagues which in itself fosters for stronger cohesive bonds and potential for social support. However with the increased numbers of students per year group this becomes a distant and far fetch idea than the reality (F. Mullan, 2010) (W Zeng, 2019).

The main intent of the institution is to help churn out a workforce that would meet the wellbeing of the national and international population. This objective is threatened by mental health problems which are known to persist into adulthood especially when undetected and unmanaged (DS Pine, 1998).

2.7.1 Adult ADHD Trends among University Students Pursuing Medicine

Several studies have been undertaken to evaluate the presence of ADHD among medics, both those in training and practice. This is because of the intensity of delicateness involved in their practice as they serve to protect lives. One study investigating the prevalence of adult ADHD among medical students found 16.5% based on the ASRS and 13.4% from the Wender Reimherr interview (Wilcutt, 2012). Studies assessing the prevalence of adult ADHD among Medical students in the

following institutions found the following figures: Zahedan University of Medical Sciences, Iran, 15.4%, University of Mustansiriya, Iraq, 16.6%, and Hamadan University of Medical Sciences, Iran 16.5%. In Riyadh City, the prevalence rate was found to be 10.9%. These figures give a report that is slightly higher than the worldwide prevalence rate which begs the question of the possibility of the fact that those assessed in lay populous may not adequately understand or they normalize the ADHD symptoms in addition to other factors. This also begs the question of whether the prevalence of adult ADHD is higher than the reported figures (N. Alrahili, 2019).

Findings from Njuwa's study of Cameroonian students found the prevalence to be 24.4% (Njuwa, 2020). In Kenya, a cross-sectional descriptive study was conducted in order to determine the prevalence of self-reported symptoms of ADHD among university students in Eldoret (L. Atwoli, 2010). All students who consented were recruited to take part in the study at Moi University's Town Campus, comprising the Schools of Medicine, Dentistry, and Public Health. Presence of ADHD symptoms as measured by the adult ADHD self-report scale (ASRS versus 1.1). Results showed that the prevalence rate of self-reported ADHD symptoms was 21.8{%}. This was significantly associated with belonging to a younger age group (17-20 years) compared to the older age groups. The prevalence was higher among females (25.2{%}) than among males (18.6{%}). In conclusion, the prevalence rate of ADHD symptoms among university students in Eldoret, Kenya is significantly higher than that reported in other studies (L. Atwoli, 2010).

Works by Njuwa et al found that in spite of having a high prevalence rate within this population group, those with a previous diagnosis of ADHD were 1.2% only. This further emphasized the low rate of diagnosis in the setting. (Njuwa, 2020).This has also been observed in several other similar studies (L. Atwoli, 2010).

2.7.2 Depression and Anxiety Trends among University Students Pursuing Medicine

Several studies have been done to compare the mental wellbeing of medical students to those who are pursuing other career ventures. Research has found higher prevalence rates of depression and anxiety among medical students to the general population (A.A MIrza, 2021). Aside from the many precipitating and perpetuating variables to this situation, recent research has found specific stressors for each year of study affecting the students. For example: first year students were found to struggle with high workload and reduced support both academically and socially. Third year students presented with increased anxiety over their capabilities in relation to the demands and expectations placed on them. Sixth year students on the other hand were found to present with anxiety over limitations in support alongside the reported stressors by the first- and third-year groups (A.A MIrza, 2021).

Effective coping strategies and personality traits such as resilience help serve as protective factors both moderate and reduce the stress as experienced by the students. Those resilient are able to appraise challenges as avenues for self-improvement and growth, utilize resources, and apply personal organization skills and utilize coping mechanisms effectively. (Ra Ramadianto, 2022).

Understanding these variables as well as how different year groups and individuals are affected by the stress of studying medicine can be of immense value to institutions. By ensuring proper policies are introduced, then the students may enjoy better mental health, academic and career success which benefits all stakeholders.

2.8 Theoretical Framework

ADHD is considered a chronic disorder that affects social interactions, and negatively affects the quality of life of affected individuals and their families (Schoeman & de Klerk, 2017). Adults presenting with ADHD in primary care settings often appear disorganized, have chaotic lifestyles and associated psychiatric comorbidities, and may rely on drugs and substance use to cope (Gentile, Atiq, & Gillig, 2006). Possible complications of adult ADHD include poor productivity, poor school performances, employment difficulties, inability to sustain relationships, substance abuse, as well as increased motor vehicle accidents (Njuwa, 2020).

This study employed the use of the Executive Dysfunction Theory of ADHD which was developed by Posner. Executive dysfunction is a term used to explain deficits in "higher-order" cognitive processes, such as planning, sequencing, reasoning, holding attention to a task, working memory, inhibition of inappropriate and selection of appropriate behaviors (Alvarez & Emory, 2006). These supervisory processes control, regulate and manage the "lower-level" cognitive operations, such as language, perception, explicit memory, learning, and action. These functions are largely put to the test in trouble shooting and problem solving of novel challenges to the individual. It helps to modulate and regulate emotions and behavior necessary towards adapting and meeting environmental demands to attain the set goals (J. de la Fuente. J. M. Martinez-Vincente, 2022).

Executive functioning involves the operation of neural circuits that link the frontal cortices with the basal ganglia, thalamus, and parietal cortices. The Executive Dysfunction theory of ADHD suggests that the symptoms of ADHD arise wholly as a result of a reduction in executive control, which is caused by abnormalities in the

structure, function, and biochemical operation of the frontoparietal and front striatal neural networks (Willcutt E. G., 2005).

Early studies in this topic showed clear relation between dysregulatory behavioral patterns and poor learning as well as self-regulatory strategies. Amongst the self-regulatory strategies include emotional regulation. To successfully attain one's goals, emotional regulation becomes a vital skill whether through intrinsic or extrinsic mechanisms. In this proposition, emotional regulation is regarded as a functional process that helps inform on the context and generates adaptive actions to meet the demands within the environment adequately (C. E. Izard, 2000). Inability to exercise adequate self-awareness of one's emotional states and therefore deficits in modulation affect adaptability which has been positively linked to psychopathological manifestations of depressive symptoms. (J. de la Fuente. J. M. Martinez-Vincente, 2022).

Recent research has confirmed emotional dysfunction to be a predictor of poor emotional regulation. In ADHD, the emotional difficulties are pervasive and chronic across the lifespan making it more challenging to recognize, attend and orient oneself to emotionally triggering stimuli (J. de la Fuente. J. M. Martinez-Vincente, 2022). With this then the link between ADHD, depression and anxiety can be linked to the implications of executive function deficits causing poor emotional regulation thereby facilitating predisposition to depression and anxiety.

2.9 Conceptual Framework

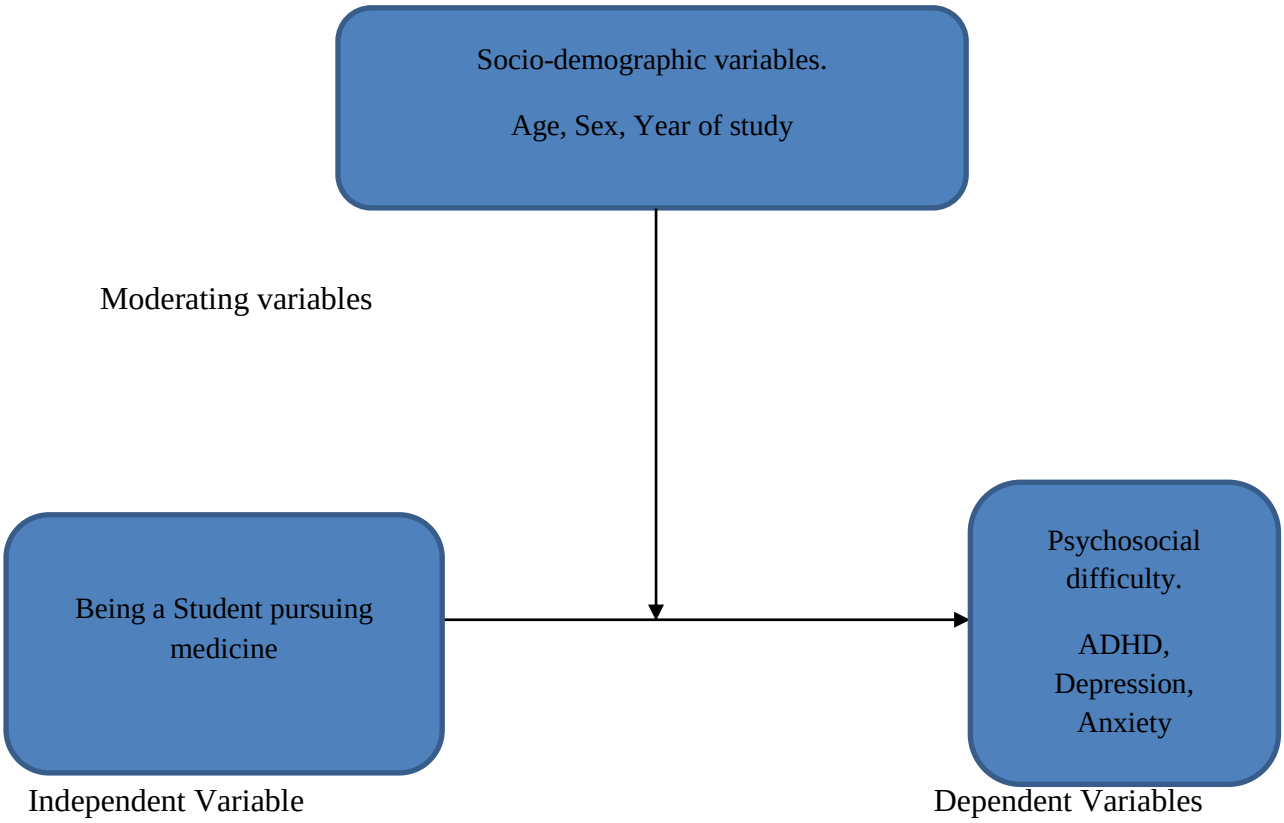

Figure 2.1: Conceptual Framework

2.10 Research Questions

The general question of this study was;

Do the students presenting with depression and anxiety also have underlying ADHD?

Specific questions included;

i. What is the prevalence of ADHD among students pursuing medicine at the University of Nairobi?

ii. What is the prevalence of depression among students pursuing medicine at the University of Nairobi?

iii. What is the prevalence of anxiety among university students pursuing medicine at the University of Nairobi?

iv. What is the prevalence of depression and anxiety among those students who also struggle with ADHD?

2.11 Research Objectives

- **Broad Objective**

To investigate the association between depression, anxiety, and ADHD among medical students at the University of Nairobi.

- **Specific Objectives**

i. To determine the prevalence rate of ADHD among University of Nairobi School of Medicine students.

ii. To determine the prevalence of depression among university students.

iii. To determine the prevalence of anxiety among university students.

iv. To determine the association between ADHD, depression, and anxiety among medical students

2.12 Research Hypothesis

Adult ADHD is associated with adverse psychological well-being and therefore linked to higher levels of depression and anxiety.

2.13 Justification of the Study

There were many scientific controversies and lay stereotypes that surrounded adult ADHD from antiquity to date on the diagnosis, presentation, course, and prognosis of the condition. By scientifically exploring the prevalence of adult ADHD among medical students, an understanding that would help break the stereotype that people with ADHD more often than not have poorer academic portfolios which may result in them not being able to hold such positions in the community can be attained (L. Atwoli, 2010). These findings help in the proper diagnosis, intervention, additional

support, care and management of ADHD to afford them such opportunities in life. It also helps to shed light into the vulnerability of developing depression and anxiety among individuals with ADHD. Depression in particular is linked with high disruptions of life with high risks of morbidity. Therefore, the findings of this study help inform policy on the early detection and treatment of ADHD to serve as a preventive measure for development of further psychological distress.

2.14 Study Significance/Utility

The findings from this study will elucidate the association between adult ADHD and psychological difficulties in an environment that is fundamentally demanding on any individual. To this effect, heightens the need for continuous and additional support for university students more so for those pursuing a career with strenuous demands such as that in the school of medicine. This will not only assist to mitigate their vulnerability to psychological difficulties but also facilitate a structured environment wherein the symptoms can be better managed (Barkley, 2008).

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This was a quantitative survey study aimed at investigating the association between depression, anxiety, and ADHD among medical students at the University of Nairobi. In this chapter, the approach that was applied in undertaking this study is described and presented. We shall explore the study design and process. The population sample and sample size, inclusion, and exclusion criteria is also discussed in addition to data collection instruments, data management, and analysis. The ethical considerations key to ensuring that the study was well conducted is also outlined.

3.2 Study Design

This study employed the use of a cross-sectional study design in which data was collected in the space of two weeks. As a cross-sectional study design looking into the levels of depression, anxiety, and Attention-deficit/hyperactivity disorder (ADHD) among medical students at the University of Nairobi, the sample was assessed for adult ADHD, Depression, and Anxiety. It therefore, not only looked into the levels of the psychological disorders (depression, anxiety, and ADHD) but also generates insights into the prevalence of adult ADHD among the medical students.

3.3 Study Site

The study was conducted at the University of Nairobi School of Medicine (Nairobi campuses). The University of Nairobi is an institution of higher learning which boasts of attracting the most intellectually talented youth both in the country as well as the region. It is ranked in the 801- 1000 range in the world. The University of Nairobi has a rich and lengthy history which begins in the year 1956 to it obtaining its current title in the year 1970. With six colleges and approximately 900-degree programs, it serves

a population of 98,713 total enrolled students in the latest figures. The School of Medicine/ College of Health Sciences is located at the Kenyatta National Hospital (KNH Campus) strategically placed there to access the medical facility.

3.4 Study Population

The target population was medical students at the University of Nairobi (Nairobi campuses). A medical student is defined as a person following a course of study leading to qualification as a doctor of medicine (Collins Dictionary, 2022).Medical students aged 18 years and above who were in session, and willing to give informed consent were recruited for the study.

3.5 Sampling and Recruitment

3.5.1 Sampling Technique

The target population was the present cohort of medical students at the University of Nairobi (Nairobi campuses).

The sample of the students was arrived at using **Yamane's formula**:

Where **n**=the sample size, **N**=is the size of the population, and **e** is the error of 5% points.

$$n = \frac{N}{1+Ne^2} = \frac{1967}{1+1967(0.05)^2} = 332.4039$$

The target sample was 333, however, a total of **335** students took part in this exercise from October 3rd to 22nd October 2022.

Proportional allocation was then used to distribute the sample among the **6 strata** which were the six years of study. The researcher used a **probabilistic sampling technique** where a stratified sample was chosen from the population.

This methodology was considered to be very good for the study because it gives all the members of the population an equal chance of participating in the study. This

technique involves selecting the sample at random from the sample frame. Using proportional allocation the following sample per year of study was obtained;

Table 3.1. Sample per year

Year of study	**Target Population**	**Percentage sample size**	**Sample size**
1st	400	400/1967=20.3%	20.3% of 335 =68
2nd	390	19.8%	19.8% of 335=66
3rd	350	17.8%	17.8% of 335=60
4th	320	16.3%	16.3% of 335=55
5th	237	12.0%	12.0% of 335=40
6th	270	13.7%	13.7% of 335=46
Total	**1967**	**100%**	**335**

Therefore, the sample size was obtained from the 6 strata as follows;

68+66+60+55+40+46= 335

The sample size for the study was **335.**

3.6 Eligibility Criteria

Inclusion criteria

a) Medical students studying at the University of Nairobi (Nairobi campuses) willing to give informed consent.
b) Aged 18 years and above.

Exclusion criteria

a) Students below the age of 18 years.
b) Students not enrolled in the medical courses.
c) Those not willing to consent.

3.7 Study Tools and Instruments

The following assessment tools were employed in undertaking the objectives of this study:

1. A socio-demographic questionnaire
2. The ASRS- v 1.1 (RC Kessler, 2005)
3. The PHQ 9 and GAD 7questionnaire (R Spitzer, 2006) (K Kroenke, 1999)

3.7.1 The socio-demographic questionnaire

The socio-demographic questionnaire was developed by the researcher assessing the age, gender, nationality, year of study of the participants, and whether or not they had an existing psychological condition and a medical condition. There was also a question on how satisfied they felt about their life and the academic course they were pursing, the level of social support they were receiving in the course of their studies.

3.7.2 The ASRS v 1.1

The Adult ADHD Self report Scale was designed by the World Health Organization to screen for adult ADHD. This checklist takes about 5 minutes to complete providing immediate scores. It bears 18 questions developed from the DSM-IV –TR diagnostic criterion. It bears two sub-parts i.e.:

Part A comprises a screener with 6 questions. Questions 1-3 in the screener are range-based response questions. On the other hand, questions, 4-6 require a response based on the frequency of the experiences. Four positive reports would be indicative of ADHD.

Part B of the questionnaire is based on the DSM-IV-TR adult ADHD diagnostic criteria. From this part, additional cues are generated as to the manifestation of symptoms. For this study to have an appropriate estimation of a positive score the full ASRS v. 1.1 was utilized.

3.7.3 The PHQ 9 and GAD 7

The PHQ was developed as a self-administered checklist from the Primary Care Evaluation of Mental Disorders (PRIME-MD) to facilitate the screening and diagnosis of depression and anxiety. These disorders tend to co-occur in many patient presentations forming the SAD (somatization, anxiety, and depression) triad.

The PHQ 9 and GAD 7 bear 2 tools in one assessment form:

- PHQ-9- assesses and monitors for presence and severity of depression.
- The GAD-7- which assesses the presence and severity of Anxiety

The cutoff points applied for the PHQ-9 and GAD 7 were as follows: 0-4 minimal, 5-9- mild, 10-14- moderate symptom patterns, 15-19- moderately severe and 10-27- severe manifestation

3.8 Recruitment Strategy/Procedure

Once the relevant ethical and appropriate clearances had been obtained from KNH-UoN ERC, NACOSTI as well as the necessary departments in the University of Nairobi School Of Medicine, the researcher liaised with the secretaries of the various departments. The lists of the medical students and the contact details of the class representatives were obtained. A systematic sampling technique was used to recruit eligible study participants who were informed about the study through their respective class representatives. After the initial contact was established, they were sent an online link. Within this link was the consent form whereby those who gave consent got access to the study tools incorporating the socio-demographic questionnaire, PHQ

9, GAD 7 and the ASRS v1.1. Those who did not give consent were thanked through an automated response on the link and excused from the study. Recruitment was done during the normal school days and those who met the inclusion criteria were enrolled within the sample frame until a sample size of 335 was achieved. The objective of the study was explained by the researcher as well as the ethical considerations which include and are not limited to the consent form, confidentiality, benefits and risks as well as the right to decline or withdraw at any point during the exercise.

In the online tool, the participants were given the option to get a call back to inform them of their outcome. Those who upon assessment provisionally presented with any or all of these disorders who gave consent for the call back were advised to seek professional assistance. The researcher ensured these participants were taken through the implication of the result.

3.9 Ethical Consideration

Approvals to undertake this study was obtained from the KNH-UoN Ethics and Research Committee and NACOSTI as required. The authorization was also sought from the relevant departments at the University of Nairobi before conducting the study. Study participants who presented with anxiety, depression, or ADHD were referred for psychological counseling upon consenting.

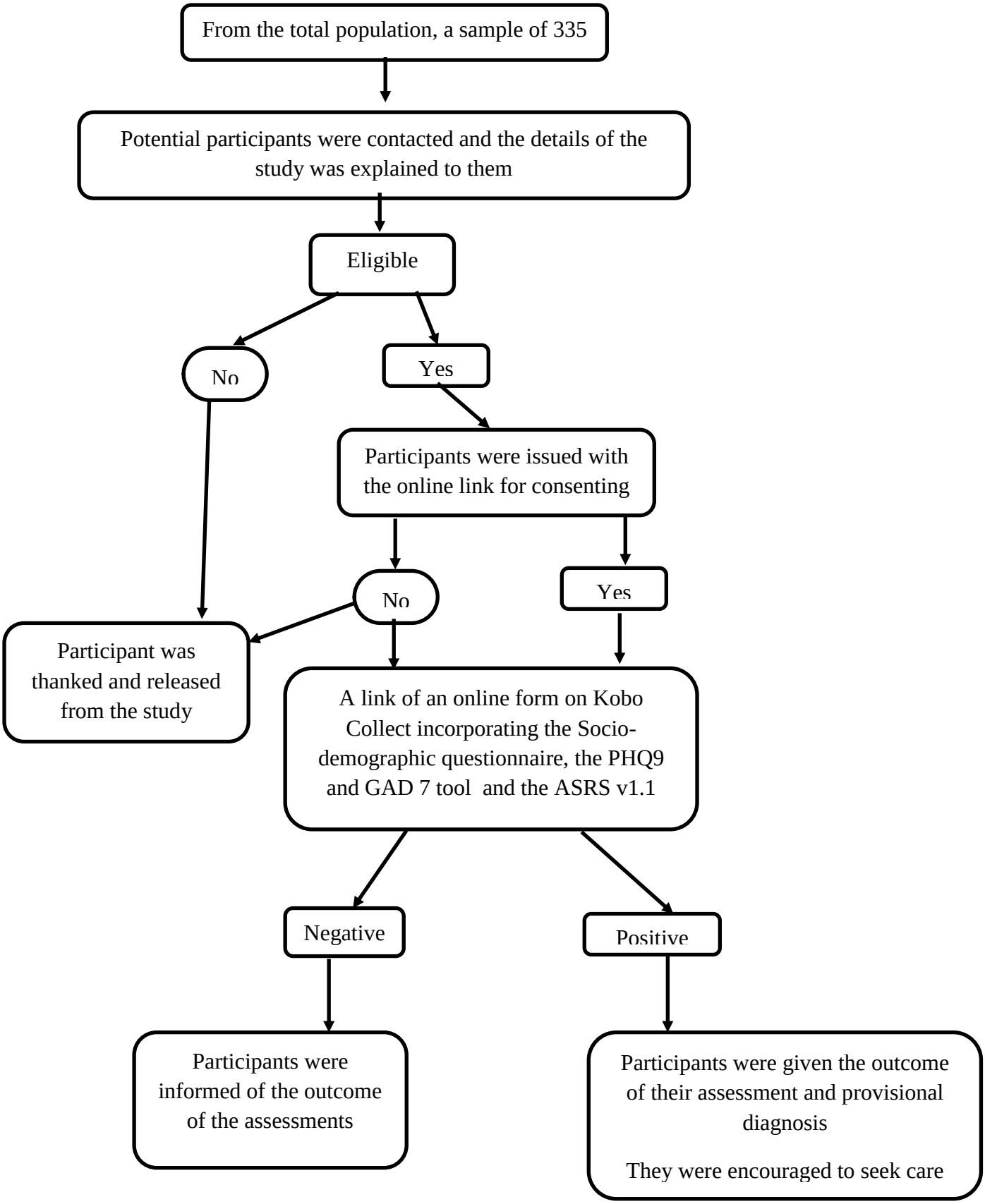

Figure 3.1: Flow chart of the data collection process.

The findings of the study were presented to the University of Nairobi- Department Of Psychiatry, and at the CADDRA Annual ADHD Research Day and Conference. The results of the study will also be published.

The following was also taken into consideration;

a) The informed consent

This document bears a detailed explanation of the purpose, objectives, and procedures that the study followed. The risks involved such as the invasion of private information on the socio-demographic questionnaire and the benefits of the study were also elaborated on this form. The expectations from the participant as well as the duration of the study was captured in the informed consent which then guided the participants accordingly on the exercise. The potential risks and benefits associated with the research were elaborated on to the subjects such as the potential benefit of getting a diagnosis of ADHD in the event the participant had no idea about this as well as facilitation towards care.

b) Confidentiality

No identifying markers was placed on the participants. No log in markers were taken and all documents that had participant's information such as their contact information were coded into numerical data. None of the deliberations as to the outcome of the assessment was shared with anyone other than the participant for purposes of facilitating continued care where necessary.

3.10 Data Collection, Data Entry and Analysis

Data was collected through Kobo Collect online questionnaire. The raw data was cleaned for errors and any inconsistencies in responses. Stata v14.2 was used for statistical analysis of the data. The quantitative data were analyzed using both descriptive analysis techniques as well as inferential statistics. Moreover, means and

frequencies were also determined for the socio-demographic factors. Bivariate and multivariate analyses were used to establish the association between the outcomes and the indicators.

3.11 Data Management

The names of study participants were not captured at any stage of the data collection process. Codes were used to protect the confidentiality of the information that was obtained during data collection. The study tools were also destroyed after the completion of the data collection process. Results are presented in graphs, tables, charts, and narratives.

3.12 Study Limitations

This study was done in one University i.e. The University of Nairobi. Therefore, students from other Universities may be underrepresented. This limitation was not expected to affect the outcome of the survey given that the University of Nairobi is considered the largest University in Kenya.

Given that other variables into the individual were not adequately investigated in this study such as their history, functional impairment, and other precipitating or perpetuating factors of their symptom presentation then the outcome of the study remains an approximation of the prevalence of ADHD and a possible diagnosis to the participant. This then resulted in those who tested positive to seek further investigation by a mental health professional.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter details the findings of this study whose aim was to investigate the association between depression, anxiety and ADHD among medical students at the University of Nairobi through a quantitative cross-sectional study design. The specific objectives were to determine the prevalence and associations between depression, anxiety and ADHD among university of Nairobi medical students. We also explored the association against socio-demographic variables around the medical students. The expected sample was 333, however, a total of 335 students took part in this exercise from October 3rd to 22nd October 2022.

4.2 Socio-Demographic Characteristics

Three hundred and thirty-five (335) respondents were recruited into the study with 173 (51.64%) being females and 162 (48.35%) males. Those aged 18-22 comprised majority of the participants, being 211 (62.99%) of the group, followed by those aged 23-26 years 93 (27.76%), 27-30years 27(8.06%), above 30 years 4(<2%). In terms of location, 125 (37.31%) respondents hailed from rural regions, with urban areas coming second 124 (37.01%) and sub urban trailing with 86 (25.01%). During the academic sessions, most 174 (51.94%) of those who participated in the study resided at school provided accommodation, 90 (26.87%) at externally provided residence such as Qwetu-student residences, 55 (16.42%) at home and 16 (<5%) had other arrangements. A high number of the students 150 (44.78%) reported average academic performance, 103 (30.73%) good performance, , while 82 (24.48%) fair academic performance. Half of the students were averagely satisfied with quality of their life, 103 (30.75%) lowly satisfied, and 64 (19.1%) highly satisfied with the quality of their life. Regarding mental health issues, an overwhelming two-thirds of

the students said that they face mental health difficulties, while the rest said they don't. Accordingly, over half 190 (56.72%) of the students said they often have negative feelings like low moods, despair and worries which was not meeting clinical significance of a diagnosis, 135 (40%) said they rarely do, and 10 (3%) said they never. These descriptive findings are summarized in Table 4.1 below.

4.2.1 Summary of Socio-Demographic Characteristics

Table 4.1: Summary of Socio-demographic Characteristics.

Gender	**Freq**	**%**
Female	173	51.6
Male	162	48.4
Age	freq	%
18-22 years	211	63
23 -26 years	93	27.8
27-30years	27	8.1
30-35years	2	0.6
Above 35years	2	0.6
Home Residence	freq	%
Rural	125	37.3
Sub-urban	86	25.7
Urban	124	37
How would you rate your academic perfomance?	freq	%
Average	150	44.8
Fair	82	24.5
Good	103	30.7
During your academic semester, where do you stay?	freq	%
At externally provided residence eg Qwetu	90	26.9
At home	55	16.4
At school provided residence	174	51.9
Other specify	4	1.2
With relatives	12	3.6
How satisfied are you with the academic program you are pursuing?	freq	%
Average	200	59.7
High satisfaction	93	27.8
Low satisfaction	42	12.5
How satisfied are you with your social life while at school?	freq	%
Average	184	54.9
High satisfaction	61	18.2

Low satisfaction		90	26.9
How satisfied are you with the level of social support you receive from fam	freq	%	
Average		139	41.5
High satisfaction		110	32.8
Low satisfaction		86	25.7
How satisfied are you with your quality of life in general?	freq	%	
Average		168	50.1
High satisfaction		64	19.1
Low satisfaction		103	30.7
Do you suffer from any chronic physical ailments?	freq	%	
No		317	94.6
Yes		18	5.4
Do you undergo any mental health difficulties?	freq	%	
No		117	34.9
Yes		218	65.1
How do you find your physical and/or mental health?	freq	%	
Excellent		21	6.3
Good		152	45.4
Poor		123	36.7
Very poor		39	11.6
How often do you have negative feelings such as low moods, despair, worries	freq	%	
Never		10	3
Often		190	56.7
Rarely		135	40.3

4.3 Prevalence of ADHD

Presence and severity of ADHD were assessed using the WHO ASRS v1.1. With the screener, the prevalence of ADHD was 32.54%. Therefore, borrowing from a study conducted by Prof Atwoli et al (L. Atwoli, 2010) and works by Stanton et al (Stanton

et al., 2018), the investigator decided to modify the criterion to incorporate the full ASRS symptom checklist to provide a clearer DSM V diagnosis. Table 4.2, and figure 4.1 below shows ADHD prevalence.

Table 4.2: Prevalence of ADHD.

ADHD	Freq.	Percent
No ADHD signs	226	67.46
Signs of ADHD	109	32.54
Total	**335**	**100**

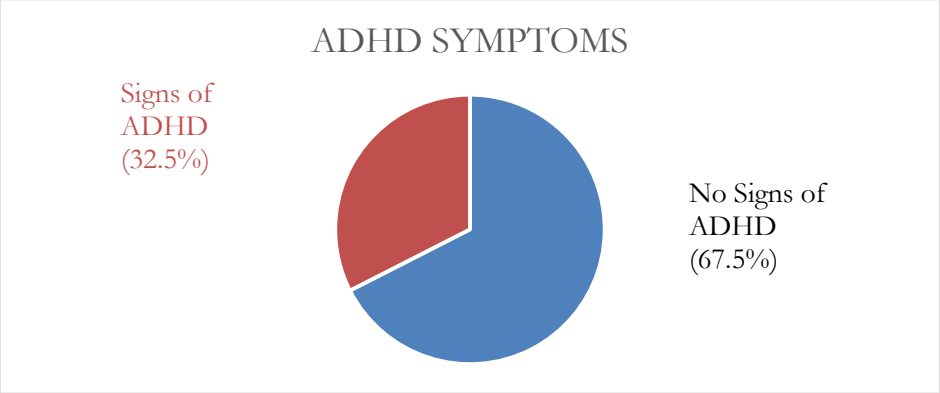

Figure 4.1: ADHD Prevalence among UoN Medical students.

Modified ASRS:

Two sub-scales are generated from the modified ASRS scale. The first sub-scale requires at least 6 of the inattentive symptoms (Questions 1-4 and 7-11 on the ASRS checklist) to be positive, and with this, 52 (15.52%) of the students reported possible ADHD inattentive type. The second sub-scale, requiring at least 6 of the hyperactivity/impulsivity symptoms (Questions 5, 6 and 12-18 on the ASRS checklist) to be positive, 29 (8.66%) students exhibited possible ADHD

hyperactive/impulsive type. Table 4.3 below displays the modification of the ASRS scale.

Table 4.3: Modification of the ASRS scale.

i. inattentive symptoms criteria (items 1-4 & 7-11)

	N	%
No Possible ADHD	283	84.48
Possible ADHD	52	15.52
Total	335	100

ii. Hyperactivity/impulsivity symptoms (items 5,6, & 12-18)

	N	%
No Possible ADHD	306	91.34
Possible ADHD	29	8.66
Total	335	100

iii. Combined ADHD Scale (showing both inattentive and hyperactive signs)

	Freq.	Percent
No signs	318	94.93
ADHD signs	17	5.07
Total	**335**	**100**

4.4 ADHD and Quality of Life

i) Inattentive symptoms

Students who reported to have average quality of life satisfaction were 79% less likely to exhibit inattentive symptoms compared to those who reported low life satisfaction. Similarly, those who reported high satisfaction with quality of life were found to be 97% less likely to have inattentive symptoms compared to the lowly satisfied with quality of life. All these findings were significant at alpha level 0.05. **Table 4a** below summarizes this information.

Table 4.4a: Inattentiveness and satisfaction with quality of life.

Inattentiveness	*Odds Ratio*	*Std. Err.*	*Z*	*P>z*	*[95% Conf.*	
Low satisfaction	*ref*					
Average satisfaction	0.21	0.055	-4.370	0.000	0.039	0.291
High satisfaction	0.03	0.057	-2.800	0.005	0.007	0.420

ii) *Hyperactivity*

Compared to those reporting low satisfaction with quality of life, medical students who reported to be averagely satisfied with their quality of life were 89% less likely to show hyperactive symptoms, while those with high satisfaction with their quality of life were found to be 94% less likely to exhibit hyperactive symptoms. This information is summarized in the *Table 4b* below.

Table 4.4b: Hyperactive symptoms and satisfaction with quality of life.

Hyperactive symptoms	*Odds Ratio*	*Std. Err.*	*Z*	*P>z*	*[95% Conf.*	
Low satisfaction	*Ref*					
Average satisfaction	0.107	0.069	-4.730	0.000	0.106	0.394
High satisfaction	0.055	0.032	-3.380	0.005	0.004	0.232

iii) Combined ADHD and quality of life

On the full scale, the medical students who reported to have average quality of life satisfaction were found to be 97% less likely to exhibit both hyperactive and inattentive symptoms (p = 0.001) as shown in Table 4.5 below. On the other hand, no student who reported high life satisfaction was found to exhibit combined ADHD.

Table 4.5. Combined ADHD and quality of life

Combined ADHD symptoms	*Odds Ratio*	*Std. Err.*	*Z*	*P>z*	*[95% Conf.*	
Low satisfaction	*Ref*					
Average satisfaction	0.03	0.033	-3.30	0.001	0.004	0.250
High satisfaction	-					

4.5 ADHD In Relation to Socio-Demographic Characteristics (Bivariate and Multivariate)

a) ADHD: Bivariate analysis

Being in age groups 18-22 and 27-30 was found to significantly increase the odds of exhibiting ADHD symptoms; with an increase in year of study also significantly increasing the likelihood of exhibiting such symptoms. Good academic performance, satisfaction with program pursued, general satisfaction with quality of life, and presence of mental health difficulties were also significantly associated with exhibiting ADHD symptoms. Table 4.6 below illustrates this information.

Table 4.56: ADHD Bivariate Analysis.

Factor	OR(95CI)	p-value
Gender		
Male	Ref	
Female	1.22(0.77,1.94)	0.387
Age		
18-22	Ref	
23-26	3.93(2.33,6.64)	0.000
27-30	4.61(2.02,10.55)	0.000
30-35	-	0.986
Above 35	3.69(0.23,60.14)	0.359
Location		
Rural	Ref	
Sub-urban	1.15(0.63,2.08)	0.648
Urban	1.31(0.77,2.23)	0.322
Year of study		
Year 1	Ref	
Year 2	3.27(1.26,8.46)	0.015
Year 3	2.46(0.91,6.66)	0.076
year 4	3.05(1.13,8.22)	0.027
Year 5	10.65(3.92,28.95)	0.000
Year 6	23.46(8.56,64.32)	0.000

Academic performance		
Average	Ref	
Fair	1.38(0.8,2.38)	0.248
Good	0.31(0.16,0.58)	0.000
Satisfaction with academic program pursued		
Average	Ref	
High Satisfaction	0.5(0.28,0.9)	0.021
Low satisfaction	3.38(1.69,6.73)	0.001
General satisfaction with quality of life		
Average	Ref	
High Satisfaction	0.39(0.17,0.93)	0.034
Low satisfaction	4.84(2.85,8.23)	0.000
Do you suffer from any mental health difficulties		
No		
Yes	7.01(3.65,13.5)	0.000
How often do you have negative feelings such as low moods, despair, worries		
Often	7.93(0.99,63.83)	0.052
Rarely	1.47(0.18,12.31)	0.720

b) ADHD: Multivariate Results

Multivariate logistic regression shows that fifth year students were 5 times more likely to exhibit ADHD symptoms, compared to those in their first year of study, *(p=0.003);* while the adjusted odds of having positive ADHD score were 11 times higher among sixth years compared to first years. Having mental health difficulties increased the odds of exhibiting positive ADHD signs by a factor of four after adjusting for all the other factors. The table below summarizes these results.

Table 4.67: ADHD Multivariate analysis.

ADHD	Adjusted Odds Ratio	Std. Err.	Z	P>z	[95% Conf.	Interval]
Location						
Rural	Ref					
Sub-urban	1.815	0.646	1.670	0.094	0.903	3.646
Urban	2.414	0.793	2.680	0.007	1.267	4.597
Year of study						
Year 1	Ref					
Year 2	2.330	1.279	1.540	0.123	0.794	6.833
Year 3	1.719	1.038	0.900	0.370	0.526	5.616
Year 4	2.214	1.331	1.320	0.186	0.682	7.193
Year 5	5.406	3.107	2.940	0.003	1.753	16.673
Year 6	11.307	6.390	4.290	0.000	3.735	34.230
Satisfaction with academic program						
Low	Ref					
Average	0.398	0.176	-2.080	0.038	0.167	0.949
High satisfaction	0.718	0.429	-0.550	0.579	0.222	2.318
General quality of life						
Low	Ref					
Average	0.371	0.121	-3.040	0.002	0.196	0.704
High	0.219	0.125	-2.650	0.008	0.072	0.673
Mental health difficulties						
No	Ref					
Yes	3.936	1.695	3.180	0.001	1.692	9.156
_cons	0.149	0.106	-2.670	0.008	0.037	0.603

4.6 Prevalence of Depression

Presence and severity of depression were assessed using the PhQ-9. 183 (54%) of the participants reported some form of depression ranging from moderate to severe levels. Participants with moderate depression were 87 (25.97%), moderately severe were 58 (17.31%) and those severely depressed were 38 (11%). Figure 4.2 and Table 4.8 below summarizes the prevalence of depression among medical students.

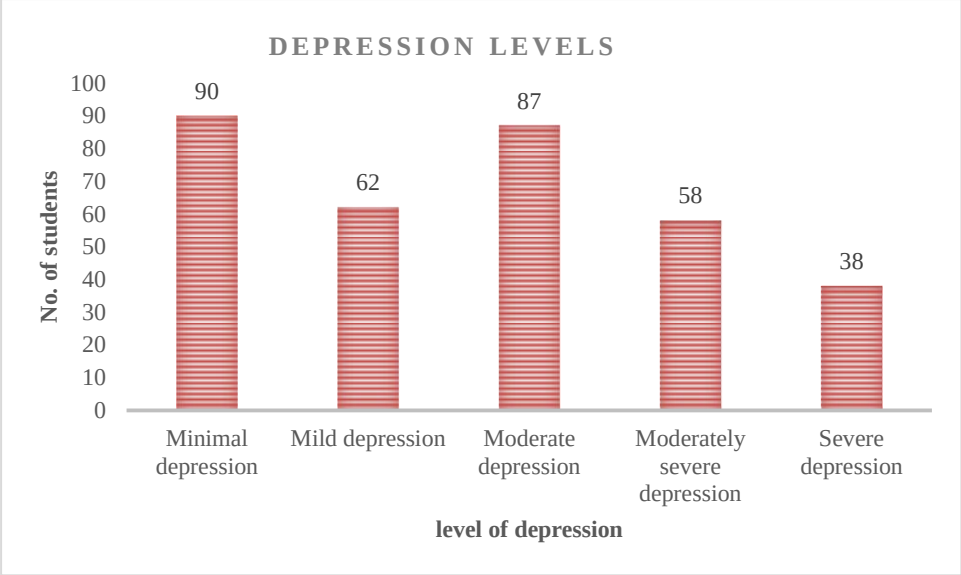

Figure 24.2: Prevalence of Depression.

Table 4. 78: Prevalence of depression by severity.

a) Level of Depression'

	n =335	%
Minimal depression	90	26.87
Mild depression	62	18.51
Moderate depression	87	25.97
Moderately severe depression	58	17.31
Severe depression	38	11.34

4.6.1 Depression in relation to socio-demographic characteristics

a) Depression: Bivariate analysis

Gender and location were found to have no significant relationship with experiencing depressive symptoms among the medical students. Year of study, age of students, academic performance, satisfaction with program pursued, and general life quality were all found to be significantly associated with depressive symptoms among the medical students. Table 4.9 below shows these results.

Table 4.89: Depression: Bivariate Analysis.

	AOR(95CI)	p-value
Factor		
Gender		
Male	Ref	
Female	1.1(0.75,1.63)	0.611
Age		
18-22	Ref	
23-26	3.26(2.09,5.07)	0.000
27-30	3.64(1.75,7.57)	0.001
30-35	0.62(0.05,8.25)	0.720
Above 35	2.72(0.06,118.8)	0.600
Location		
Rural	Ref	
Sub-urban	1.1(0.71,1.09)	0.540
Urban	0.95(0.61,1.47)	0.810
Year of study		
Year 1	Ref	
Year 2	3.48(1.83,6.6)	0.000
Year 3	4.89(2.51,9.56)	0.000
year 4	2.83(1.45,5.51)	0.002
Year 5	8.75(4.20,18)	0.000
Year 6	18.2(8.8,37,9)	0.000
Academic performance		
Average	Ref	
Fair	1.41(0.86,2.26)	0.180

Good	0.21(0.13,0.34)	0.000
Satisfaction with academic program pursued		
Average	Ref	
High Satisfaction	0.20(-1.76,-1.12)	0.000
Low satisfaction	4.21(2.27,7.82)	0.000
General satisfaction with quality of life		
Average	Ref	
High Satisfaction	0.21(0.12,0.69)	0.000
Low satisfaction	7.35(4.49,12)	0.000
Do you suffer from any mental health difficulties		
No	Ref	
Yes	17.81(10.55,30.04)	0.000
How often do you have negative feelings such as low moods, despair, worries		
Never	Ref	
Often	23.64(5.75,97.15)	0.000
Rarely	1.67(0.41,6.77)	0.470

b) Depression: Multivariate analysis

The results showed that students hailing from sub-urban backgrounds were 2.47 times more likely to have depression relative to those who hail from rural backgrounds *(p = 0.002);* while the adjusted odds of having depression among students hailing from urban areas was 1.84 compared to those from the rural, *(p=0.019).*

The findings also showed that those students with low satisfaction level with academic program pursued were 2.55 times more likely to develop depression compared to those who were averagely satisfied *(p=0.007).* Additionally, students reporting high satisfaction with quality of life were 51% less likely to develop depression compared to their counterparts with average satisfaction (*p =0.049),* while the adjusted odds of developing depression were three times higher among those students who reported low satisfaction with quality of life relative to those averagely satisfied *(p=0.000).*

Students reporting to have mental health difficulties were six times more likely to develop depression compared to their counterparts who do not have mental health difficulties *(p=0.000).* Accordingly, the adjusted odds of developing depression were six times higher among students who reported that they often have negative feelings such as low moods, despair and worries, compared to those who never experience such feelings (p=0.026). Table 4.10 below presents multivariate findings between depression and the indicators.

Table 4.~~910~~: Depression: Multivariate Analysis.

	AOR (95CI)	p-value
Factor		
Gender		
Male	Ref	
Female	1.23(0.82)	0.300
Age		
18-22	Ref	
23-26	1.44(0.66, 3.16)	0.362
27-30	1.19(0.4,3.56)	0.753
30-35	2.13(0.02,243.92)	0.754
Above 35	1.75(0.08,37.79)	0.722
Location		
Rural	Ref	
Sub-urban	2.47(1.39,4.4)	0.002
Urban	1.84(1.1,3.06)	0.019
Year of study		
Year 1	Ref	
Year 2	1.21(0.56,2.61)	0.633
Year 3	1.6(0.74,3.45)	0.235
year 4	0.72(0.3,1.75)	0.473
Year 5	1.18(0.39,3.59)	0.771
Year 6	2.08(0.67,6.5)	0.206
Academic performance		
Average	Ref	
Fair	0.95(0.55,1.62)	0.839
Good	0.58(0.32,1.04)	0.067
Satisfaction with academic program pursued		

Average	Ref	
High Satisfaction	0.73(0.39,1.37)	0.333
Low satisfaction	2.55(1.3,5)	0.007
General satisfaction with quality of life		
Average	Ref	
High Satisfaction	0.49(0.25,1)	0.049
Low satisfaction	3.07(1.77,5.3)	0.000
Do you suffer from any mental health difficulties		
No	Ref	
Yes	6.02(3.23,11.24)	0.000
How often do you have negative feelings such as low moods, despair, worries		
Never	Ref	
Often	6(1.24,29.05)	0.026
Rarely	1.23(0.25,6.07)	0.796

4.7 Prevalence of Anxiety

Presence and severity of anxiety were assessed using the GAD-7. Participants who reported moderate to severe symptoms of anxiety were 145 (43%) of the total sample. Minimal to no anxiety was reported by 109 (32.54%), 81 (24.18%) participants reported mild anxiety, 86 (25.67%) moderate anxiety with 59 (17.6%) showing severe symptoms of anxiety. Figure 4.3 and Table 4.11 shows a summary of the prevalence of anxiety.

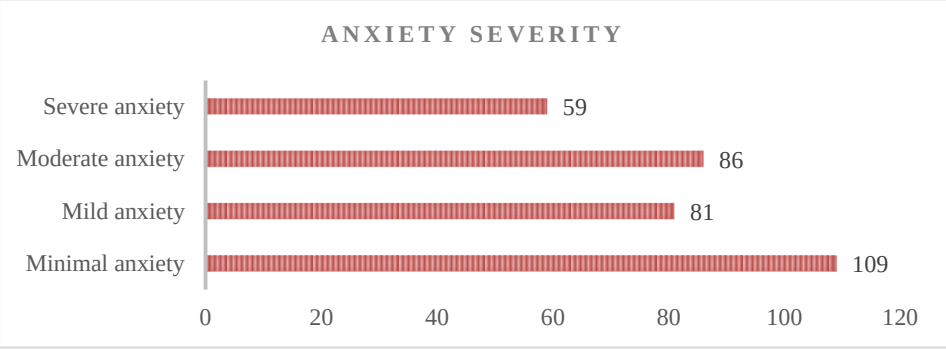

Figure 4.3: Summary of prevalence of anxiety.

Table 4.1011: Summary of prevalence of anxiety.

Minimal anxiety	109	32.54
Mild anxiety	81	24.18
Moderate anxiety	86	25.67
Severe anxiety	59	17.61
Total	***335***	***100***

Anxiety in relation to socio demographic characteristics

a) Anxiety: Bivariate analysis

Year of study, good academic performance, and satisfaction with program pursued, general satisfaction with quality of life, and mental health issues were found to be significantly related to anxiety severity among the participants. The table below summarizes this information.

Table 4.1112: Summary of anxiety in relation to socio-demographic characteristics.

		p-value
Location	AOR (CI)	
Rural	Ref	
Sub-urban	1.14(0.69,1.88)	0.607
Urban	0.95(0.61,1.48)	0.833
Year of study		
Year 1	Ref	
Year 2	3.48(1.79,6.75)	0.000
Year 3	4.38(2.19,8.78)	0.000
year 4	2.93(1.46,5.85)	0.002
Year 5	12.41(5.88,26.2)	0.000
Year 6	28.07(12.96,60.8)	0.000
Academic performance		
Average	Ref	
Fair	1.21(0.75,1.97)	0.438
Good	0.25(0.16,0.41)	0.000
Satisfaction with academic program pursued		
Average	Ref	
High Satisfaction	0.34(0.21,0.54)	0.000
Low satisfaction	3.02(1.62,5.65)	0.001
General satisfaction with quality of life		
Average	Ref	
High Satisfaction	0.26(0.15,0.47)	0.000
Low satisfaction	4.16(2.6,6.66)	0.000
Do you suffer from any mental health difficulties		
No	Ref	
Yes	9.79(6.04,15.89)	0.000
How often do you have negative feelings such as low moods, despair, worries		
Never	Ref	
Often	8.5(2.62,27.6)	0.000
Rarely	0.78(0.24,2.55)	0.682

b) Anxiety: Multivariate analysis

It was found that being between 27-30 years increases the likelihood of developing anxiety by a factor of 4.19 compared to being in18-22 years, (*p= 0.011*). Also, those students hailing from sub-urban areas are two times more likely to develop anxiety relative to their counterparts from the rural areas. Being a sixth-year student was found to significantly increase the chances of developing anxiety by a factor of 4, compared to those in first year *(p=0.028).* Moreover, those students who suffer from mental health difficulties were three times likely to develop anxiety compared to those who don't, *(p=0.001). Table 4.13* below summarizes the regression findings.

Table 4.1213: Anxiety: Multivariate Analysis

		p-value
Location	AOR(CI)	
Rural	Ref	
Sub-urban	1.95(1.08,3.51)	0.027
Urban	1.49(0.87,2.52)	0.144
Year of study		
Year 1	Ref	
Year 2	1.59(0.73,3.48)	0.242
Year 3	1.85(0.84,4.11)	0.129
year 4	0.89(0.36,2.18)	0.801
Year 5	2.17(0.71,6.63)	0.176
Year 6	3.66(1.15,11.65)	0.028
Academic performance		
Average	ref	
Fair	0.87(0.5,1.51)	0.625
Good	0.57(0.31,1.05)	0.702
Satisfaction with academic program pursued		
Average	ref	
High Satisfaction	1.03(0.56,1.89)	0.933
Low satisfaction	2.01(0.99,4.09)	0.052
General satisfaction with quality of life		
Average	ref	
High Satisfaction	0.62(0.3,1.26)	0.185
Low satisfaction	1.69(0.98,2.91)	0.06
Do you suffer from any mental health difficulties		
No	ref	
Yes	2.94(1.59,5.44)	0.001
How often do you have negative feelings such as low moods, despair, worries		
Never	ref	
Often	1.95(0.49,7.78)	0.347
Rarely	0.41(0.1,1.63)	0.204

4.8 The Relationship between ADHD, Anxiety and Depression

Table 4.14 presents the association between ADHD, depression and anxiety.. Multivariable ordinal logistic regression shows that students who exhibit ADHD symptoms are 9.28 times significantly more likely to develop anxiety compared to those who don't, p = 0.000; and 8.63 times significantly more likely to develop depression severity, p= 0. 000.

Table 4.14. Ordinal regression showing relationship between ADHD, anxiety and Depression

	AOR	Std. Err.	Z	P>z	[95% Conf.
Anxiety levels					
No signs	*ref*				
ADHD signs	9.28	2.25	9.21	0.000	[5.78,14.91]
Depression severity					
No signs	*ref*				
Signs of ADHD	8.63	2.05	9.09	0.000	[5.42,13.74]

4.8.1 Relationship between ADHD and an Interaction between Depression and anxiety

Table 4.15 below shows the relationship between ADHD and an interaction between depression and anxiety levels. Overall, the table indicates that the effect of anxiety on ADHD depends on the different levels of depression. Almost all the interaction terms significantly determine whether a student shows ADHD signs or not. The only interaction levels not significantly related to ADHD are minimal anxiety and mild depression (p = 0.056), mild anxiety and minimal depression (p= 0.070), mild anxiety and mild depression (p =0.133), and mild anxiety and moderately severe depression.

Table 4.15: Relationship between ADHD and an interaction between depression and anxiety

ADHD	Odds Ratio	P>z	[95% Conf.	Interval]
anxiety # Depression				
Minimal anxiety#Mild depression	6.167	0.056	0.955	39.803
Mild anxiety#Minimal depression	6.727	0.070	0.855	52.940
Mild anxiety#Mild depression	4.111	0.133	0.649	26.030
Mild anxiety#Moderate depression	18.500	0.000	3.801	90.041
Mild anxiety#Moderately severe depression	12.333	0.065	0.856	177.691
Moderate anxiety#Mild depression	15.857	0.006	2.250	111.779
Moderate anxiety#Moderate depression	22.905	0.000	4.775	109.880
Moderate anxiety#Moderately severe depression	56.923	0.000	11.831	273.873
Moderate anxiety#Severe depression	37.000	0.000	5.128	266.979
Severe anxiety#Moderate depression	44.400	0.000	7.040	280.036
Severe anxiety#Moderately severe depression	138.750	0.000	23.198	829.876
Severe anxiety#Severe depression	111.000	0.000	21.380	576.281
_cons	0.027	0.000	0.007	0.110

CHAPTER FIVE: DISCUSSION, CONCLUSION, LIMITATION AND RECOMMENDATION

5.1 Introduction

This chapter incorporates a discussion of this study findings juxtaposing them to other studies and growing the body of knowledge in the area of adult ADHD in sub-Saharan Africa and the world at large.

335 participants were assessed for ADHD, Depression and Anxiety and their socio-demographics were also explored. Within the socio-demographic questionnaire, predisposing, precipitating perpetrating and protective variables towards the manifestation of symptoms of attention deficit hyperactivity disorder (ADHD), depression and anxiety were explored within this population group. These include their location of residence both while in session and during school breaks. An estimation of functioning was assessed through the item on academic performance. Their subjective quality of life, course pursued, level support received both by their family and peers as well as the state of their emotional and physical wellbeing were assessed to estimate the profile of the participants.

5.2 Hypothesis

The main assumption under study was that adults ADHD was associated with adverse psychological well-being and therefore linked to higher levels of depression and anxiety.

The hypothesis was accepted. Participants with a positive read for ADHD were found to be more likely to experience moderate to severe anxiety and depression. Having a mental illness increased the likelihood of ADHD symptom presentation. However,

ADHD was not associated with experiencing negative moods that was not meeting any diagnostic criterion for depression or anxiety.

5.3 Prevalence of ADHD among Medical Students

The prevalence of self-reported ADHD symptoms through the ASRSv1.1 screener was 32.54% significantly higher than similar studies conducted locally (L. Atwoli, 2010) and elsewhere in the world (Willcutt, 2012) (N. Alrahili, 2019) (Njuwa, 2020). With the modifications to use all items in the ASRS v1.1, the prevalence of ADHD was found to be 5% combined type, with inattentive symptoms at 15.52% while hyperactive/impulsive stands at 8.66%.

This high prevalence rate may be explained by the self-report methodology applied. Presence of symptoms in childhood was not assessed and further investigations were not employed. With the ASRS having high sensitivity, low specificity (Mattos, Nazar, & R.Tannock, 2018), there also runs the chance that the tool requires further validation for this population which was also observed in a similar study conducted in Moi University (L. Atwoli, 2010). The implications of COVID 19 on the population under study may have also contributed to the high prevalence rate with the possibility of false positives. It is also possible that changes that arose from the pandemic placed significant demands on the students making it hard for them to continue to meet expectations and function without manifestation of ADHD symptoms. Neurodevelopmental health is closely associated to flexible adaptations and regulation in meeting the ever-changing environmental demands (Bush, 2020). To this effect, the extreme changes that came about with the COVID 19 pandemic compounded the existing stressors met by the medical students resulting in symptom manifestation of ADHD even to those previously coping who would not have had a positive read.

Researchers agree that especially in this population, there is increased possibility of ADHD being underdiagnosed, unrecognized and mislabeled (Geffen & Forster, 2018). There are several reasons for this population to be overlooked in exploration of ADHD. Possibly, significant numbers of medical students do not disclose their diagnosis and struggles due to fear of scrutiny by supervisors and peers as well as perceived and real stigma. With the hallmark symptoms of ADHD as the condition is defined, having a diagnosis would generate an inaccurate perceived barrier or bias that the individual may not be capable to meet the tasks required to successfully complete training in medicine (D Duong, 2022).

As with most neurodevelopmental disorders, if the individual has structure for example in the form of social support and flexibility or low severity these variables may camouflage the symptom patterns then they may never be recognized until there is a discrepancy between capacity and environmental demands. The minor symptoms visible to family, colleagues and supervisors would be misattributed to the personality, character flaws and would consequently be dismissed (D Duong, 2022) (Alv MIlioni, 2014).

High intellectual abilities tend to compensate for the executive function difficulties present in ADHD (Alv MIlioni, 2014). Given that individuals who pursue medicine are generally regarded to be highly intelligent, there is a possibility that their IQ masks their difficulties until their executive functions are tasked beyond the ability of their intellectual abilities (TE Brown, 2009). A study on the association between high IQ and ADHD posited that creative compensation becomes key to modulating the symptoms of ADHD. To this effect, the diagnosis of ADHD in this population group and other similarly gifted individuals would require detailed exploration of ADHD symptoms as well as the neuropsychological functionality of the executive functions

for the condition to be recognized. This conclusion serves to further emphasis the limitations of purely qualitative screening tools in the place of individuals with elevated IQ versus those with relatively lower intellectual abilities (Alv MIlioni, 2014). The difficulties experienced by this group of individuals portray further the chronicity of adult ADHD especially as pertaining control of executive functions (TE Brown, 2009). Studies have found that those with childhood diagnosis of ADHD (inclusive of those whose symptoms persist into adulthood) have higher likelihood towards academic and career underachievement when juxtaposed to their objective IQ due to these executive function deficits. These findings are not accounted for by comorbidity rather they may be exacerbated by them (C Rapinesi, 2018).

If a medical student does seek out evaluation, they would be under scrutiny and face some resistance by the service providers over concerns regarding the prescription of stimulant medication and risk of abuse among this population group (D. S. Im, 2023). Nevertheless, ADHD has been found to be among the top self-disclosed mental health challenges/ disabilities among medical students (LM Meeks, 2016). With this, it continues to be the condition for which many students receive accommodations and additional support for.

Fifth year and sixth year students whose ages were ranging 23-30 showed significantly higher odds of having a positive ADHD score. Having adjusted all factors age had no relation to a positive ADHD score. The extra demands and expectations placed on fifth years and six years may explain their increased inability to function in the context of their environment. this is consistent with research findings which have shown with increase in volume and complexity of items to be learned and applied, in the course of training then there is higher distress and symptom manifestation (D. S. Im, 2023) (D Duong, 2022). With this finding, this

study tends to agree with a proposition made by Meng Shi et al whereby early detection was emphasized to facilitate care to vulnerable medical students as a way to mitigate further psychological distress which then adversely impacts other aspects of life (Shi, 2018).

Consistent with other works (Hechtman, 2017), inattention was found to bear higher positive report. This serves to confirm the psycho-morphorsis of ADHD across the lifespan with a marked decrease in hyperactivity while inattention and combined types of the disorder increasingly dominate in adulthood (Sibley, 2017).

The findings of this study are comparable to works by Shi Meng et al (Shi, 2018) wherein both found ADHD to be significantly associated to subjective reported low life satisfaction. Students reporting average life satisfaction were 89% less likely to present with hyperactive symptoms and 79% less likely to present with inattentive symptoms. Shi Meng et al found that inattention was closely linked and a predictor of life satisfaction. According to prior studies, inattention bears closer association to emotional dysregulation and psychological difficulties such as depression and anxiety. This in itself can result in poorer life satisfaction among individuals (Shi, 2018) (Das D, 2012).

A significant association between ADHD and having a mental health condition consistent with previous works was demonstrated in this study. Works by Katzman found that 80% of adult with ADHD have at least one psychiatric comorbidity (Katzman, Bilkey, Chokka, Fallu, & Klassen, 2017) (Kessler, 2006).

5.4 Prevalence of Depression among Medical Students

Based on the global reports, it is safe to say that depression holds one of the top positions among illnesses causing disability and impacting the global burden of disease. Locally Kenya ranks in the top 10 among African countries with high cases of depression. It is worth noting that even prior to the COVID 19 pandemic, studies on the mental wellbeing of medical students have found higher prevalence rates of psychological challenges as compared to the general population (OY Mousa, 2016) (LN Dyrbye, 2006) (SJ Halperin, 2021).

Previous studies looking into medical students have found the prevalence of depression to be significantly higher than the 4.4% global prevalence rate (Phomprasith, 2022). The estimated worldwide prevalence as estimated through a meta-analysis comprising 62 728 medical and 1845 non-medical students stands at 28% (R Shao, 2020). A study done in Addis Ababa on the prevalence and predictors of depression and anxiety among medical students had its prevalence at 51.3% which is quite close to the findings by this study (Kebede, 2019). Other studies on the same have had a range from 27.7% to 70% making the findings obtained in this study to fall within the general prevalence range.

Different from other studies when all factors are adjusted the year of study and age have no association to depression. Nevertheless, bivariate analysis found that senior students were more likely to present with symptoms of depression compared to the younger students which was comparable to findings by Shao et al (R Shao, 2020), Shamsuddin et al (K Shamsuddin, 2013) and Bonstanci et al (M Bostanci, 2005). This emphasizes the possibility of a gradual decline in mental wellness among medical students as they proceed across the levels. However, this study did not look into the possible explanations for this. Other studies have shown no major significance across

the year groups. This may be explained by the fact that different groups and study populations cam generate varying responses.

Low subjective satisfaction with the academic program and the quality of life were significantly associated with depression. This co-relates to findings from works by Phomprasith (Phomprasith, 2022). It goes without saying that symptoms of depression such as the cognitive symptoms of poor concentration, anhedonia and having a significantly low mood predominantly for at least 2 weeks would have repercussions to one's academic career and their general satisfaction with life. On the other hand, the dissatisfaction in academia and life in general can result in development of symptoms of depression.

A study by Steffen et al found that 64% of mild depression cases also had another mental health difficulty. This percentage increased with more severe forms of depression (72% moderate, 78% severe) (Phomprasith, 2022) (A Steffen, 2020). Those presenting with depression were found to have twice as much likelihood of a psychiatric comorbidity. They were also found to experience negative feelings not meeting diagnostic criterion for other psychological conditions. Consistent with previous research the presence of a pre-existing mental health difficulty increased the likelihood of presenting with depressive symptoms by 6 times.

Depression is highly comorbid with other mental and somatic/physiological conditions. The most common interconnections with depression are substance use disorders and anxiety disorders. This study did not seek to explore the various mental health challenges as reported by the participants. Nevertheless, symptoms of depression especially when unaddressed are associated with unhealthy living which perpetuate and predispose the person to other conditions such as substance use for

self-medication, non-adherence to treatment which worsens the depressive symptoms as well as those of the accompanying condition and complications in the neuroendocrine system (A Steffen, 2020). Comorbidity in depression is linked to poor quality of life and more difficulty prognosis for the individual with increased likelihood for relapses of wither/both depression and the other condition (A Steffen, 2020).

Previous findings find that prior to joining the school of medicine, the individuals who then are selected to pursue these career path show similarities to the general population. Exposure to general stressors in medical school such as increased workload, expectation to perform as a competent medical practitioner, fear of failure, teaching styles and increased exposure to the sufferings of patients, compounds with other life difficulties away from the school of medicine affecting their mental health (Smith, 2007). Those with personality vulnerabilities tend to have their capacities further put to the test. Lins et al reported that the poor quality of life among medical students is largely attributable to their mental health environment. Lins' research shows that burnout a common outcome from the stressors experienced in medical school progressively develops in the course of the training which can then be correlated to the vulnerability towards depression. (Lins, 2015). Studies have also found that experiencing depressive symptom patterns as a medical student can be linked to vulnerability towards burn out during residency and specialization (postgraduate training) (ZX Low, 2019).

5.5 Prevalence of Anxiety among Medical Students

Though as debilitating as its counterpart, anxiety tends to receive sloppy seconds attention to depression especially among the medical student population. A global prevalence of anxiety among medical students found an overwhelming 33.8% which then translates to at least one in three medical students globally experiencing some form of anxiety (Quek TT, 2019). There is generally a wide variation among the prevalence rates of anxiety among medical students from regions not in North America ranging between 7.7% to 65.5% (R Shao, 2020) (Quek TT, 2019). On the other hand, the range for students within North America was found to be 29.2% to 38.7%. These differences can be accounted for by the different tools used to measure anxiety, the differences in the group under study such as their ability to recognize and definitions of anxiety and the nature of anxiety under study (P Arun, 2021). This study found the prevalence of anxiety to be 43% which was significantly higher than the global prevalence but within the range of regions outside of North America.

In an attempt to explain this findings studies have postulated that some students selected to pursue medicine in addition to the environmental variables such as high academic workload resulting in poor self-care such as sleep deprivation, poor feeding patterns and limited time for rest and rejuvenation, constant exposure to death, financial difficulties, time away from family; they also have personality traits that further predispose them to developing anxiety symptoms. This population tends to have more neurotic and perfectionistic tendencies which then when one fails to attain expectations placed on them both by themselves and others can result in the development of anxiety. (Quek TT, 2019) (R Puthran, 2016) (Enns, Cox, Sareen, & Freeman, 2001).

In this study regardless of these moderating variables not being explored, the bivariate analysis reports indicated significant low satisfaction with their quality of life (OR-4.16, p= 0.00) and the academic program (OR- 3.02, p=0.001) which may have emerged as a consequent of the presentation of anxiety symptoms. Participants experiencing anxiety also reported to experience negative feelings not within any diagnostic criterion (OR-8.5, p=0.000). These findings attempt to extrapolate the outcomes of anxiety within the study group on their day-to-day functions.

In other studies, there is a marked reduction in susceptibility of anxiety typed symptoms in the senior year groups with normalization of the environmental and academic demands, and having established structure and support systems being a key factor (Kebede, 2019). Interestingly, this study findings reported marked reduction in the likelihood of anxiety between second year to fourth year then a sharp increase among the fifth and sixth years. This exposes the possibility that with the academic curriculum becoming more demanding in the two final years that then this increases the anxiety. The increased responsibilities as they are now at the clinical years of the course. The expectations and the fear of the next part in training of a doctor also come with a lot of anxiety and worry.

Students hailing from sub urban regions had higher susceptibility to developing anxiety in comparison to those hailing from rural regions. These findings echo those of other studies. There are various explanations that have been put forward for this observation which include: the many difficulties affecting the youth in urban centers as well as the differences of socialization and cultures between these two distinct regions. Nevertheless, it begs the question on the impact of adjustment among the students as one would anticipate that those migrating from rural regions would have

greater struggles as compared to those living in sub urban and urban regions (A Anjum).

Gender was not found to bear any statistically significant difference in presentation of anxiety symptoms. This was similar to the study conducted by Quek et al (Quek TT, 2019) despite there being clear marked vulnerability towards anxiety by females than males (APA). Consequently, this seconds the proposition by Quek et al in having measures to mitigate this cutting across both genders.

In many of the studies that explored levels of depression and anxiety, anxiety was found to be higher than depression contrary to this study findings where the rates of for depression and anxiety are 54% and 43% respectively with their reported symptoms ranging from moderate to severe. These findings in addition to the possible explanations brought forth by other studies can also be attributed to dynamic changes that occurred during and after the COVID 19 pandemic.

5.6 Link between ADHD, Depression and Anxiety among University Students Pursuing Medicine

The National Comorbidity Survey, 2006, found that adults with ADHD have three times more likelihood of developing major depressive disorder. This is consistent with the studies by Njuwa et al. (Njuwa, 2020) and Almeida et al (Almeida Montes, 2007). Findings from this study reported that the students with a positive ADHD score were 7 times more likely to have moderately severe depression and 6 times more likely to present with severe depression. The deficits in emotional self-regulation characteristic of ADHD present a predisposing factor to the development of depressive symptoms. This is only further compounded by the implications of the executive function deficits across other areas of life. The environmental context in the course of pursuing

medicine places significant demands across the board as depicted in this study but with more vulnerability to those who have ADHD.

Previous studies have found rates of co-occurrence between ADHD and anxiety to be as high as 25% and more both in clinical and epidemiology reports (Bowen, 2008) (Michelini, 2015). Drawing closer to the population under study, parallels can be drawn with works by Njuwa among Cameroonian medical students ((Njuwa, 2020) which are consistent with this study findings. However, there is a significant increase in the odds ratio (10 p=0.000).

Inattention has been co-related to anxiety whilst overt hyperactivity with more impulsive presentations. One of the theories explaining this relationship is the role of attention biases and ability to shift attention in the development of anxiety manifestations. This hyper-fixation on the threat stimuli may further result in inattention in individuals experiencing this (Michelini, 2015).

Drawing parallels form works by Njuwa, this study shows clear relationship between depression, anxiety and ADHD. It is worth mentioning that depression and anxiety may have developed as complications from ADHD in the study group which would to some extent help explain part of the trends observed. This withstanding, with high prevalence rate for depression and anxiety, there stands a possibility that the demands of being a medical student affect both neurotypicals (students without ADHD) and students with ADHD similarly. However, those with traits of ADHD have a higher susceptibility towards depression and anxiety, exhibiting more severe presentations of these conditions.

To this effect, measures to support students' wellbeing should not only be geared towards those who are found to have ADHD but also to those without to mitigate the possibilities of developing depression and anxiety.

5.7 Prevalence trends and differences among the year groups

In this study much as the multivariate analysis found no association between the year of study and self-reported symptoms of ADHD, Depression and anxiety, by the bivariate analysis there were marked differences of prevalence outcomes across the year groups with the general rates increasing gradually between the second and third years then a sharp decline among the fourth year students. The fifth years had significantly higher prevalence which then doubled among the sixth years. This observation was made cutting across all the three conditions under study.

This can be explained by several factors such as the levels of resilience among the fourth year cohort in the sampled population, the levels of psychosocial support and functions within the year group.

It is worth mentioning that this study was conducted during the re-adjustment phases after the pandemic with the implications of the pandemic not having been considered in the study design. To this effect, factors related to the pandemic such as the disruptions in learning caused by the lockdown measures, having to conduct pre-clinic classes online while the seniors had to be temporarily discontinued and schedule their final years of medicine compounded by the other stressors could have contributed to the study findings.

5.8 Conclusion

This study illuminates and adds the body of scientific knowledge on the general canvas around adult ADHD and the association it bears with anxiety and depression among university students pursuing medicine. The prevalence rates reported are significantly higher which then pushes the agenda on attempting to understand risk factors towards the development of depression and anxiety as well as adult ADHD within the college of health sciences. It also begs the question that with this being the case among the medical students what is the situation among other university and college students? The administration of higher learning institutions should take these findings into account to develop student assistance programs and promote mental health wellness when students are experiencing mental health difficulties.

5.9 Strength of the Study

This study had some strengths such as:

1. A well-defined and adequate sample size was involved. The participants were all eager and willing to participate.
2. The study used tools that were globally reputed, standardized and validated
3. The study was able to estimate variables and factors that are associated with depression, anxiety and ADHD among medical students.

5.10 Recommendations

1. With the high prevalence rate noted for ADHD, Depression and Anxiety within this population, institutions of higher learning should set in place additional academic support programs, mental health wellness programs and mentorship programs to help alleviate emotional distress.
2. In the course of the study, it was observed by the researcher that several participants preferred to remain anonymous. This provided a challenge by

itself as they did not provide their contact detains for follow up to receive the outcomes of their results and guidance towards seeking care. Upon exploration, the researcher observed that this was a consequent of fear of stigma (both self and public) following mental health difficulties. To this effect, mental health awareness conversations to help normalize these realities should be conducted. Medical students should be afforded self-care prompts to help safeguard their wellbeing.

3. There is still great paucity of information on ADHD that results in a major blind spot not only in institution of higher learning but across the board. Early interventions have been found to lower risks of comorbidity and build resilience. Students with academic and interpersonal difficulties should be taken through psychological assessment as part of investigation to help inform the intervention deployed to them.
4. While the findings of this study may not fully represent the reality of medical students in the University of Nairobi, it generates a need for further research to determine the true burden of ADHD and the implications of this condition across the board.

5.11 Study Limitations

Participants gave a self-report of their subjective experiences and there were no psychiatric interviews or further investigations to verify the outcome of the results. This may have resulted in some false positives consequently a higher prevalence rate. Therefore this only serves as an estimation of the prevalence of ADHD, depression and anxiety. Nevertheless, the ASRS, PhQ -9 and GAD-7 validity studies have shown significant correlation with the diagnostic criterion. This withstanding the study findings draw a major concern on this population.

The implications of the COVID 19 pandemic were not considered which may have resulted in significant emotional distress as such affecting the true picture among the group under study.

In regards to the associations drawn in the findings, reverse causality should be considered as a potential bias with further works on this research area being encouraged to elucidate the mental wellness of not only medical students but student in institutions of higher learning.

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APPENDICES

APPENDIX 1: CONSENT FORM

Study Title: **The Association between Depression, Anxiety and Attention-Deficit/Hyperactivity Disorder among University Of Nairobi Medical Students.**

Investigator: Zawadi Kimari- 0706876200.

RESEARCHERS' STATEMENT

1. Introduction

We are requesting you to take part in this research. The purpose of this consent form is to give you the information you will need to help you decide whether or not to be a participant in the study. Feel free to ask any questions about the purpose of the research, what happens if you participate in the study, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions to your satisfaction, you may decide to be in the study or not. This process is called 'informed consent'. Once you understand and agree to be in the study, I will request you to sign your name on this form. You should understand the general principles which apply to all participants in a medical research: i) Your decision to participate is entirely voluntary ii) You may withdraw from the study at any time without necessarily giving a reason for your withdrawal iii) Refusal to participate in the research will not affect the services you are entitled to in this University. We will give you a copy of this form for your records.

2. What Is This Study About?

The researcher named above is looking at the association between depression, anxiety, and ADHD among University of Nairobi Medical Students. The purpose of the interview is to learn about your experiences while pursuing a medical course at the University of Nairobi. We are interested in finding out how common these problems are among the medical students at the University of Nairobi. We are asking for your consent to consider participating in this study. I have selected you to be one of the participants of the study.

3. What Will Happen If You Decide To Be In This Research Study?
If you agree to participate in this study, the following things will happen:
You will be interviewed by a trained interviewer in a private area where you feel comfortable answering questions. The interview will last approximately 25 minutes.

Before we start the discussion, we will ask you to answer a few questions including your age, and level of education among others. We will thereafter start the discussion and ask you to tell us about your experiences while studying at the University of Nairobi and whether you have ever been diagnosed with Anxiety, Depression, or ADHD.

If you agree to participate today, you will sign or make your mark on this consent form. We will give you a copy of this consent form for your records. We will also take notes during the discussion. Moreover, we will not use your name during the interview. Again, you do not have to answer every question if you do not want to. The only people who will hear your answers are those involved in the study.

4. Are There Any Risks, Harms Discomforts Associated With This Study?

Medical research has the potential to introduce psychological, social, emotional, and physical risks. We will put every effort to minimize any risks. One potential risk of being in the study is loss of privacy. We will keep everything you tell us as confidential as possible. We will use a code number to identify you in a password-protected computer database and will keep all of our paper records in a locked file cabinet. However, no system of protecting your confidentiality can be absolutely secure, so it is still possible that someone could find out you were in this study and could find out information about you.
Also, answering questions in the interview may be uncomfortable for you. If there are any questions you do not want to answer, you can skip them. You have the right to refuse the interview or any questions asked during the interview.

5. Are There Any Benefits Being In This Study?

You may not directly benefit from the study. However, the results of this exercise will help to inform on the prevalence of adult ADHD and its association with depression and anxiety. Thereby the outcome can be used to help inform policy on additional support for students towards a better academic and student life while in the program. There will be no other benefits or any other financial incentives for taking part in the study. You will not be paid to take part in the study.

6. What If You Have Questions In the Future?
If you have further questions or concerns about participating in this study, please call or send a text message to the study staff at the number provided at the bottom of this page.
For more information about your rights as a research participant, you may contact the Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics and Research Committee Telephone No. 2726300 Ext. 44102 email uonknh_erc@uonbi.ac.ke.

The study staff will pay you back for your charges to these numbers if the call is for study-related communication.

7. What Are Your Other Choices?

Your decision to participate in research is voluntary. You are free to decline participation in the study and you can withdraw from the study at any time without injustice or loss of any benefits.

8. Will being in this study cost you anything?

There will be no financial cost to you.

9. Confidentiality of Research Information

Confidentiality

The information you provide will be kept secret by the study staff. We will not publish or discuss in public anything that could identify you. We will use a number code to identify your responses and will only link the number code to your name in a storage device/book. The storage device/book will be stored in a room/cabinet under lock and key, and that only the research team will be aware of.

10. What if you have questions in the future?

If you have further questions or concerns regarding your participation in this study, please call or send a text message to Zawadi Kimari- at 0706876200.

If you have questions regarding your rights as a research participant, or personal injury, you should contact the Secretary/Chairperson- Kenyatta National Hospital Ethics and Research Committee, at 2726300-Extension 44102.

CONSENT FORM (STATEMENT OF CONSENT)

Participant's Statement

I have read this consent form or had the information read to me. I have had the chance to discuss this research study with the researcher. I have had my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this study.
I understand that all efforts will be made to keep information regarding my personal identity confidential.

By signing this consent form, I have not given up any of the legal rights that I have as a participant in this research study.

I agree to participate in this research study: Yes_____ No_____

I agree to have the questionnaire preserved for later study: Yes _____No_____

_____	_____	_____
Participant's Name	Signature/Thumbprint	Date

_____	_____	_____
Witness name	Signature/Thumbprint	Date
(if unable to sign)		

Researcher's Statement

I declare that I have given both a written and verbal explanation of the study. I have explained the purpose of the study, methods, risks, and benefits of the study. I have answered and will continue to answer any questions that may arise about the study. The participant will not suffer any adverse consequences in case of early termination of participation in this study.

_____	_____	_____
Researcher's name	Signature	Date

Copies to: Researcher

Participant

APPENDIX 2: THE SOCIO-DEMOGRAPHIC QUESTIONNAIRE

Respondent's Code:	
Individual	
1). What is your age?	a. 18-22 years b. 23-26 years c. 27-30 years d. 30-35 years e. Over 35 years
2). What is your gender?	a. Male b. Female
3). Home residence	a. Urban b. Sub-urban c. Rural
Academic	
1). What is your year of study?	a. Year 1 b. Year 2 c. Year 3 d. Year 4 e. Year 5 f. Year 6
2). How would you rate your academic performance?	a. Good b. Average c. Fair
3). During your academic semester, where do you stay?	a. At home b. At school provided residence c. At externally provided residence eg Qwetu d. With relatives e. Other –specify
4). How satisfied are you with the academic program you are pursuing?	a. High satisfaction b. Average c. Low satisfaction
Social life in school	
1). How satisfied are you with your social	a. High satisfaction

life while at school?	b. Average c. Low satisfaction
2). How satisfied are you with the level of social support you receive from family, friends, and others as you progress in your academic career – both in session and when on holidays?	a. High satisfaction b. Average c. Low satisfaction
3). How satisfied are you with your quality of life in general?	a. High satisfaction b. Average c. Low satisfaction
Health	
1). Do you suffer from any chronic physical ailments?	a. Yes b. No
2). Do you undergo any mental health difficulties?	a. Yes b. No
3). How do you find your physical and/or mental health?	a. Excellent b. Good c. Poor d. Very poor
4). How often do you have negative feelings such as low moods, despair, worries, and frustration?	a. Often b. Rarely c. Never

APPENDIX 3: PATIENT HEALTH QUESTIONNAIRE AND GENERAL ANXIETY DISORDER SCREENER

(PHQ-9 and GAD-7)

Over the last 2 weeks, how often have you been bothered by any of the following problems? Please circle your answers.

PHQ-9	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
1. Little interest or pleasure in doing things.	0	1	2	3
2. Feeling down, depressed, or hopeless.	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much.	0	1	2	3
4. Feeling tired or having little energy.	0	1	2	3
5. Poor appetite or overeating.	0	1	2	3
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down.	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television.	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual.	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself in some way.	0	1	2	3
Add the score for each column				

Total Score (add your column scores): _____

If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people? (Circle one)

Not difficult at all **Somewhat difficult** **Very Difficult** **Extremely Difficult**

***Over the last 2 weeks, how often have you been bothered by any of the following problems? Please circle your answers*.**

GAD-7	**Not at all sure**	**Several days**	**Over half the days**	**Nearly every day**
1. Feeling nervous, anxious, or on edge.	0	1	2	3
2. Not being able to stop or control worrying.	0	1	2	3
3. Worrying too much about different things.	0	1	2	3
4. Trouble relaxing.	0	1	2	3
5. Being so restless that it's hard to sit still.	0	1	2	3
6. Becoming easily annoyed or irritable.	0	1	2	3
7. Feeling afraid as if something awful might happen.	0	1	2	3
Add the score for each column				

Total Score (add your column scores): _____

If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people? (Circle one)

Not difficult at all **Somewhat difficult** **Very Difficult** **Extremely Difficult**

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APPENDIX 4: ADULT ADHD SELF REPORT SCALE (ASRS-v1.1) SYMPTOM CHECKLIST

Participant's Name		**Today's Date**					
Please answer the questions below, rating yourself on each of the criteria shown using the scale on the right side of the page. As you answer each question, place an X in the box that best describes how you have felt and conducted yourself over the past 6 months. Please givethis completed checklist to your healthcare professional to discuss during today's appointment.			Never	Rarely	Sometimes	Often	Very Often
1. How often do you have trouble wrapping up the final details of a project,once the challenging parts have been done?							
2. How often do you have difficulty getting things in order when you have to doa task that requires organization?							
3. How often do you have problems remembering appointments or obligations?							
4. When you have a task that requires a lot of thought, how often do you avoidor delay getting started?							
5. How often do you fidget or squirm with your hands or feet when you haveto sit down for a long time?							
6. How often do you feel overly active and compelled to do things, like youwere driven by a motor?							
							Part A
7. How often do you make careless mistakes when you have to work on a boring ordifficult project?							
8. How often do you have difficulty keeping your attention when you are doing boringor repetitive work?							
9. How often do you have difficulty concentrating on what people say to you,even when they are speaking to you directly?							
10. How often do you misplace or have difficulty finding things at home or at work?							
11. How often are you distracted by activity or noise around you?							
12. How often do you leave your seat in meetings or other situations in whichyou are expected to remain seated?							
13. How often do you feel restless or fidgety?							

14. How often do you have difficulty unwinding and relaxing when you have timeto yourself?					
15. How often do you find yourself talking too much when you are in social situations?					
16. When you're in a conversation, how often do you find yourself finishingthe sentences of the people you are talking to, before they can finish them themselves?					
17. How often do you have difficulty waiting your turn in situations whenturn taking is required?					
18. How often do you interrupt others when they are busy?					
					Part B

APPENDIX 5: DUMMY TABLES

Correlations

		Depression & Anxiety	Depression & ADHD	Anxiety & ADHD	Comorbid Depression/Anxiety & ADHD
Depression & Anxiety	Pearson Correlation				
	Sig.				
	N				
Depression & ADHD	Pearson Correlation				
	Sig.				
	N				
Anxiety & ADHD	Pearson Correlation				
	Sig.				
	N				
Comorbid Depression/ Anxiety & ADHD	Pearson Correlation				
	Sig.				
	N				

Demographic

Variable	**Category**	**Frequency (N=333)**	**Percentage (%)**
Age	18-22 years		
	23-26 years		

	27-30 years 30-35 years Over 35 years		
Gender	Male Female		
Residence			
Year of study			
Academic performance e.t.c.			

APPENDIX 6: STUDY TIMELINES

Activity	**July-Oct 2021.**	**Oct 2021-Feb 2022.**	**Feb 2022-July 2022**	**Aug – Sept 2022**	**Oct-Nov 2022**	**Nov 2022**	**Feb 2023-June 2023**
Development of proposal							
Approval of proposal							
Ethics committee							
Data collection							
Data analysis and reporting							
Presentation							
Completion of work and binding							

APPENDIX 7: BUDGET AND BUDGET JUSTIFICATION

Item	No of units	Cost per unit	Cost	Total cost
Assisting personnel				
Biostatistician	1 analyst contracted for a month		30,000	30,000
Sub-total				**30,000**
Printing cost				
Questionnaires	350	10 per form		3500
Consent form	350	10 per form		3500
Sub total				**7000**
Communication and transport				
Transport				**2100**
Airtime and emails				**2000**
Sub-total				**4100**
Stationery for production				
Paper rims	1	500	500	500
Cartridge	1	2000	2000	2000
Writing materials				200
Production of copies	4	500		2000
Sub-total				**4700**
Total				
15% contingency				10000
Grand total				**55800**