PREVALENCE OF DEPRESSION AND ANXIETY, ASSOCIATED FACTORS, AND CORRELATION WITH EMOTIONAL DYSREGULATION AMONG SCHOOL-ATTENDING ADOLESCENTS IN DAR ES SALAAM: A MIXED METHOD STUDY.

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By

Getrud Joseph

A Dissertation submitted in (partial) Fulfillment of the Requirements for the Degree of Masters of Medicine (Pediatrics and child health) at

Muhimbili University of Health and Allied sciences

October, 2024

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance the dissertation entitled "**PREVALENCE OF DEPRESSION AND ANXIETY, ASSOCIATED FACTORS, AND CORRELATION WITH EMOTIONAL DYSREGULATION AMONG SCHOOL-ATTENDIND ADOLESCENTS IN DAR ES SALAAM: A MIXED METHOD STUDY"**, in fulfillment of the requirements for the degree of Master of Medicine (Pediatrics and Child health) of Muhimbili University of Health and Allied Sciences.

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(Supervisor)

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Date: ……

DECLARATION AND COPYRIGHT

I, **Getrud Joseph**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

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You have all made this journey fulfilling.

DEDICATION

To my late little brother, Joachim: I dedicate this work.
May it contribute to the efforts to improve young people's mental health.

ABSTRACT

Introduction: The rising global burden of mental illnesses among adolescents, particularly depression, anxiety, and emotional disorders significantly impair their ability to thrive. Half of the estimated cases start by 14 years of age, but the majority remain undetected and unattended. It is both critical and timely to establish the evidence that will support the need for routine screening and guide future intervention design to address these disorders among school-attending adolescents.

Objective: To assess the prevalence of anxiety and depression, associated factors, and correlation with emotional dysregulation among school-attending adolescents in Dar-es-salaam. Furthermore, the study aimed to explore the perceived risk factors for anxiety and depression among parents, teachers, and adolescents themselves.

Methodology: This mixed-method study involved adolescents from fifteen schools in Dar es Salaam. Depression, anxiety, and emotional dysregulation were assessed using PHQ-9, GAD-7, and DERS respectively. The correlation of DERS with anxiety and depression was assessed using Spearman's rank test whereas Kruskal-Wallis test compared mean DERS subclass scores with anxiety and depression severity categories. Logistic regression was used to identify the factors associated with depression and anxiety. Perceptions towards depression and anxiety were explored using Focus group discussions and in-depth interviews followed, by thematic analysis by using NVIVO version 11.

Results: Among 1111 adolescents, the median age was 16 years, 59.6% were females, 62.2% were secondary school students and 25.3% had separated/divorced parents. Overall, 50% had both anxiety and depression, 35.8% had depression only while 35.2% had anxiety only. 4.7% of the participants had co-existing moderate to severe forms of anxiety and depression. Emotional dysregulation scores increased with anxiety and depression severity. Depression was associated with orphanhood (aOR 3.26 95%CI 1.45-9.34) and longer home-to-school commuting time (aOR 1.21 95%CI 1.01-1.41). Private school adolescents had higher odds of anxiety (aOR 1.65

95%CI 1.79-3.46). Adolescents who have witnessed their parents fighting had a higher likelihood of both anxiety and depression. Perceived risk factors included academic pressure, negative peer influence, and unstable family dynamics.

Conclusion: Anxiety and depression were prevalent among school-attending adolescents in Dar-es-salaam. Emotional dysregulation had a positive correlation with depression and anxiety. Associated factors included negative family dynamics, orphanhood, academic pressure, and negative peer influence. Common adverse exposures among adolescents were parents' fights, sexual assault, and alcohol and substance use.

Recommendations: Addressing anxiety and depression among school-attending adolescents requires routine screening, enhancing adolescents' emotional intelligence, and regulation of academic pressure. Community education on the negative effects of adverse exposures on adolescents is also paramount.

MUHTAHSARI

Utangulizi: Ongezeko la magonjwa ya akili miongoni mwa vijana balehe, hususan sonona, wasiwasi wa kukithiri, na matatizo ya kudhibiti hisia kunadhohofisha ustawi wao. Asilimia hamsini ya magonjwa haya yanakadiriwa kuanza katika umri wa miaka 14, lakini wagonjwa wengi hubaki bila kugunduliwa wala kutibiwa. Utafiti huu utasaidia kuongeza ushahidi wa kuunga mkono haja ya uchunguzi wa magonjwa ya akili na kusaidia uundwaji wa afua za utatuzi kwa vijana wanaohudhuria shule.

Lengo: Lengo la utafiti huu ni kutathmini ukubwa wa matatizo ya sonona, na wasiwasi wa kukithiri, sababu zinazohusiana nazo, pamoja na uhusiano uliopo na matatizo ya kihisia miongoni mwa vijana wanaohudhuria shule jijini Dar-es-salaam, Tanzania. Zaidi ya hayo, kuchunguza mawazo ya wazazi, walimu, na vijana wenyewe juu ya vihatarishi ninavyopelekea matatizo ya sonona na wasiwasi wa kukithiri miongoni mwa vijana.

Mbinu: Utafiti huu ulijumuisha vijana kutoka shule kumi na tano za Dar es Salaam. Sonona, wasiwasi wa kukithiri, na matatizo ya kihisia vilitathminiwa kwa kutumia PHQ-9, GAD-7, na DERS. Uhusiano kati ya matatizo ya kudhibiti hisia na wasiwasi na msongo wa mawazo ulitathminiwa kwa kutumia “Spearman’s rank test” na “Kruskal-Wallis test”. “Logistic regression” ilitumika kutathmini sababu zinazopelekea matatizo ya sonona na wasiwasi wa kukithiri. Mitazamo ya wazazi, walimu na Vijana-balehe ilikusanywa kwa kupitia majadiliano ya mtu moja moja au kwa vikundi.

Matokeo: Vijana 1111 wenye umri wa wastani wa miaka 16 walishiriki. 59.6% walikuwa ni wasichana, 62.2% walikuwa ni wanafunzi wa sekondari na 25.3% walikuwa na wazazi walioachana au waliotalikiana. Kwa jumla, 35.8% walikuwa na sonona, huku 35.2% walikuwa na wasiwasi wa kukithiri. Uwepo wa matatizo ya kudhibiti hisia kulionekana kuongeza na ukali wa sonona na wasiwasi wa kukithiri. Sababu zilizoonekana kuongeza hatari ya sonona na wasiwasi wa kukithiri ni kuwa yatima, kutumia muda mrefu wa kusafiri kutoka nyumbani kwenda shule, na kushuhudia wazazi wakiwa wamelewa au wanagombana. Vijana wa shule za

binafsi walikuwa na uwezekano mkubwa wa kuwa na wasiwasi wa kukithiri. Mitazamo ya washiriki ilijumuisha mzigo mkubwa wa masomo, ushawishi mbaya wa rika, na matatizo ya kifamilia.

Hitimisho: Matatizo ya sonona na wasiwasi wa kukithiri yameshamiri miongoni mwa vijana wanaohudhuria shule Dar-es-salaam. Matatizo ya kudhibiti hisia yalionyesha uhusiano chanya na matatizo haya. Sababu zinazohusiana zilijumuisha mienendo hasi ya kifamilia, kuwa yatima, shinikizo la masomo, na ushawishi mbaya wa rika, na kukumbana na matukio mabaya.

Mapendekezo: Kushughulikia wasiwasi na msongo wa mawazo miongoni mwa vijana wanaohudhuria shule kunahitaji uchunguzi wa mara kwa mara, kuboresha uwezo wao wa kudhibiti hisia, pamoja na utatizi wa visababishi vilivyoainishwa.

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ABBREVIATIONS

aOR : Adjusted Odds Rati
BMI : Body Mass Index
cOR. : Crudes odds ration
DALYs : Disability Adjusted Life Years
DERS : Disorders of Emotional Regulation Scale
DSM-5 : Diagnostic and Statistical Manual of Mental Disorders, Fifth edition
FGD : Focus Group Discussion
GAD-7 : Generalized Anxiety Disorder scale, seventh edition
GBD : Global Burden of Disease
IDI : In Depth Interview
IQR : Inter-quartile range
LMIC : Lower- and Middle-Income Countries
MUAC : Mid Upper Arm Circumference
MUHAS: Muhimbili University of Health and Allied Sciences
NCD : Non-Communicable Disease
ODK : Open Data Kit
PHQ-9 : Patient Health Questionnaire, version 9
SDG : Sustainable Development Goals
SSA : Sub-Saharan Africa
UNICEF: United Nation Children's Fund
WHO : World Health Organisation

DEFINITION OF TERMS

Adolescent: An adolescent is defined as an individual aged between 10-19 years inclusively

Depression: Depression in this study will be defined as a PHQ-9 score at least 5, with categorization as follows;

Mild depression: PHQ-9 score of 5 - 9

Moderate depression: PHQ-9 score of 10 - 14

Moderate to severe depression: PHQ-9 score of 15 - 19

Severe depression: PHQ-9 score of 20 - 27

Anxiety: Anxiety was defined as a GAD-7 score of 5 and above, categorized as follows

Mild anxiety: GAD-7 score of 5- 9

Moderate anxiety: GAD-7 score of 10 - 14

Severe anxiety: GAD-7 score of 15 – 21

Emotional dysregulation: Emotional dysregulation is characterized by the inability to generate an appropriately controlled magnitude, quality, duration, and trajectory of emotional response to a provocative trigger

Body mass index: was defined as weight in kilograms divided by the square of height in centemetre.

1.0 INTRODUCTION

1.1 Background

1.1.1 Global situation and the burden of mental illnesses

The World Health Organisation (WHO) defines health as "the state of complete physical, mental and social wellbeing and not merely the absence of infirmity"(1). WHO further defines mental health as "a state of well-being in which an individual realizes his or her abilities, can cope with normal stresses of life, can work productively, and can contribute to the community"(1). Both mental and physical well-being are integral components of health at the individual, community, and population levels.

Physical health has received a significant portion of attention and resources as compared to mental health, especially in resource-limited settings. The Sustainable Development Goals (SDG) call for good physical and mental well-being for all people, regardless of age, sex, race, socioeconomic status, or geographical location (2). Specifically, SDG 3.4 pitches towards a global reduction of premature mortality from non-communicable diseases by at least one-third and promotion of mental well-being by 2030 (2). Furthermore, making the SDG target of universal health coverage a reality requires prioritization of mental health, as it is crucial in enhancing population-level health and prosperity (3).

The burden of mental illnesses is rising globally. The global burden of disease (GBD) study reported that mental illnesses accounted for 125 million Disability-adjusted Life Years (DALYs) in 2019, representing an increase of more than 300 million cases over the past three decades (4). Depression and anxiety were the commonest reported mental disorders accounting for 279 and 300 million cases respectively (4). Besides effects on individual well-being, mental illnesses contribute significantly to premature mortality and broadly affect societal welfare leading to losses in socio-economic productivity (5). Individuals with untreated mental illnesses face an elevated risk of acquiring both infectious and non-communicable diseases (NCDs) and have increased risk of dying up to two decades early (6–8).

Sub-Saharan Africa (SSA) is dually burdened by both infectious diseases and NCDs. Mental illnesses contribute significantly to the NCD burden in the region, and the prevalence is projected to rise by more than double over the next four decades (9). It has been reported that SSA has the highest burden of depression, with more than 4500 cases per 100,000 population (4). However, up to 85% of individuals suffering from mental illnesses in lower- and middle-income countries (LMICs) do not receive treatment on time, owing to the inadequacy of the health system in detecting and managing these conditions, scarcity of age-disaggregated data, limited mental health literacy, and poor prioritization of mental health in resource allocation (1). Multisectoral approaches are needed to improve mental health at all stages of one's life course including adolescence.

1.1.2 Adolescents' mental health

Mental well-being is an essential component of the development trajectory during adolescence. Adolescence is a critical period of significant physical, cognitive, and mental growth spurt accompanied by self-realization, developing characters, and forging meaningful relationships that significantly influence their adult lives (10). It is a period of increased vulnerability to risk-taking behaviors and a heightened risk of anxiety and depression (11–14). Adolescents' mental well-being is essential for them to enjoy fulfilling lives and make healthy transitions into adulthood.

It is estimated that 50% of mental health disorders start by the age of 14 years, but almost 70% of them remain undetected and unattended (15). Adolescents living in resource-limited settings may be disproportionately affected due to poorer social determinants of health including extreme poverty, high burden of HIV, adverse childhood experiences, and lack of adolescent-friendly mental health care (16,17). Adolescents with poor mental health are at an increased risk of engaging in risky sexual behaviors, substance abuse, self-harm, perpetrating violence, and experiencing school absenteeism, all of which can lead to poor academic performance (18–21). Ensuring adolescents' well-being is a global health priority. The aim is not just to improve their survival, but also to promote their capacity to thrive and positively impact their communities (22). On that accord, prioritizing adolescent mental health is crucial for optimal health outcomes over a life course.

Mental illnesses cause significant morbidity among adolescents globally. A systematic review of adolescent mental illnesses in SSA 2023

reported high rates of emotional disorders, anxiety, depression, and suicidality, at 40%, 29.8%, 26%, and 20% respectively (23). Similarly, a global study reported a 21% prevalence of suicidal ideation among African adolescents (24). Besides morbidity, mental illnesses significantly contribute to mortality among adolescents. In 2019 alone, injuries, including those due to interpersonal violence contributed 32% of global adolescents' deaths, whereas self-harm contributed 8.2% (25). Despite the documented rising trend of mental illnesses among adolescents globally, there is still limited age-disaggregated data on the drivers of these disorders especially from SSA countries.

1.2 Problem statement

Tanzania, akin to other countries in SSA, is faced with a significant burden of mental illnesses among adolescents. For instance, a multi-country study conducted in six SSA nations reported that the prevalence of depression among adolescents aged 10 – 19 years ranged from 21% to 33%, with Tanzania reporting a prevalence of 31% (26). The reported burden of anxiety among this age group in SSA also ranges between 18.6% and 36.4% (27). Despite the existing evidence on the burden, and that the majority of mental illness cases begin during adolescence, almost three-quarters will not be diagnosed and treated until adulthood (17).

Furthermore, most of the existing literature combines both in-school and out-of-school adolescents when assessing the burden and drivers of mental illnesses, despite the possibility of systematic uniqueness of those attending schools. This leaves a knowledge gap regarding the burden and specific risk factors associated with anxiety and depression among school-attending adolescents. Consequently, the deployed interventions to address depression and anxiety may not be responsive to the particular needs, preferences, and context of in-school adolescents. Without evidence-based tailored interventions, the effectiveness and uptake of mental health promotion efforts can be limited, leading to a continued burden of depression and anxiety among school-attending adolescents.

1.3 Conceptual framework

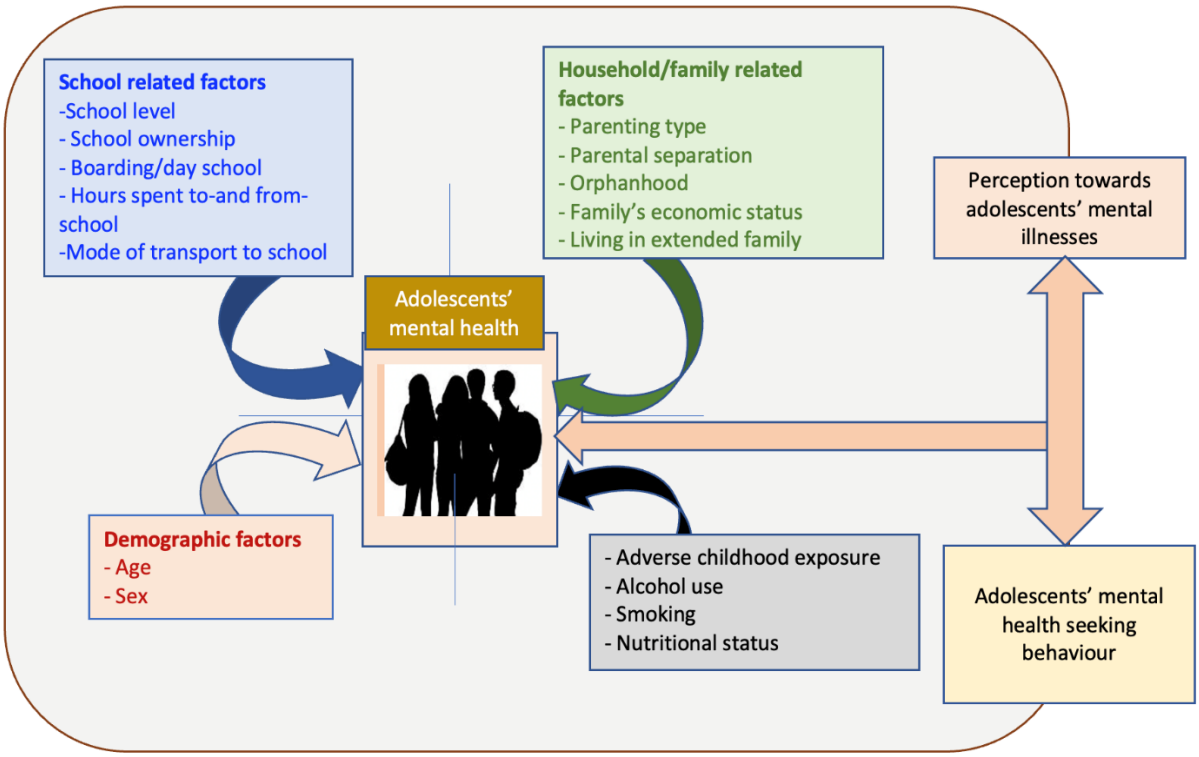


Figure 1: Conceptual framework of factors influencing adolescents' mental health

1.3.1 Conceptual framework description

Applying adolescent-centered thinking, various domains of inter-woven factors may influence the occurrence of mental illnesses including depression, anxiety, and emotional dysregulation among school-attending adolescents. There are many conditions that one lives in, such as demographic factors, household functionality, exposure to adverse events, and socioeconomic factors that have a significant contribution to adolescents' mental health (28). Such social determinants of mental health informed the main domains investigated in the study. These included demographic factors, school-related factors, household-related factors, nutritional status, adverse childhood exposure, alcohol use, and smoking as shown in the conceptual framework in *Figure 1* above. School-related factors that were assessed

included school level (primary or secondary), school ownership (private or public), duration of commuting from home to school, and mode of transport to school. Household-related factors included primary caretaker, single parenthood, orphanhood, and wealth status. Other factors that were assessed included nutrition status and adverse exposure such as physical and sexual violence, witnessing parents fighting, alcohol use, and smoking.

1.4 Rationale

Findings from this study add to the existing body of evidence on the burden of depression and anxiety, and how these disorders correlate with emotional dysregulation among school-attending adolescents. This is to support the need for screening programs for mental health disorders among school-attending adolescents. Furthermore, the established occurrence and distribution of risk factors highlight the groups of school-attending adolescents who are at a higher risk of depression and anxiety and provide the basis for intervention design to address these disorders. Additionally, the knowledge about prevailing perceptions adds critical insights to guide structures of context-specific, and responsive interventions. Moreover, Tanzania is actively strengthening strategies to address NCDs across a life course, including mental health. These findings provide policymakers and other adolescent health stakeholders in the country with baseline information necessary for designing adolescent mental health promotion strategies in Tanzania.

1.5 Research questions

The following research questions were addressed in this study;

1. What is the magnitude of depression and anxiety among school-attending adolescents in Dar es Salaam?
2. What is the correlation of emotional dysregulation with depression and anxiety among school-attending adolescents in Dar es Salaam?
3. What are the factors associated with depression and anxiety among school-attending adolescents in Dar es Salaam?
4. What are the perceived risk factors for adolescent depression and anxiety according to adolescents, teachers, and parents?

1.6 Objectives

1.6.1 Broad objective

The broad objective was to determine the prevalence of anxiety and depression, correlation with emotional dysregulation, and the associated factors among school-attending adolescents in Dar es Salaam Tanzania.

1.6.2 Specific Objectives

The following were the specific objectives;

1. To determine the prevalence of depression and anxiety among school-attending adolescents in Dar es Salaam.
2. To determine the correlation of emotional dysregulation with depression and anxiety among school-attending adolescents in Dar es Salaam.
3. To determine the factors associated with depression and anxiety among school-attending adolescents in Dar es Salaam
4. To explore adolescents', teachers', and parents' perceptions of risk factors for adolescent depression and anxiety.

2.0 LITERATURE REVIEW

2.1 Burden of depression and anxiety

Depression is a common mental health disorder among adolescents although it is often not diagnosed and treated until adulthood (20). The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) defined depression as "recurrent episodes of changes in affect, cognition, and neuro-vegetative function for at least two weeks, accompanied by functional impairment". Among other features, it is characterized by periods of extreme sadness, loss of interest, and suicide ideation in severe forms (29).

The rising burden of depression among adolescents is a global health issue of concern. A meta-analysis of seventy-two studies with a pooled sample size of over 324,000 adolescents representing all the continents across the globe reported an increase in the prevalence of depression from 24% in 2001 to 37% in 2020 (30). LMICs are disproportionately affected with substantial regional variation. Studies conducted in Asia have reported the prevalence of depression among adolescents ranging from 34.9% in Thailand to 51.2% in India (31–36). From SSA, a multi-country study that involved 7662 adolescents also reported the prevalence of depression ranging from 21% in Ethiopia to 32.5% in Ghana (26). The burden reported in this multi-country study aligns with those from individual studies from East African countries. A study involving school-attending adolescents from Jimma town in Ethiopia found a prevalence of depression of 28% (37). Cross-sectional studies from Uganda also reported a prevalence of 21% from central Uganda (38), and 33.5% from northern Uganda (39). Similarly, a study that assessed the burden of depression among adolescents attending public secondary schools in Nairobi Kenya has reported a prevalence of 26.4% (40).

The burden of depression among Tanzanian in-school and out-of-school adolescents involved in a multi-country indicates a prevalence of 31% (26). A slightly higher prevalence of 36% has been reported in a study that involved out-of-school adolescents in Tanzania (41). Data on the burden of depression, focusing solely on school-attending adolescents in Tanzania is scarce, despite plausible differences such as exposure to academic stress, and in-

school bullying (42). This underscores the necessity to assess the burden of depression among school-attending adolescents.

Anxiety is defined by the DSM-5 as "excessive worry and apprehensive expectation, occurring more often than not, affecting one's function in multiple aspects such as work or school performance," (29). Anxiety is among the leading mental illness among adolescents. A global survey that included over 200,000 school-attending adolescents aged 12-17 reported an overall prevalence of anxiety of 9%, with a higher prevalence of 13% among African adolescents (24). A meta-analysis that involved only studies from SSA countries reported a prevalence of up to 36% (27).

Similar to other mental illnesses among adolescents, the burden of anxiety is also on the rise. A study conducted in 2008 in seventeen secondary schools from Nairobi reported a prevalence of anxiety of 12.9% (43), while a more recent study that was conducted 9 years later, involving 658 school-attending adolescents reported a higher prevalence of 37.9% (44). Evidence of the burden of anxiety among school-attending adolescents in Tanzania is scarce. A small-scale study that assessed the burden and correlates of anxiety among 92 secondary school students from Dodoma-Tanzania reported a rather outlying prevalence of anxiety of 84% (45). However, methodological limitations such as the inclusion of small sample size, possible selection bias, and the resultant lack of precision may limit the ability to draw a plausible inference regarding the burden of anxiety among in-school adolescents in Tanzania from that study. A large-scale study is necessary to ascertain the burden of anxiety and its drivers among in-school adolescents in Tanzania. However, it is important to note that the proportion of anxiety and depression reported may differ depending on the tools used, due to variations of their sensitivities.

2.2 Correlation of emotional dysregulation with depression and anxiety

Emotional dysregulation is characterized by the inability to generate an appropriately controlled magnitude, quality, duration, and trajectory of emotional response to a provocative trigger. It also involves failure to revert to one's baseline emotional state and disruptions in social relationships (46,47). It may present with inappropriate bursts of anger, severe tantrums, low threshold of initiating conflicts, aggressive behaviors, excessive fear,

sadness, risk-taking, self-injury, and suicidality, features that are also common in depression and anxiety (48). Disorders of emotional regulation have been shown to independently increase the risk of onset and persistence of mental illnesses (46,48).

Optimal emotional regulation during adolescence is key to their mental well-being. Adolescents are on a critical transition from childhood emotional regulation which relies on external support from parents and caretakers to a more independent emotional regulation characterized largely by individual control strategies (47,49). Emotional dysregulation may exacerbate symptoms of anxiety and depression, and they share risk factors such as exposure to social adversities (48). Furthermore, the DSM-5 highlights emotional dysregulation disorder as a "constellation of mislabelled and mis-conceptualized psychological and psychiatry disorders" that sit at the core of other mental health disorders (29). Therefore, understanding the interplay between emotional dysregulation and mental illnesses such as anxiety and depression is crucial for designing comprehensive approaches to address these disorders among school-attending adolescents.

2.3 Factors associated with anxiety and depression among school-attending adolescents

2.3.1 Socio-demographic factors

Studies have consistently reported a higher prevalence of depression among female adolescents compared to males (37,38,40,43). Similarly, the study that assessed the global burden of anxiety among adolescents across the five WHO regions reported a nine-fold higher risk of anxiety among female adolescents (24). The 2019 Global burden of disease documented a higher prevalence of depression and anxiety among females across all age groups (4). Female adolescents may be more susceptible to depression and anxiety due to the differences in hormonal changes during puberty and sensitivity to the associated changes of body image, difference in coping strategies as well as feminine social constructs that encourage girls to be more expressive of their emotions (50).

Mixed findings have been reported about the association between age and depression. For instance, a study among Ethiopian school-attending adolescents reported lesser odds of depression with the increase in age (37), contrary to the multi-country study in SSA that

reported a significantly higher prevalence among older adolescents (26). On the other hand, various studies have indicated increased odds of anxiety among older adolescents (51,52). Such variation may be explained by methodological variations such as the proportion of different age groups in the selected sample, or socio-cultural differences. It is therefore crucial to determine the context-specific influence of factors such as age and sex on depression and anxiety to guide intervention design.

2.3.2 School-related factors

Various school-related factors may influence the occurrence of anxiety and depression among adolescents (18,45). School-related factors that have been associated with depression and anxiety include separation from family members especially those attending boarding schools, academic workload, corporal punishment at schools, and bullying (38,45). Additionally, anxiety and depression may contribute to sleep disturbances which can in turn affect concentration ability, recall ability, and school performance. The Global Student Health Survey reported 12% of anxiety-induced sleep deprivation among school-attending adolescents in SSA and 5.1% among Tanzanian participants (53). Furthermore, the burden of anxiety and depression may vary between adolescents from private and public schools (54). There are limited data on school-related factors that may be associated with depression and anxiety in the Tanzanian context.

School-attending adolescents spend most of their time with their peers. Peer influence affects adolescents' decision-making and engagement in risky behaviors such as unsafe sexual relationships, substance use, bullying, low self-esteem, and social exclusion, all of which may increase the risk for depression and anxiety (55–57). On the other hand, peer influence is also a useful target for interventions to improve mental well-being among adolescents using peer-led interventions (58). Studies from resource-limited settings have shown promise in the acceptability, affordability, effectiveness, and feasibility of peer-led interventions in SSA settings (59–61).

2.3.2 Exposure to childhood adversities

Adolescents' exposure to social adversities at the community or household levels increases their risk of anxiety and depression (62,63). In general, various biopsychosocial mechanisms underlie the effects of exposure to adverse events on one's mental health over a life course. These include epigenetic DNA modifications, dysfunction in the prefrontal-hippocampal-amygdala circuits, and impaired neurotransmitter functioning that result in compromised emotional response and stress regulation (64,65). However, various factors such as socioeconomic status, and accessible support systems may mitigate the negative impacts of adverse exposures on adolescent mental health (66).

Social adverse events that are associated with increased risk of depression and anxiety among adolescents include household dysfunction such as marital disharmony, abuse, orphanhood, negligence, extreme poverty, exposure to alcoholism, and substance use (23,37,38,43,44,67). There is a reciprocal relationship between adolescents' substance use and the risk of developing anxiety and depression.

2.3 Perceived risk factors for adolescent depression and anxiety

Despite the documented increasing burden and global omnipresence of depression and anxiety among adolescents, these conditions largely remain undiagnosed and hence under-treated. Perceptions around mental illnesses may affect how significant these disorders are viewed in society, readiness to seek care, and the uptake of adolescents' mental health promotion strategies. Parents, teachers, and adolescents are key stakeholders whose perceptions may provide a comprehensive understanding of the drivers of depression and anxiety, prevailing misconceptions, and health-seeking behaviors (68). Pervasive stigma, relating mental health with witchcraft, normalization of symptoms, and use of cultural approaches for the treatment of mental illnesses such as depression and anxiety are among the most common documented perceptions from SSA settings (68–70). Perceptions may differ across contexts. Hence, understanding local perceptions of depression and anxiety can inform the development of cultural and context-relevant mental health programs to address these disorders among school-attending adolescents.

3.0 METHODOLOGY

3.1 Study design

This embedded mixed-method research was conducted to facilitate a robust understanding of the burden, drivers, and contextual factors, that contribute to depression and anxiety among school-attending adolescents (71). Quantitatively, a cross-sectional method was employed to assess the prevalence and factors associated with depression and anxiety and their correlation with emotional dysregulation. A qualitative approach using Focus Group Discussions (FGDs) and In-depth Interviews (IDIs) was employed to assess adolescents', parents', and teachers' perceptions of depression and anxiety.

3.2 Study duration

The study was conducted for nine months from the 1st of October 2023 to the 31st of March 2024. This duration included the time for data collection, analysis, and report writing.

3.3 Study area

The study was conducted in the five municipal councils of Dar es Salaam: Kinondoni, Ilala, Temeke, Kigamboni, and Ubungo municipal councils. According to the 2022 national census, Dar es Salaam is Tanzania's commercial capital, and the most populated region harboring 5.3 million people, and approximately 40% are aged below 19 years. (72). Dar es Salaam is located on the Eastern coast of Tanzania, encompassing people of diverse demographics and socioeconomic profiles, and educational infrastructure that includes a wide range of public and private schools that cater to students from various backgrounds. According to the census reports, there are 838 primary and 350 secondary schools. Most of the schools are located in Ilala, followed by Ubungo, Kinondoni, Temeke, and Kigamboni municipal councils (72).

3.4 Study population

The study population included adolescents aged 10-19 years attending primary and secondary schools in Kinondoni, Kigamboni, Ilala, Temeke, and Ubungo municipal councils

in Dar es Salaam. Parents and teachers of the adolescents from the participating schools were part of the study population for the qualitative component only. Adolescents participated in both quantitative and qualitative components.

3.5 Inclusion criteria

Adolescents aged 10-19 years enrolled in classes five to seven for primary school students and ordinary and advanced level secondary school were included in the study. The inclusion criteria for the teachers and parents were teaching in one of the participating schools or having an adolescent child attending one of the participating schools respectively.

3.6 Exclusion criteria

Adolescents from special schools such as those enrolling students with hearing impairment, visual impairment, or learning disabilities were not included in the study. Furthermore, adolescents who declined to provide written assent or whose parents did not provide written parental consent to participate in the study were excluded.

3.7 Sample size calculation

Sample size calculation was done based on the prevalence of depression, the most common mental illness among adolescents in SSA (73). Using the *Leslie Kish* sample size estimation for proportion, considering a prevalence of 26.4% of that was reported among school-attending adolescents from the neighboring country of Kenya (37), at a 95% confidence level and a 3% margin of error, the sample size was estimated as follows;

$$N = \frac{z^2 * p\,(100 - p)}{\varepsilon^2}$$

Whereby;

Z = 1.96

P = 26.4%

ε = 3

N = 1.96 X 1.96 x 26.4x (100-26.4)/ 3*3

N = 830

Adjusting for 20% possible non-response rate

N = n x 1/0.8

N = 830x1/0.8

N = 1038

The minimum sample size required for the study was 1038 school-attending adolescents.

3.8 Sampling strategy

3.8.1 Quantitative sampling

A stratified multi-stage sampling strategy was employed for the quantitative approach of the study. First, a list of schools was obtained for each municipal council. One primary school and 2 secondary schools were randomly selected from each council. The number of students from each council was determined using Probability Proportional to Size (PPS) to account for the variation in number of students across different councils. This required the inclusion of at least 294 adolescents from Ilala, 238 from Ubungo, 235 from Kinondoni, 196 from Temeke, and 74 students from Kigamboni councils. After selecting the schools and determining the required number of participants from each council, classes for recruitment were randomly assigned for each school. Students were then consecutively enrolled from each chosen class within the schools. The final required sample comprised participants from fifteen schools across all five municipal councils, ranging from class five to advanced-level secondary schools.

3.8.2 Qualitative sampling

A purposively selected sample of adolescents, parents, and teachers were invited to participate in the qualitative component of the study. Purposive sampling allowed for the intentional selection of participants who could offer valuable insights on the topic of adolescent depression and anxiety. Headteachers, their assistants, or discipline coordinators from participating schools were invited to take part in the IDIs. Parents living near the schools were also contacted for their willingness and availability to participate in the IDIs. Sex-concordant groups of eight adolescents each were invited to participate in the FGDs.

Data saturation was met after nine interviews with teachers, eight interviews with parents, and ten focus group discussions with adolescents. All IDIs and FGDs were audio recorded.

3.9 Study variables

The outcome variables of the study were the prevalence of depression and anxiety among school-attending adolescents. Independent variables included socio-demographic characteristics, family dynamic characteristics, school-related factors, exposure to adverse social events, emotional dysregulation, and body mass index (BMI).

The socio-demographic characteristics included age, sex, and council of schooling. Family characteristics included the primary caretaker, whether the parents live together, and the wealth index. Adverse social events included witnessing the parents fighting, witnessing parents drinking alcohol, marital disharmony, exposure to sexual violence, ever drunk alcohol, and smoking cigarettes. School characteristics included the educational level (primary or secondary), school ownership (private or public), mode of transport to school, and commuting time between home and school.

Emotional dysregulation was assessed by using the Disorders of Emotional Regulation Scale (DERS-18) under the subclasses of non-acceptance of emotional responses, difficulty engaging in goal-directed behaviour, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity (74). DERS scores were summed up for each subclass and the overall score. Participants' overall score was categorized into two categories, (less than the 75^{th} percentile, and greater or equal to the 75^{th} percentile). Higher DERS scores indicate a higher severity of emotional dysregulation (75).

BMI was calculated as weight in kilograms divided by the square of the height in centimetres. The BMI values were then categorized according to established percentiles: underweight (less than the 5th percentile), normal weight (between the 5th and 85th percentiles), and overweight/obesity (above the 85th percentile).

3.10 Data collection tools

Depression was assessed using the Swahili version, self-administered Patient Health Questionnaire-version 9, modified for adolescents (PHQ-9A). PHQ-9A is a nine-question tool designed for rapid screening of depression and its severity over two weeks before the assessment. Scores for each item range from 0 (not at all), 1 (several days), 2 (more than half of the days), and 3 (nearly every day). The total score was categorized as; no depression, mild depression, moderate depression, moderate to severe depression, and severe depression by corresponding scores of 0-4, 5-9, 10-14, 15-19, and 20-27 respectively (37,76).

Anxiety was assessed by using a self-administered Generalised Anxiety Disorder tool version 7 (GAD-7). GAD-7 is a seven-item tool that assesses symptoms corresponding to generalized anxiety disorder over the past two weeks. Each response is indicated on a Likert scale ranging from 0 (not at all), 1 (several days), 2 (More than half the days), and 3 (Nearly every day). The overall scores were classified into four categories: no anxiety (0-4), mild anxiety (5-9), moderate anxiety (10-14), and severe anxiety (15-21) (43,44).

Emotional dysregulation was assessed using the eighteen-question DERS tool as described in the previous section. A Swahili-translated pre-tested structured questionnaire was used to assess participants' characteristics and the factors associated with depression, and anxiety. All quantitative data tools were self-administered by the adolescent. Qualitative data was collected by using Swahili FGD and IDI guides.

3.11 Data quality control

The research assistants (intern doctors and nurses) underwent a mandatory three-day training on research ethics, the objectives of the study, and the study tools. All tools and questionnaires were self-administered to reduce the possible socio-desirability bias. Qualitative data collection was led by the principal investigator.

3.12 Data processing and analysis

Quantitative data entry was done by using the Open Data Kit (ODK) tool, and the analysis was done by using STATA version 15. Categorical data were expressed by using frequency and proportions. Continuous data were expressed as median and interquartile ranges. The chi-square test was used for the association between categorical variables and the study outcomes. The continuous correlation of emotional dysregulation with depression and anxiety was determined by using Spearman's rank test, whereas Kruskal-Wallis test was used to compare subclass median DERS scores across the severity categories of depression and anxiety. Univariate and multivariate logistic regression were used to assess for factors associated with the outcomes of depression, and anxiety. The multivariate model was built based on biological plausibility, clinical significance, and statistical significance at the univariate analysis stage. A *p-value* of less than 0.05 was considered statistically significant. Analyses were conducted on available data without performing any imputation for missing values. Observations with missing data were excluded from the analysis of the particular outcome.

For qualitative data, thematic analysis was done by using NVIVO software version 11, applying Braun and Clarke's six-step approach (76). Following a systematic process, audio-recorded data was transcribed and translated verbatim. After significant familiarisation with the data, it was then coded, categorized, and refined into themes and subthemes.

3.13 Ethical consideration

The study was approved by the MUHAS Institutional Review Board (IRB) with an approval number MUHAS-REC-08-2023-1886. Upon approval, permission to conduct the study was sought from the regional and all five municipal councils of Dar es Salaam. Thereafter, permission was sought from the head teachers of the selected schools. For the consenting process, eligible students were given a sheet of information containing details of the study in Swahili language and the investigator's contacts to present them to their parents. The information sheet was attached with a Swahili version of the parental consent that they were asked to sign if they accepted the inclusion of their adolescents in the study. Assent was sought from adolescents aged below 18 years who returned the signed parental consent

forms. Informed consent was sought from adolescents aged 18 – 19 years of age. Parents of participants who screened positive for depression, and/or anxiety were contacted and referred to attend the nearby council hospital for further evaluation.

4.0 RESULTS

A total of 1245 participants were enrolled. Among them, 123 were excluded because the documented age was above 19 years of age, and 11 were excluded because they did not have complete data in any of the study outcomes. A total of 1111 participants were included in the final analysis. The flow diagram in *figure 2* below summarizes participants' recruitment.

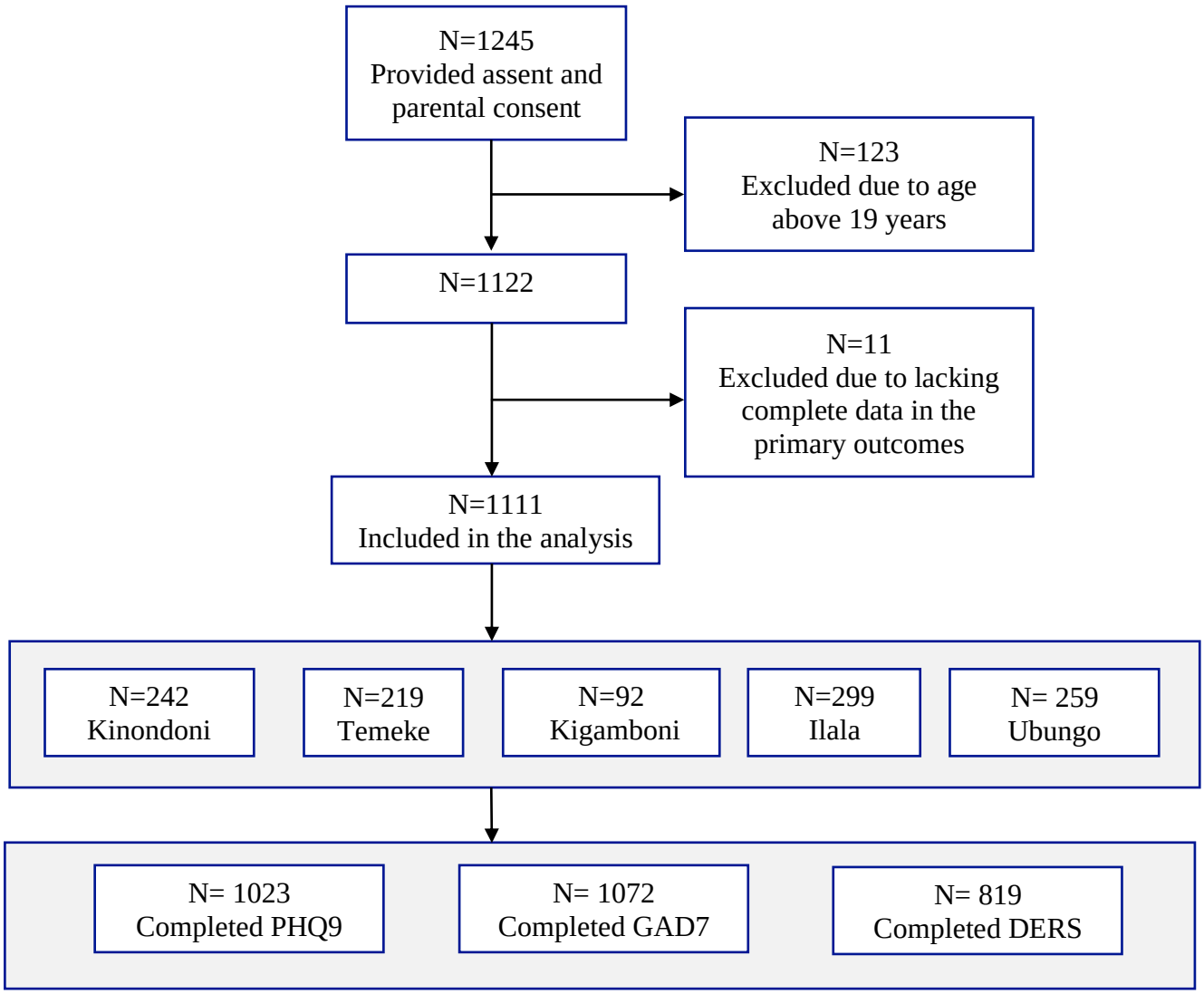


Figure 2: flow diagram summarizing participants' recruitment

4.1. Participants' characteristics

The median age of the study participants was 16 years (IQR 12 – 18), 662 (59.6%) of them were females, 691 (62.2%) were secondary school students, and 15.1% were overweight/obese. The majority (85.7%) of the participants had both parents alive, but one-quarter (25.3%) of the parents were not living together. Half (51.1%) of the participants were using public means for transport to school and the median home-to-school commuting time was 30.6 minutes (IQR 16.5 – 61.0). Social adverse events were reported in 14.4% who had ever witnessed their parents fighting, and 3.2% of the participants reported they had experienced sexual assault either from peers or elders as shown in *Table 1*.

Table 1: Social and demographic characteristics of the study participants.

Participants' Characteristics		N	Percentage
Age (years)	10-13	408	36.7%
	14-16	279	25.1%
	17-19	424	38.2%
Gender	Female	662	59.6%
	Male	449	40.4%
School level	Primary	420	37.8%
	Secondary	691	62.2%
Primary caretaker	Both parents	717	64.6%
	Single Parent	225	20.2%
	Other	169	15.3%
Parents alive	Both are alive	952	85.7%
	One parent is alive	136	12.3%
	Both are deceased	12	1.1%
	Not aware	11	0.9%
Parents live together	No	241	25.3%
	Yes	711	74.7%
Wealth index	Lowest	365	32.9%
	Middle	393	35.4%
	Highest	353	31.8%
Transport to school	Private/school bus	63	5.8%
	Public transport	567	51.1%
	Walking	481	43.1%
DERS score	$< 75^{th}$ percentile	645	78.8%
	$\geq 75^{th}$ percentile	174	21.2%
Nutrition status	Underweight	57	5.2%
	Normal weight	886	79.7%
	Overweight and obesity	168	15.1%
Ever witnessed parents fighting	No	950	85.6%
	Yes	160	14.4%
Ever slept without eating for lack of food	No	970	87.5%
	Yes	139	12.5%
Ever witnessed parents drunk	No	1063	92%
	Yes	45	8%
Ever experienced sexual assault	No	1074	96.8%
	Yes	36	3.2%
Currently smoking	No	992	99%
	Yes	10	1%
Currently consuming alcohol	No	1046	97.5%
	Yes	27	2.5%

4.2 Prevalence of depression and anxiety among school-attending adolescents in Dar es Salaam

Among participants who completed both PHQ9A and GAD-7, 560 (50.4%) screened positive for both anxiety and depression, whereas 53 (4.8%) screened positive for moderate to severe forms of both.

Among the participants who completed the PHQ-9A tool, 366 (35.8%) scored at least 5 indicating a positive screening for depression. About one quarter (24.7%) had mild depression whereas 11.1% of the participants screened positive for moderate to severe forms as shown in *Figure 3 below*.

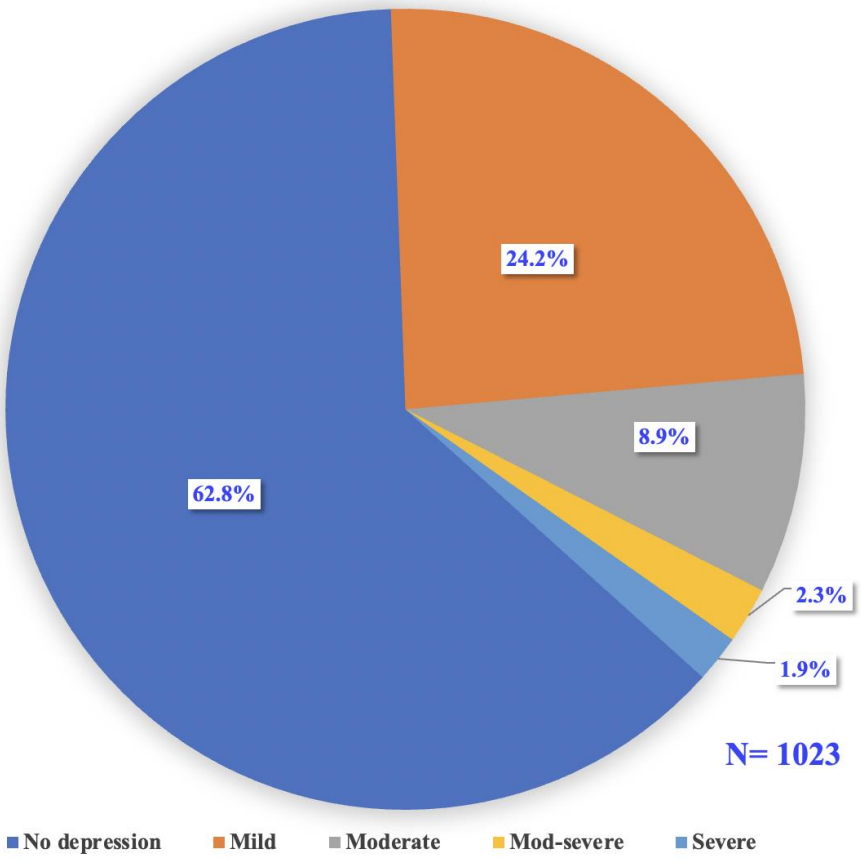


Figure 3 Prevalence of depression by severity

Among those who completed the GAD-7 tool, 377 (35.2%) met the criteria for anxiety. Regarding the severity of anxiety, 261 (24.3%) screened positive for the mild form of anxiety whereas 10.8% of the participants had moderate to severe forms as described in *Figure 4 below*.

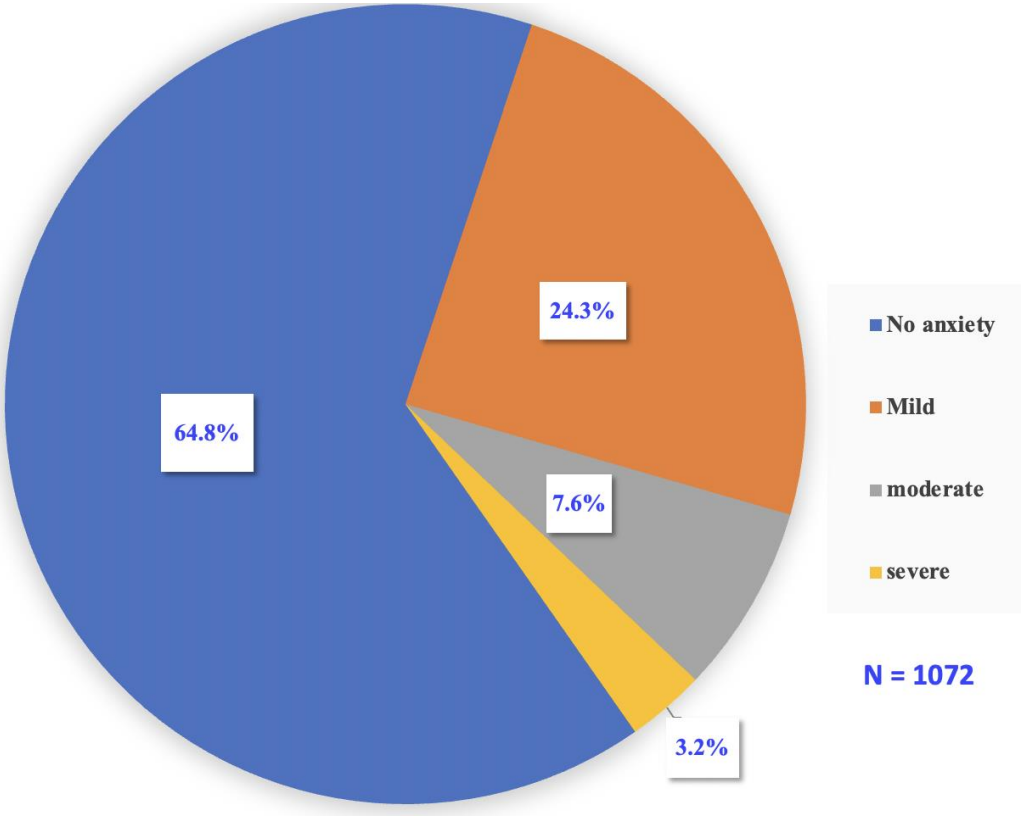


Figure 4 : Prevalence of anxiety by severity

4.3 Correlation of emotional dysregulation with depression and anxiety

Overall, the minimum DERS score was 18 and the maximum was 80 with a median score of 35.69. As described in *Table 1* above, 174 (21.2%) of the participants had DERS score of 75th percentile and above. The median score for DERS subclasses ranged from 4.9 in the subclass that assessed for "lack of emotional clarity" to 8.25 in the "lack of emotional awareness" subclass. *Figures 5a and 5b* below are whisker plots summarising the overall DERS score and subclass scores respectively.

Figure 5a: Overall DERS score

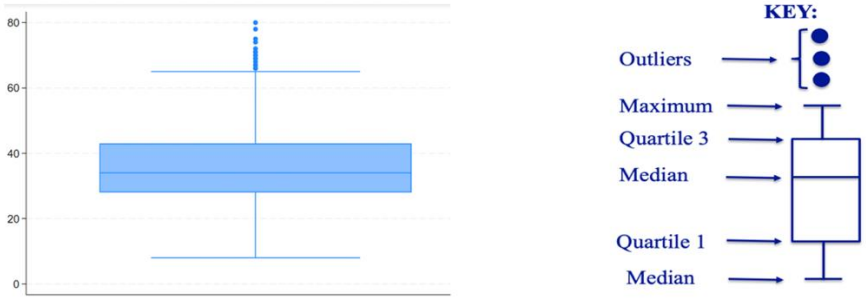


Figure 5a: Overall DERS score

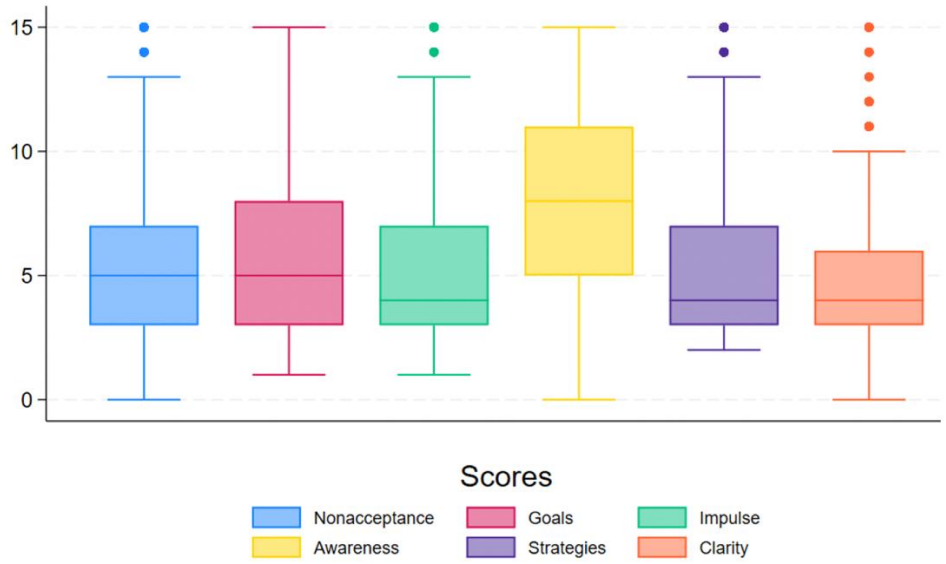


Figure 5b: Subclass DERS scores

Figure 6b Subclass DERS scores

A moderate positive correlation was observed between DERS scores and anxiety (***Spearman's rank correlation coefficient = +0.35***). The same correlation pattern was observed between DERS scores and depression (***Spearman's rank correlation coefficient = +0.33***). Furthermore, the median scores in all DERS subclasses increased with the increase in severity of anxiety and depression (*p-value < 0.001*), except for the subclass assessing emotional awareness as shown in *figures 6a and 6b.*

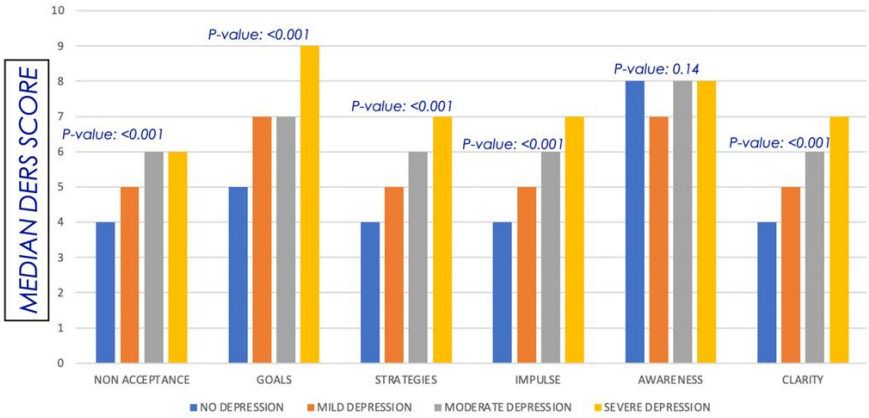


Figure 7a: DERS subclass median scores by depression severity

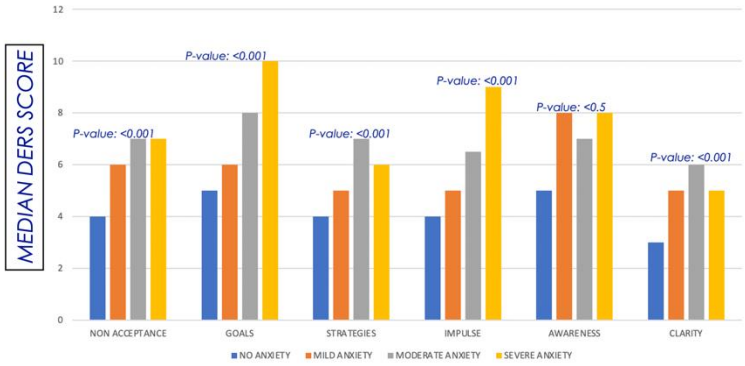


Figure 8*b* : DERS subclass median scores by anxiety severity

4.4 Factors associated with depression

4.4.1 Association between participants' characteristics and depression (chi-square test)

Participants aged 17 – 19 had a higher proportion of moderate and severe depression of 10.6% and 3.5% respectively, as compared to the younger age categories with a significant p-value of 0.03. A higher proportion of moderate and severe depression (12.9% and 3.9% respectively) was also observed among adolescents whose caretakers were not biological parents. (p-value <0.001). Overweight/Obese adolescents had a 7.1% proportion of severe depression as compared to 1% among those with normal BMI. Significantly, higher proportions of moderate and severe depression were observed among adolescents who have ever witnessed their parents fighting or drunk, those who have experienced sexual assault, and those who are currently smoking or taking alcohol. *Table 2* below shows a detailed chi-square association between participants' characteristics and depression.

Table 2: Association between participants' characteristics and depression (Chi-square)

Characteristics		No depression N (%)	Mild N (%)	Moderate N (%)	Severe N (%)	P-value
Age (years)	10-13	237 (65.7)	86 (23.8)	34 (9.42)	4 (1.11)	0.03
	14-16	186 (70.2)	60 (22.6)	17 (6.4)	2 (0.8)	
	17-19	234 (58.9)	107 (27.0)	42 (10.6)	14 (3.5)	
Sex	Female	376 (62.5)	153 (25.4)	62 (10.3)	11 (1.8)	0.36
	Male	281 (66.7)	100 (23.8)	31 (7.4)	9 (2.1)	
School level	Primary	236 (64.1)	92 (25.0)	36 (9.8)	4 (1.1)	0.51
	Secondary	421 (64.3)	161 (24.6)	57 (8.7)	16 (2.4)	
Primary caretaker	Both parents	440 (67.0)	155 (23.6)	51 (7.8)	11 (1.7)	<0.001
	Single Parent	129 (61.4)	56 (26.7)	22 (10.5)	3 (1.4)	
	Others	87 (56.1)	42 (27.1)	20 (12.9)	6 (3.9)	
Parents alive	Both are alive	573 (65.2)	218 (24.8)	71 (8.1)	17 (1.9)	0.03
	One is alive	73 (59.8)	31(25.4)	16 (13.1)	2 (1.6)	
	Both are deceased	6 (50)	2 (16.7)	4 (33.3)	0 (0.0%)	
	Unknown	3 (37.5)	2 (25.0)	2 (25.0)	1 (12.5)	
Parents live together	No	160 (62.3)	70 (27.2)	23 (8.9)	4 (1.6)	0.69
	Yes	429 (65.1)	158 (24.0)	58 (8.8)	14 (2.1)	
Ever witnessed parents fighting	No	587 (67.1)	207 (23.7)	68 (7.8)	13 (1.5)	<0.001
	Yes	69 (46.9)	46 (31.3)	25 (17.0)	7 (4.8)	
Ever witnessed parents drunk	No	639 (65.2)	245 (25.0)	78 (8.0)	18 (1.8)	<0.001
	Yes	17 (42.5)	7 (17.5)	14 (35.0)	2 (5.0)	
Experienced sexual assault	No	641 (64.9)	243(24.6)	86 (8.7)	17 (1.7)	0.003
	Yes	15 (42.9)	10 (28.6)	7 (20.0)	3 (8.6)	
Ever lacked food	No	593 (66.4)	222 (24.9)	68 (7.6)	10 (1.1)	<0.001
	Yes	63 (47.7)	31 (23.5)	28 (21.2)	10 (7.6)	
Wealth index	Lowest	213 (62.8)	83 (24.5)	29 (8.6)	14 (4.1)	0.01
	Middle	250 (68.1)	85 (23.2)	30 (8.2)	2 (0.5)	
	Highest	194 (61.8)	85 (27.1)	31(9.9)	4 (1.3)	
Nutrition status	Underweight	31 (57.4)	15 (27.8)	7 (13.0)	1 (1.9)	<0.001
	Normal weight	549 (67.6)	186 (22.9)	69 (8.5)	8 (1.0)	
	Overweight/ obesity	77 (49.4)	51 (32.7)	17 (10.9)	11 (7.1)	
Smoking	No	591 (64.4)	227 (24.7)	83 (9.0)	17 (1.9)	0.007
	Yes	4 (50)	2 (25)	1 (12.5)	1 (12.5)	
Taking alcohol	No	625 (64.6)	238 (24.6)	88 (9.1)	17 (1.8)	0.004
	Yes	13 (56.5)	6 (26.1)	1 (4.3)	3 (13.0)	
DERS Score	< 75th centile	438 (73.4)	127 (21.3)	28 (4.7)	4 (0.1)	<0.001
	≥ 75th centile	76 (45.5)	51 (30.5)	28 (16.8)	12 (7.2)	

4.5 Logistic regression analysis for factors associated with depression

Logistic regression was used to assess the magnitude and direction of the association between participants' characteristics and moderate and severe forms of depression (PHQ9 score ≥ 10). On univariate analysis, there were higher odds of depression among participants from private schools, those who had lost both parents, overweight/obese, those with DERS score of 75th percentile and above, and those who had experienced adverse events.

Upon controlling for confounders, the death of a parent(s) showed three times higher odds of depression as compared to participants whose parents were both alive. Furthermore, there were almost six times the odds of depression among adolescents who have ever witnessed their parents drunk (aOR 5.99 95%CI 2.36-5.2 p-value: <0.001), and two-fold higher odds (aOR 2.13 95%CI 1.18 – 3.16 p-value: 0.01) among those who have ever observed their parents fighting. Emotional dysregulation score of 75th percentile and above was associated with 6.9 times the odds of depression as compared to those with lower scores (aOR 6.91 95%CI 3.36 – 14.21 p-value <0.001). Further details on the association between participants' characteristics and depression are shown in *Table 3* below.

Table 3: Logistic regression for factors associated with depression

Participants characteristics		Univariate			Multivariate		
		cOR	95% CI	p-value	aOR	95% CI	p-value
Age (Years)	10-13	ref					
	14-16	0.6	0.34 – 1.06	0.07	0.74	0.23 – 2.37	0.60
	17-19	1.28	0.84 - 1.95	0.24	0.86	0.23 – 3.16	0.81
Gender	Female	ref					
	Male	0.77	0.52 – 1.15	0.19	0.94	0.29 – 3.08	0.17
School level	Primary	ref					
	Secondary	0.98	0.66 – 1.44	0.89	0.61	0.28 – 3.13	0.91
Primary caretaker	Single parents	ref					
	Both parents	0.83	0.55 – 1.25	0.36	0.99	0.53 – 1.86	0.22
	Other	1.11	0.47 – 2.62	0.80	0.93	0.25 – 3.46	0.35
School ownership	Government	ref					
	Private	2.23	1.42 – 3.48	<0.001	1.55	0.7 – 3.44	0.22
Parents alive	Both are alive	ref					
	One parent is alive	1.38	0..8 - 2.36	0.24	3.62	1.28– 10.21	0.02
	Both are deceased	4.51	1.33 – 15.26	0.01	3.26	1.45– 9.34	0.03
	I do not know	4.52	1.11 – 18.33	0.03	1.39	0.11 – 20.07	0.80
Parents live together	No	ref					
	Yes	0.23	0.64 – 1.56	0.99	0.95	0.52 – 1.73	0.87
Wealth index	Lowest	ref					
	Middle	0.67	0.42 – 1.08	0.09	0.97	0.52 – 1.82	0.92
	Highest	1.01	0.65 – 1.58	0.95	1.45	0.79 – 2.63	0.22
Nutritional status (BMI)	Underweight	1.55	0.71 – 3.38	0.27	2.74	0.63 – 12.03	0.18
	Normal	Ref					
	Overweight/obesity	1.70	1.06- 2.37	0.03	1.16	0.35 – 0.80	0.80
Currently consuming alcohol	No	Ref					
	Yes	1.45	0.49 – 4.27	0.5	1.23	0.26- 5.67	0.79
Ever witnessed parents drunk	No	ref					
	Yes	5.14	2.7 – 9.4	<0.001	5.99	2.36 – 15. 2	<0.001
Ever witnessed parents fighting?	No	ref					
	Yes	2.58	1.66 – 4.01	<0.001	2.13	1.18 – 3.86	0.012
Experienced sexual assault	No	ref					
	Yes	3.37	1.58 – 7.18	0.002	0.65	0.14 – 3.12	0.59
DERS score	< 75th percentile	ref					
	≥ 75th percentile	5.54	3.39 – 9.06	<0.001	6.91	3.36 – 14.21	<0.001
Time taken to and from school (min)		1.01	1-1.04	0.17	1.21	1.01 – 1.41	0.03

4.6 Factors associated with anxiety

4.6.1 Association between participants' characteristics and anxiety (chi-square test)

Anxiety was more prevalent among adolescents aged 17-19 years, among whom 103 (25.1%), 45 (11%), and 18 (4.4%) had mild, moderate, and severe forms of anxiety respectively. Overall, the proportion of anxiety among female participants was higher, 38.4% as compared to 30.1% among the males. Furthermore, a significantly higher proportion of anxiety was observed among adolescents who had experienced various adverse events. For instance, 51% of the participants who had ever witnessed their parents fighting had anxiety as compared to 32.6% among those who had never (*p-value* <0.001). Participants who had ever experienced sexual assault from peers or elders had a 49.9% proportion of anxiety, as compared to 34.7% among those who had never, with a *p-value* of 0.03. *Table 4* below shows further details of the association between sociodemographic characteristics of the participants and anxiety.

Table 4: Association between participants' characteristics and anxiety (chi-square test)

Characteristics		No anxiety N (%)	Mild N (%)	Moderate N (%)	Severe N (%)	P-value
Age (Years)	10-13	256 (65.6)	95 (24.4)	27 (6.9)	12 (3.1)	0.002
	14-16	195 (71.7)	63 (23.2)	10 (3.7)	4 (1.5)	
	17-19	244 (59.5)	103 (25.1)	45 (11.0)	18 (4.4)	
Sex	Female	391 (61.5)	172 (27.0)	53 (8.3)	20 (3.1)	0.03
	Male	304 (69.9)	88 (20.2)	29 (6.7)	14 (3.2)	
School level	Primary	256 (64.0)	101 (25.3)	30 (7.5)	13 (3.3)	0.95
	Secondary	439 (65.3)	160 (23.8)	52 (7.7)	21 (3.1)	
Primary caretaker	Both parents	460 (66.5)	167 (24.1)	48 (6.9)	17 (2.5)	0.55
	Single Parent	137 (63.4)	50 (23.1)	19 (8.8)	10 (4.6)	
	Others	96 (59.3)	44 (27.2)	15 (9.3)	7 (4.3)	
Parents alive	Both are alive	593 (64.6)	228 (24.8)	69 (7.5)	28 (3.1)	0.16
	One is alive	88 (65.2)	33 (24.4)	9 (6.7)	5 (3.7)	
	Both are deceased	8 (72.7)	1 (9.1)	1 (9.1)	1 (9.1)	
	I do not know	4 (50.0)	1 (12.5)	3 (37.5)	0 (0.0)	
Parents live together	No	172 (64.7)	64 (24.1)	19 (7.1)	11(4.1)	0.73
	Yes	452 (65.4)	167 (24.2)	53 (7.7)	19 (2.7)	
Wealth index	Lowest	225 (64.3)	84 (24.0)	30 (8.6)	11 (3.1)	0.19
	Middle	260 (68.2)	92 (24.1)	22 (5.8)	7 (1.8)	
	Highest	210 (61.6)	85 (24.9)	30 (8.8)	16 (4.7)	
Nutrition status	Underweight	34 (64.2)	13 (24.5)	5 (9.4)	1 (1.9)	0.001
	Normal BMI	578 (67.4)	201 (23.5)	55 (6.4)	23 (2.7)	
	Overweight/ obesity	83 (51.6)	46 (28.6)	22 (13.7)	10 (6.2)	
Drinking alcohol	No	650 (64.5)	250 (24.8)	76 (7.5)	32 (3.2)	0.54
	Yes	15 (55.6)	7 (25.9)	4 (14.8)	1 (3.7)	
Smoking	No	615 (64.1)	245 (25.5)	68 (7.1)	31(3.2)	0.01
	Yes	4 (44.4)	2 (22.2)	2 (22.2)	1 (11.1)	
Ever witnessed parents fighting?	No	620 (67.4)	214 (23.3)	62 (6.7)	24 (2.6)	<0.001
	Yes	74 (49.0)	47 (31.1)	20 (13.2)	10 (6.6)	
Ever witnessed parents drunk	No	669(65.3)	251(24.5)	74 (7.2)	31 (3.0)	0.08
	Yes	25 (60.0)	9 (18.8)	7 (14.6)	3 (6.3)	
Sexual assault	No	677 (65.3)	253 (24.4)	76 (7.3)	31 (3.0)	0.03
	Yes	17 (50.1)	8 (23.5)	6 (17.6)	3 (8.8)	
Ever lacked of food	No	636 (67.7)	212 (22.6)	67 (7.1)	24 (2.6)	<0.001
	Yes	57 (43.5)	49 (37.4)	15 (11.5)	10 (7.6)	
DERS scores	<75th centile	438	145	31	9	<0.001
	≥ 75th centile	77	49	25	16	

4.7 Logistic regression analysis for factors associated with anxiety

The table below shows the association between participants' characteristics with moderate and severe anxiety (GAD7 ≥ 10) by using logistic regression.

On univariate logistic regression, a higher likelihood of anxiety was observed among older adolescents, participants from private schools, overweight and obese adolescents, those who had higher DERS scores, and participants who reported exposure to social adversities.

Upon controlling for confounders, adolescents from private schools had 65% higher odds of anxiety as compared to those enrolled in government schools (aOR 1.65 95% CI 1.79 – 3.46, *p-value* 0.04). Likewise, those whose emotional dysregulation score was at least 75th centile were 3.6 times more likely to have anxiety (aOR 3.64 95% CI 2.00 – 6.62, *p-value* <0.001). Participants who had ever witnessed their parents fighting were two-fold more likely to have anxiety, as compared to those who had never. *Table 5* below shows further details of the factors associated with anxiety.

Table 5: Logistic regression analysis for factors associated with anxiety

Participants characteristics		Univariate			Multivariate		
		cOR	95% CI	p-value	aOR	95% CI	P- value
Age (Years)	10-13	ref					
	14-16	0.49	0.26 – 0.91	0.03	0.84	0.26 – 2.68	0.77
	17-19	1.64	1.07 – 2.49	0.02	3.30	0.85 – 12.83	0.08
Gender	Female	ref					
	Male	0.83	0.56 – 1.23	0.35	0.79	0.48 – 1.31	0.11
Primary caretaker	Single parents	ref					
	Both Parents	0.86	0.57 – 1.3	0.47	0.93	0.50 – 1.68	0.41
	Others	1.34	0.59 – 3.03	0.49	1.72	0.52 – 5.63	0.37
School ownership	Government	ref					
	Private	1.84	1.15 – 2.93	0.01	1.65	1.79 – 3.46	0.04
Parents alive	Both are alive	ref					
	One parent is alive	0.99	0.55 – 1.79	0.49	0.64	0.14 – 2.98	0.57
	Both are deceased	1.72	0.37 – 7.98	0.97	3.93	0.22 – 7.53	0.36
	I do not know	4.31	1.06 – 17.7	0.04	1.31	0.09 – 19.85	0.85
Parents live together	No	ref					
	Yes	0.88	0.56 – 1.36	0.55	0.91	0.52 – 1.62	0.76
Wealth index	Lowest	ref					
	Middle	0.68	0.41 – 1.11	0.12	1.05	0.57 – 1.97	0.89
	Highest	1.18	0.76 – 1.86	0.46	1.79	1.01 – 3.22	0.05
Ever drunk alcohol	No	ref					
	Yes	1.93	0.72 – 5.21	0.19	1.92	0.50 – 7.32	0.34
Ever witnessed parents drunk	No	ref					
	yes	2.55	1.23 – 5.30	0.01	1.61	0.56 – 4.65	0.38
Ever witnessed parents fighting?	No	ref					
	Yes	2.38	1.52 – 3.74	<0.001	2.01	1.13 – 3.58	0.02
Sexual assault	No	ref					
	Yes	2.95	1.35 – 3.74	0.007	1.03	0.28 – 3.77	0.96
DERS scores	< 75th centile	ref					
	≥ 75th centile	1.06	2.77 – 7.08	<0.001	3.64	2.00 – 6.62	<0.001
Home-to-school commuting time in (min)		1.07	1.00 – 1. 09	0.06	1.01	0.96 – 1.02	0.09

4.8 Perception of adolescent mental health among parents, teachers, and adolescents.

A total of 97 participants were involved in the qualitative assessment of the perception of adolescents' depression and anxiety. *Table 6* below summarises the participants' distribution. A total of ten FGDs were conducted, each involving 8 sex-concordant adolescents, and 17 IDIs were conducted with parents and teachers.

Table 6: Characteristics of the participants of the qualitative study.

Participants	Age range (years)	Male N (%)	Females N (%)	Total
Students	12 – 18	40 (50%)	40 (50%)	80
Teachers	29 - 45	4 (44.4%)	5 (55.6%)	9
Parents	34 - 47	4 (50%)	4 (50%)	8
Total		48 (49.5%)	49 (50.5%)	97

The narrative descriptions of perception towards depression and anxiety were summarised into two main themes which were about mental health literacy, and the perceived contributing factors, and seven sub-themes as shown in *Table 7* below. These themes with their respective subthemes, and supporting participants' quotes are further described hereunder.

Table 7: Emerged themes and sub-themes

Themes	Sub-themes
Mental health literacy	Knowledge about mental illnesses
	Perceived burden of anxiety and depression among adolescents
	Stigma
Perceived contributing factors	School related factors
	Household related factors
	Community related factors
	Peer related factors

4.8.1: Mental Health Literacy

Knowledge about mental illnesses

Adolescents, teachers, and parents demonstrated varying perceptions regarding mental health literacy, reflecting both awareness and misconception about the presenting features of depression and anxiety. The frequently mentioned features included self-isolation, extreme sadness, self-harm and suicide, alcohol and substance dependency, extreme worry, and perpetrating violence. Participants were aware that depression and anxiety could result in adolescents' poor performance at school and inability to fulfill their responsibilities as expected.

While adolescents, parents, and teachers highlighted the symptoms of depression and anxiety, several misconceptions also emerged. It was often mentioned that depression and anxiety among adolescents result from failure to control emotions because they are still relatively immature, and lack life experience. In addition, participants related mental illnesses to curses, envy, cultural practices, and witchcraft. For instance, a parent was quoted saying: "*…in our societies these days many youths are affected, it happens when your relative sees your child excelling, they bewitch him/her, it is a bad form of jealousy and people are so envious…"* [FEMALE PARENT, 48Y.O]

Furthermore, participants often expressed a belief that mental illnesses must present with psychosis to warrant medical attention. Additionally, features such as extreme alcoholism, substance addiction, and perpetrating violence were mentioned as indicators of bad manners due to poor parenting, whereas extreme sadness and worry could be considered normal or suggestive of adolescents' immaturity. An adolescent was quoted saying *"..It becomes dangerous when a person becomes affected to the extent of doing abnormal/irrelevant things and becoming insane…."* [FEMALE ADOLESCENT, 16 Y.O]

Perceived burden of anxiety and depression among adolescents

Adolescents highlighted that the burden of depression and anxiety is increasing, exerting negative effects on themselves, society, and the nation at large. They argued that these conditions are neglected and they continue to affect adolescents and the entire population.

Further, adolescents affirmed that unattended mental illnesses such as anxiety and depression affect their academic performance due to school absenteeism, poor concentration, and lack of confidence. They further mentioned that depression and anxiety can affect their social wellbeing and physical health for instance when the affected adolescents fail to eat well. An adolescent boy was quoted "…*It is a very big problem even here in Tanzania, and when a person has a mental health problem, it reduces the manpower so the production decreases''* [MALE ADOLESCENT 17 Y.O]

On the other hand, mixed findings regarding the burden of depression and anxiety were demonstrated by parents and teachers. While many could correctly point out the rising burden of adolescent mental illnesses, some of the parents and teachers expressed a belief these disorders mainly affect the adults and elderly population, largely sparing adolescents. For example, a teacher stated, *"..I have seen people with mental illnesses, but mainly it affects older people than adolescents, it is rare to see an adolescent suffering from mental illnesses especially at schools…."* [MALE TEACHER 29 Y.O]

Stigma

Stigma against individuals with mental illnesses is deeply embedded among community members, as it was mentioned by adolescents, parents, and teachers. Participants frequently mentioned that mental illnesses are seen as an expression of weakness or failure, especially if it affects an adolescent who is expected to be relatively "young and energetic". In fear of pervasive stigma, affected individuals may not be able to express themselves to family members. Parents, teachers, and adolescents affirmed that stigma against mental illnesses such as depression and anxiety is among the key contributing barriers to improving awareness and health-seeking behaviour. Further, adolescents expressed possibilities of worries, shame, and likelihood of isolation should one be diagnosed with a mental illness, in fear of stigma from peers and community members. For example, an adolescent girl was quoted saying*"..Young people see it as a waste of time disclosing their situations, once people know the news will spread, others may laugh at them and there are no environments with good privacy for counseling"* [FEMALE ADOLESCENT, 15Y.O]

4.9.2: Perceived contributing factors

Parents, teachers, and students assert that there are multifactorial determinants of adolescents' mental well-being, from household levels to school and community levels. Some of the factors stem from negative peer influence.

School related factors

The most frequently mentioned school-related risk factor mentioned by parents was the tendency to focus solely on creating academically excellent adolescents. They asserted that school curricula often neglect other aspects of a thriving person, such as social, emotional, and economic skills. This focus results in a heavy and unregulated school workload, accompanied by high-performance expectations. Consequently, students often experience sleep deprivation and have limited opportunities for sports and other social interactions.

On the other hand, adolescents condemned practices of keeping poor performers in different streams from better-performing students. This often creates a sense of losing hope and feeling like a failure. Furthermore, having to change schools because of not attaining a set average score, harsh physical punishments, and bullying were also mentioned as risk factors for depression and anxiety. A female student was quoted, *"..imagine the stress when the teachers say if you get below average, your parents should find another school for you, you are always worried…"* [FEMALE, ADOLESCENT 18 Y.O]

Peer-influence

Adolescents' voices affirmed the power of peer influence as a risk factor for mental illnesses. The commonest mentioned was the influence to engage in betting and gambling due to the pleasure and the possibility of financial gains. Further, adolescents often highlighted that some friends make it seem like a "cool trendy fashion" to engage in habits such as smoking, alcohol use, having multiple sexual partners, and watching pornography. Similarly, parents and teachers also frequently mentioned the role of negative peer influence in the increasing burden of mental illnesses among adolescents. For instance, a parent said, *"Peer pressure has a great contribution, especially during the adolescent period. They are in those groups where they share a lot concerning relationships, taking tobacco and alcohol with a belief that it is a sign of maturity"* [MALE PARENT 34 Y.O]

Family and community-related factors

At the family level, traumatic events such as the death of a parent or sibling, and living in orphanages, were perceived as major risk factors by the adolescents, teachers, and parents. Unstable family dynamics such as parental conflicts, divorce/separation, and poverty were also frequently raised as family-level risk factors for depression and anxiety among adolescents. Parents and adolescents affirmed that, economic hardships cause failure to acquire basic needs such as food and clothing, contributing to stress among adolescents. Quoting one of the parents, *"...life is tough, family conflicts and separation of parents is the new trend, children and adolescents must be affected .. '* [MALE PARENT, 38 Y.O]

Participants also mentioned that certain behavioral patterns indicating poor mental health in parents are also risk factors for depression and anxiety among adolescents. Parents who demonstrate behaviors such as excessive alcohol intake, substance addiction, and perpetration of violence are also likely to have affected adolescents. In the community, an increase in uncontrolled gaming stalls, access to relatively cheap alcohol despite being under the age of 18, and a decline in the sense of shared parenting were frequently mentioned.

5.0 DISCUSSION

This study sought to assess the prevalence of anxiety and depression, their correlation with emotional dysregulation, and the associated risk factors in a large sample of school-attending adolescents in Dar es Salaam Tanzania. It further explored the perceived risk factors for depression and anxiety among parents, teachers, and adolescents themselves. The findings demonstrated that both depression and anxiety were prevalent. Three in ten adolescents were found to have either depression or anxiety, and one in ten had moderate to severe forms. Adolescence is a crucial developmental stage marked by substantial physical and cognitive growth, along with socio-emotional conformity, which increases the vulnerability to depression and anxiety (11,12).

5.1 The burden of depression and anxiety among adolescents

The burden of depression reported in this study is similar to the recently reported global pooled prevalence of 34% that included a population of both in-school and out-of-school adolescents (30). However, cautious comparison is warranted because school-attending adolescents may face unique risk factors. Considering studies that focused solely on school-attending adolescents, a higher burden of depression was reported among Asian adolescents. For instance, a prevalence of 39% was reported from Bhopal India (35), and 42.9% from Nepal (36). The use of different depression assessment tools may have contributed to the difference in the reported burden as compared to this study. Depression Anxiety Stress Scale (DASS-42), the Center for Epidemiological Studies-Depression (CES-D), and PHQ-9 were used in India, Nepal, and this study respectively. Diagnostic comparison studies have demonstrated differences in sensitivity leading to varying estimates of the burden of depression depending on the tool used (77). However, a study that used the same tool as the index study (PHQ-9) still reported a much higher prevalence of 51.2% among school-going adolescents (32), suggesting that Asian adolescents may indeed have a higher burden of depression. This could be explained by a higher epigenetic susceptibility to mood disorders among Asians as reported in a cross-continental culture-allelic interaction study (78), in addition to mental challenges related to adhering to strict Asian cultural values during the socially explorative stage of adolescence, as seeking self-identity beyond family values is considered a taboo (79).

Delving into the burden reported from the SSA region, a similar prevalence of 33.5% was reported from Western Cape South Africa (80), whereas a lower prevalence of 23.9% was reported among school-attending adolescents from Northern Uganda (39). The similar prevalence between this study and the one from South Africa could be attributed to both studies using the same depression assessment tool in a comparable sample of school-attending adolescents from urban and semi-urban settings, and allowing the participants to self-administer the study tools. Conversely, the lower prevalence in Northern Uganda might be due to under-reporting and desirability bias due to interviewer-led assessments. Another study from Central Uganda found a 21% prevalence rate (38). This difference may be due to its single-district focus and smaller sample size, half of that in the current study.

With regard to anxiety, the observed prevalence falls within a reported range of 18.6% to 36.4% among adolescents from SSA (27). Individual studies involving exclusively school-attending adolescents have reported a varying range of prevalence of anxiety. As compared to the findings of this study, Osborn and colleagues from Kenya reported a much higher prevalence of 37.9%, 25.3%, and 12.3% for mild, moderate, and severe forms of anxiety (44), whereas a lower prevalence of 20.9% was reported from Western Cape South Africa (80). Both these studies used the GAD-7 assessment tool, with similar cut-off points as this study, enabling a plausible comparison of the reported prevalence. In contrast to the index study which included primary and secondary school adolescents aged 10-19 from five different municipalities in Dar es Salaam, the higher prevalence of anxiety observed in Kenya could be due to their exclusive focus on high school adolescents from the largest slum of Kibera-Nairobi, a population that is likely facing a higher risk of anxiety. Conversely, the lower prevalence observed in South Africa may be attributed to the inclusion of adolescents aged only between 10 and 14 years, as this group is generally reported by the WHO to exhibit lower levels of anxiety compared to older adolescents likely due to lesser hypersensitivity to social pressure (81).

In other settings, a significantly higher prevalence of 44% was reported among school-attending adolescents in the United States of America (USA) (82), and 48.5% among in-school adolescents from diverse settings in Bangladesh (52). There are various contextual differences between Tanzania and the United States, as well as Asia, which may account for the observed variations. Bangladeshi adolescents could experience elevated levels of anxiety, possibly due to the stringent cultural norms in Asian societies (79). The different burden of anxiety between Tanzanian and American adolescents may be explained by several factors. The American study was online-based, in a predominantly white population with better mental health awareness and reduced stigma, potentially leading to increased symptom reporting. Additionally, the study's diverse sample, including transgender adolescents with a higher anxiety burden, could contribute to the difference (82).

Despite the high prevalence of both anxiety and depression as discussed above, participants of the qualitative inquiry revealed a low perceived burden of these disorders among school-attending adolescents, a finding that is not unique to this study. A systematic review of thirty qualitative studies reported that poor recognition of mental illness symptoms significantly contributes to the underestimation of the true burden among adolescents (83). This is mainly due to limited mental health awareness among adolescents themselves and their caretakers. Moreover, insufficient understanding led some participants to believe that depression and anxiety are due to witchcraft/curse, similar to the perceptions reported in qualitative studies from Northern Tanzania (70), Uganda (84), and Indonesia (85). Furthermore, many would only consider mental illness when it presents with psychosis, similar to the findings reported in a qualitative study from Ghana (86). Such misconceptions and the low perceived burden may translate to poor mental health-seeking behaviour, low perceived need, and underutilization of mental health services (87).

5.2 Correlation of emotional dysregulation with anxiety and depression

Score-wise, the weak-to-moderate positive correlation that was observed indicates that as dysregulation scores increased, there was some corresponding rise in depression and anxiety scores. Even though this cannot imply causality or temporal relationship, similar findings were reported from an ecologically robust study that analyzed seven-day actual emotional control events among American adolescents. The study observed higher emotional

dysregulation among adolescents with depression and anxiety (88). Furthermore, another study among Austrian adolescents reported higher rates of maladaptive emotional regulation among those with anxiety, compared to age-matched controls (89), findings that correlate with the observation of higher odds of anxiety and depression among participants with DERS scores above the 75th Percentile. Arguably, the generalizability of findings from America and Austria should be approached with caution because these studies included adolescents from high-income settings with potentially different emotional triggers and social responses as compared to Tanzanian adolescents. However, neuro-biological evidence suggests that regardless of the differences in settings, compromised emotional regulation during adolescence increases susceptibility to the onset and persistence of mental illnesses due to alterations in the development of the prefrontal cortex and limbic systems, which are essential for concrete emotional regulation (90–92). There is limited evidence regarding the association between emotional dysregulation and adolescent mental illnesses in SSA settings. However, a study that was done among multiracial, predominantly Black South African adolescents also found a positive correlation between emotional dysregulation and internalizing disorders including depression and anxiety (93).

Except for the emotional awareness domain, dysregulation in the domains of emotional clarity, impulse control, goal-directed emotional response, acceptance, and emotional regulation strategies worsened with the severity of depression and anxiety. Various studies have demonstrated limited clinical utility and reliability of the lack of emotional awareness score in predicting the severity of mental illnesses, although this did not seem to affect the reliability of the total DERS score (51,74,94,95). A plausible explanation for these observations might be that the constructs that shape one's emotional responses such as the impulse, strategies, and goals of a particular response, rather than a mere awareness of emotional state, play a more crucial role in the risk of developing mental illnesses.

5.3 Factors associated with depression and anxiety

Marital conflicts, parental alcohol consumption, and parental death are social adverse events that increase the likelihood of depression and anxiety among adolescents, in line with literature that suggests neurobiological alterations resulting from exposure to adversities increase the risk of mental illnesses (65).

The increased likelihood of depression and anxiety among participants who had ever witnessed parental conflicts, along with affirming perceptions from the qualitative inquiry have also been reported from other settings. Studies conducted in the United States (96), Europe (97), and China (98), showed that adolescents who are exposed to parental conflicts are more likely to display features of depression and anxiety due to various plausible underlying mechanisms. Marital disharmony may result in strained parent-adolescent relationships, parental absence, exposure to violence, and a higher risk of substance use (99). In agreement with that, Emotional security theorists also posit that exposure to parental conflict can diminish one's sense of security, resulting in negative psychological and physiological effects (100). However, critics have argued that the association between parental conflicts and adolescents' mental illnesses is complex and not straightforward. A study by Wang et al. contended that the effect could be altered by various mediation factors such as the ability to maintain a healthy adolescent-parent attachment amidst quarrels (101). Moreover, some authors have argued that when parents constructively resolve conflicts and use effective problem-solving approaches while maintaining positive attitudes toward their children, it can make adolescents feel safe and enhance their emotional skills (102,103).

Another identified risk factor for depression was witnessing the parents drunk, although this did not appear to increase the likelihood of anxiety after controlling for confounders. However, the qualitative inquiry suggested that parental alcoholism is perceived as a risk factor for both anxiety and depression in adolescents, similar to the results of a systematic review of forty-nine qualitative studies. Synthesis of the review suggested that this may be due to stressful experiences of living with an alcoholic parent, unpredictable parent-child relationships, shame, and parental neglect (104). However, qualitative studies are inherently of limited generalizability. The above findings may not apply to settings like Tanzania because the studies included were primarily conducted in Europe, Australia, and America,

with no representation from developing countries. These settings potentially vary in terms of societal attitudes toward alcohol use, as well as the availability of protective support for adolescents who experience parental alcoholism. Quantitatively, a comparative cross-sectional study conducted among high-school adolescents in Bangalore, India observed higher rates of both anxiety and depression among children of alcoholic parents (105), similar to the study conducted in Puducherry (106). Contrary to these findings, the index study may not have identified the association between parental drinking and adolescents' anxiety because it did not take into account the severity of parental alcohol addiction, nor did it use detailed structured tools for the assessment of children of alcoholics.

Furthermore, the death of one or both parents was also shown to increase the likelihood of depression and anxiety, a plausible observation that is consistent with findings reported in several other studies (33,34,38,107). A prospective cohort study among over 2000 Dutch adolescents that assessed mental health status before and after a family bereavement revealed higher rates of internalizing problems, such as depression and anxiety among bereaved adolescents (108). Similarly, Gray *et al.* observed a 25% prevalence of major depression among adolescents who have lost a parent, as compared to 1% among community controls (109). The death of a parent(s) is a devastating, permanent loss that can lead to extreme emotional anguish, deep grief, and feelings of abandonment that can significantly affect one's mental health. In African settings, the death of parents often causes family members who are minors to move and start living with other relatives or experience life with a step-parent, change schools, and experience financial and social deprivation, all of which can increase their vulnerability to depression and anxiety (110).

Regarding school-related factors, participants perceived academic pressure as a risk factor for adolescent anxiety and depression. This aligns with a study among students from China, which reported that excessive academic stress impairs impulse control and could increase the risk of mood, and behavioral disorders among school-going adolescents (111). Similarly, adolescents who participated in qualitative studies conducted in Iran (112), and India (113), perceived that; expectations of academic perfectionism, grouping students by performance, overwhelming assignments, and the possibility of being forced to change schools due to poor performance caused chronic stress that contributes to mental instability. In the current view

of globalization, digitalization, and a highly competitive global economy, academic excellence is considered necessary for better career opportunities and social mobility. On the other hand, parents who participated in the qualitative aspect of this study urged that schools should prioritize the development of well-rounded adolescents with optimal academic, social, behavioral, and emotional skills. Such holistic approaches may enhance students' self-determination to achieve set goals and mental well-being, as reported in a meta-analysis of seventy-seven studies from various countries (114).

Moreover, the study showed that participants from private schools were more likely to experience anxiety compared to those in public schools, possibly due to increased academic pressure often imposed to maintain academic excellence that upholds the school's prestige and attracts enrolment. Contrary to this study, a study conducted among adolescents from Karachi, Pakistan reported lesser odds of anxiety among those enrolled in private schools, owing to better learning environments and resource availability (115). However, the above study only involved high school adolescents aged between 15 and 19 years, hence its findings may not be comparable to this study where one-third of the participants were younger adolescents from primary schools and aged between 10 and 13 years. Another study conducted among school-attending adolescents in Telangana, India reported comparable proportions of students with anxiety in private and public schools (20.8% versus 20.5%), but the authors only employed descriptive analysis for proportions, limiting the ability to draw inferences from the findings. (54).

After controlling for confounders, this study did not demonstrate a significant association between demographic factors such as age and sex, and the likelihood of depression or anxiety despite the wide age range of the participants and a large sample size. Such findings are contrary to those reported in several other studies (24,26,37,38,40,43). There is a possibility that factors such as family dynamics, academic stress and exposure to adversities have more profound effects on adolescents' mental health than age and sex alone, or a potential overshadowing effect of these variables. Furthermore, there may be unmeasured contextual socio-cultural differences that mediate the effect of age and sex on adolescents' mental well-being.

Peer influence was perceived among the risk factors for depression and anxiety due to the associated pressure to conform to habits such as risky sexual behaviours, gambling and betting, alcohol consumption, and substance use. School-attending adolescents typically spend most of their time with their peers. Corroborating peer persuasion, an experimental study using artificial intelligence among adolescents from the USA reported a 79% rate of peer-influence conformity in sex-related decisions (55). Although the real-life generalizability of such computer-enhanced scenario-based study may be limited, the role of peer influence in high-risk sexual behaviors including early sexual debut, multiple partners, pornography addictions, and cross-generational sexual relationships has been well elucidated in literature (116–119). Outcomes of peer-influenced risky sexual practices such as unwanted pregnancy can evoke feelings of guilt, shame, and negative judgment from family and the surrounding community, all of which ultimately affect one's mental well-being.

Gambling was also perceived as a peer-driven risk factor for adolescent depression and anxiety. Gambling industry is growing in SSA, and its harmful social and mental health effects have not spared adolescents (120). It is associated with a significant risk of addiction particularly for adolescents who may consider it a quick opportunity to earn money (121). It has been associated with an increased risk of depression, suicidality, and anxiety as reported by several studies (122,123). Similar to what participants mentioned, sports betting is the most common form of gambling among Tanzanian adolescents (124), like in many other developing countries such as Malawi (125), Uganda (126), and Nigeria (127). Sports betting advertisements are often accompanied by appealing billboards and celebrity endorsements, often influencing uptake by young people, without sufficient information about the potential harmful mental health effects. Furthermore, adolescents can often find ways to circumvent the lightly-mentioned age restrictions against under-18 individuals on betting sites. Participants perceived that it is crucial to establish and reinforce regulations to protect school-attending adolescents from mental illnesses resulting from gambling.

Alcohol consumption and smoking were also perceived as peer-related risk factors for depression and anxiety in adolescents during the qualitative inquiry but a significant association was not observed in the quantitative analysis. Similar perceptions emerged from participants of qualitative studies conducted in Congo (128), Liberia (129), Nigeria (130),

and Abu Dhabi (131). Besides addiction, frequent and prolonged exposure to alcohol and nicotine can alter cognitive functions, and disrupt mood and emotional regulation during a critical period of neurological development of adolescence, as affirmed by a critical review conducted by *Blumental et al* (132). This study did not observe an association between adolescents' alcohol intake and smoking with depression or anxiety. On the contrary, the assessment of risk factors for depression among school-attending adolescents from Norway revealed that alcohol use and smoking increased the risk significantly(133). Furthermore, a secondary analysis of 16,000 adolescents from eight SSA countries involved in the Global school-based health survey also reported an increased risk of anxiety among those who smoke or consume alcohol (134). The lack of association in this study may be attributed to a smaller number of adolescents who reported to have ever used alcohol, or smoking, with a possibility of underreporting due to social desirability bias.

Stigma against mental illnesses emerged among perceived risk factors for poorly treated, and recurrent mental illnesses, and a significant barrier to mental health promotion. Similar to other qualitative studies, participants cited discriminatory social practices and negative attitudes towards individuals with mental illnesses, primarily due to insufficient knowledge about mental health. In resource-limited settings where there is a rising mental health burden, stigma has been associated with delayed mental health-seeking behavior, inadequate social support which is crucial for mental health care, and an increased risk of recurrent mental illnesses (135). This underscores the critical need to address stigma as a significant barrier to effective mental health promotion among school-attending adolescents.

6.0 STRENGTH AND LIMITATIONS,

The strengths of this study include the following. First, the inclusion of a large representative sample size from different municipalities of Dar es Salaam, the application of sampling strategies that ensure representativeness and generalizability, and the resultant narrow confidence intervals that indicate the precision of the results. Moreover, the methodological triangulation of embedding qualitative inquiry of the perceptions enables the application of contextual insights that may underly the quantitative observations.

This study was not without limitations. These included the possibility of social desirability bias and recall bias. A mitigation approach for desirability was to have the participants privately fill in the study questionnaires to reduce the risk of reporting what they perceived as appropriate answers, however, this is not expected to fully resolve the bias. Another limitation is that participants who did not complete the PHQ-9A, GAD-7, and DERS-18 tools may have been systematically different from those who did. However, the large sample size enabled the study to retain adequate power for the estimation of the outcomes and their risk factors.

7.0 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

Despite a low perceived burden, anxiety and depression were prevalent among school-attending adolescents in Dar-es-salaam, Tanzania. Emotional dysregulation had a moderate positive correlation with depression and anxiety. Exposure to social adverse events such as witnessing parental conflicts, witnessing parents drunk, and the death of a parent(s) were associated with increased likelihood of depression and anxiety. Academic pressure, family dysfunction, pervasive stigma and negative peer influence to engage in risky behaviors such as alcoholism, unsafe sex, and betting were among the dominant perceived risk factors for depression and anxiety among school-attending adolescents.

7.2 Recommendations

Addressing anxiety and depression among school-attending adolescents may require establishment of screening programs, enhancing adolescents' emotional intelligence, and regulation of academic pressure. Community education on the negative effects of adverse exposures on adolescents' mental health is also of paramount importance. Schools present a conducive avenue to reach a large number of adolescents for mental health promotion, early diagnosis, and care. Co-designing approaches should be employed to include parents', teachers', and adolescents' views in the development of interventions aimed at addressing depression and anxiety among adolescents.

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APPENDICES

Appendix 1: Parental consent form English version

Parental consent to allow participation of an adolescent in a research study

Adolescents' study ID number:_____

Study tittle: Prevalence of mood and emotional disorders and associated factors among school attending adolescents in Dar es salaam

Introduction: My name is _____ I am here on behalf of a Dr. Getrud Joseph who is resident pursuing her Masters of Medicine in Paediatrics and child health at Muhimbili University of health and allied sciences (MUHAS). As part of her study requirements, she is conducting research to find out the burden and factors associated with depression, anxiety and emotional dysregulation among school attending adolescents in Dar es salaam. We would like for your permission to allow participation of your adolescent child into this study.

This sheet contains information about the study. Please read/listen to it being read to you for you to understand the study before you allow participation of your child. You can ask any questions about the study at any point.

Aim of the study?: Adolescents are at high risk of suffering from mental illnesses which affects their health and transition into adulthood. We are doing this research to find out more about mental health and factors that are associated with mental illnesses among adolescents. We want to understand if there are problems that youth like you may be facing and what increases or decreases the risk of mental illnesses among adolescents like you. We will be mainly researching about depression, anxiety and emotional dysregulation

What would happen if your child participates this research?: If you allow your child to participate in the research, we would ask to ask him/her a set of questions about mental health, specifically about depression, anxiety, and emotional dysregulation. We will also ask a few questions about his/her daily life in order to find out factors that increases risk of these mental illnesses among adolescents.

Risks: Some of the questions may be uncomfortable to answer. But all of the answers are kept in great secret and confidentiality, no one other than your child and the researcher will know what you have answered. The questions will be asked in privacy.

Benefits: This research may not help your child individually. However, If we find out that he/she requires medical help, we will give provide a referral letter to the mental health facility near you. In general, this research it will help to find out the burden of mental illnesses among adolescents in general. It will help in planning how to prevent and to take care of those with mental illnesses such as depression, anxiety and emotional dysregulation.

Confidentiality: Study records that identify your child will be kept confidential. A special identification number will be assigned to all participant. Your child will not be identified by name, school name, address, telephone number, or any other direct personal identifier in any study records. Data will never be published with participants' identification details.

Other important details: We hope to enroll approximately 1700 students in Dar es salaam. We plan to include 20 schools from all five districts of Dar es salaam. This study includes both primary and secondary schools, boarding and day schools as well as private and public schools. Please ask any questions you may have in order to know more about our study

Effects of disagreeing: It is solely your decision to agree or disagree to participation of your child in this research study. There will not be any punishment, or any effects if you say NO. The study team respects your decision and we will not be upset of you say NO

Changing decision: It is OK to say yes now and change your mind at any time. You can stop participation of your child at any time. In case you change your decision, please tell any of our research staff.

Dissemination of the results: Results of this study will be communicated at health and education offices of respective districts in Dar es salaam. We also plan to publish results of this study in scientific journals so as to communicate with the broad society of scientists and researchers about the burden and factors associated with mental illnesses among adolescents. Publis

Contacts: You can ask questions now or any time. If you have any questions or you need to report any study related concerns you can talk to Dr. Getrud Joseph who is the main investigator when you see her physically, or contact her through phone: 0765126726 or email: g.josephmollel@gmail.com. You may also contact the main study supervisor Dr. Edward Kija through phone number 0754391662

If you have any concerns regarding your rights as a participant, or how this study is being carried out, you may contact the director of publication and research,

Dr. Nahya Salim
Director of Research and Publications

Muhimbili University of Health and Allied Sciences
P.O.BOX 65001,
Phone: +22 2152489

Take the time you need to make your choice.

Certificate of consent?

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and all the questions I have asked have been answered to my satisfaction. I consent voluntarily to allow my child to participate in this study

Name of Parent _____

Name of Participant (adolescent) _____

Signature of Researcher

_____

_____ _____

Date ***Time***

Appendix 2: Parental consent form Swahili version

Fomu ya ridhaa kwa wazazi kuruhusu ushiriki wa Watoto wao kwenye utafiti.

Namba ya utambulisho ya kijana:_____

Utafiti wa ukubwa wa matatizo ya akili yakiwemo sonons, wasiwasi wa kukithiri na changamoto za kudhibiti hisia, Pamoja na sababu zinazoambatana nazo miongoni mwa vijana balehe katika shule za Dar es salaam

Utangulizi: Jina langu ni _____. Nipo hapa kwa niaba ya Dr Getrud Joseph anayechukua masomo ya udaktari bingwa wa watoto katika chuo kikuu cha afya na sayansi shirikishi cha Muhimbili. Kama moja kati ya mahitaji ya masomo yake, anafanya utafiti ili kuweza kugundua ukubwa na visababishi vya matatizo ya sonona, wasiwasi uliopitiliza na changamoto za kudhibiti hisia kati wa vijana balehe wanaosoma shule za msingi na sekondari katika mkoa wa Dar es salaam. Tunapenda kukuomba uruhusu ushiriki wa mtoto wako katika utafiti huu. Karatasi hii imebeba taarifa juu ya utafiti huu, tafadhali soma, au uniruhusu nikusomee ili pindi utakapoelewa uweze kufanya maamuzi. Unaweza kuuliza maswali wakati wowote

Lengo la utafiti: Vijana balehe wapo katika hatari ya kupata magonjwa ya akili ambayo yanaweza kuathiri afya zao kwa ujumla na ukuaji wao katika kuelekea umri wa utu uzima. Tunafanya utafiti huu ili kufahamu kuhusu ukubwa wa matatizo ya sonona, wasiwasi wa kukithiri, na changamoto katika kudhibiti hisia pamoja na visababishi vyake. Tutanataka kutambua endapo vijana wanakumbwa na matatizo haya, na nini kinaweza kupelekea matatizo haya kuongezeka au kupungua.

Nini kitatokea endapo mtoto wako atashiriki?: Endapo mtoto wako atashiriki kwenye utafiti huu, tutamuuliza maswali kuhusu afya ya akili, hususan kuhusu sonona, wasiwasi wa kukithiri, na changamoto za uthibiti wa hisia. Tutamuuliza pia maswali kuhusu maisha yake

ya kila siku ili kuweza kutambua sababu zinazoweza kuongeza au kupunguza uwezekano wa vijana balehe kukumbwa na matatizo haya.

Hatari: Hakuna hatari kubwa inayoweza kutokana na utafiti huu. Baadhi ya maswali yanaweza yakamkwaza, au asijisikie urahisi wa kuyajibu. Tunapenda utambue kwamba majibu yote yanatunzwa kwa usiri mkubwa, na hakuna mtu yeyote zaidi ya watafiti wanaweza kugundua mshiriki alichojibu. Hakuna hatari zingine zinazoletwa na utafiti huu. Maswali yanaulizwa katika sehemu yenye usiri

Faida: Ushiriki wa mtoto wako unaweza usiwe na faida ya moja kwa moja kwake. Japokuwa, endapo itagundulika kwamba anahitaji msaada wa kiafya tutatoa rufaa ya kwenda katika kito cha kutolea huduma za afya ya akili kilichopo karibu. Kwa ujumla, utafiti huu utasaidia kugundua ukubwa wa matatizo ya afya ya akili kwa vijana balehe. Hii itasaidia katika kuweka mipango ya jinsi ya kuzuia matatizo haya, kugundua na kuwapatia huduma stahiki wale wenye matatizo ya sonona, wasiwasi wa kukithiri na changamoto za kudhibiti hisia.

Utunzaji wa taarifa kwa usiri; Taarifa zote za utafiti huu zitatunzwa kwa usiri mkubwa. Mtoto wako atapewa namba maalum ya ushiriki katika utafiti huu. Mtu yeyote hataweza kumtambua mshiriki kwa jina, shule au anuwani au taarifa zozote za binafsi. Machapisho yanayotokana na utafiti huu hayatakuwa na taarifa za utambulisho wa washiriki.

Taarifa zingine za muhimu kuhusu utafiti huu: Tunatarajia kuwa na washiriki takriban 1700 kutoka katika shule ishirini za wilaya zote tano za Dar es Salaam. Utafiti huu unahisisha shule za msingi na za sekondari, za binafsi na za serikali. Vile vile, utahusisha shule za kulala (boarding) Pamoja na za kutwa. Tafadhali uliza maswali yoyote uliyonayo ili uweze kufahamu zaidi kuhusu utafiti huu.

Ushiriki wa hiari: Kwa hakika, ni maamuzi yako wewe mwenyewe, kwahiari kabisa, kuruhusu ushiriki wa mtoto wako katika utafiti huu au la. Hakutakuwa na adhabu yoyote, au madhara yoyote endapo utaamua kukataa. Pia, hatutakasirika endapo utasema hapana.

Kubadilisha maamuzi ya ushiriki: Unaruhusiwa kabisa kukubali kushiriki, na kuamua kubadili maamuzi hayo baadae. Unaweza ukasitisha ushiriki wako muda wowote. Endapo

utaamua kubadili maamuzi na kusitisha ushiriki wako, tafadhali mfahamishe mtafiti aliyepo na wewe wakatu huo.

Taarifa za matokeo ya utafiti: Taarifa za matokeo ya utafiti huu yatawasilishwa katika ofisi za elimu na za elimu katika kila wilaya ya mkoa wa Dar es salaam. Pia tunatarajia kuchapisha matokeo ya utafiti huu katika majarida ya kisayansi ili kuweza kuujulisha umma wa watafiti na wanasayansi juu ya matatizo ya afya ya kili kwa vijana balehe. Taarifa na machapisho haya hayatakuwa na taarifa za utambulisho wa washiriki.

Mawasiliano: Unaruhusiwa kuuliza maswali wakati wowote. Unaweza kumuuliza Dr. Getrud Joseph ambaye ndiye mtafiti mkuu unapomuona wakati wowote, au ukawasiliana naye kwa simu namba: 0765126726 au barua pepe: g.josephmollel@gmail.com. Unaweza pia kuwasiliana na msimamizi mkuu wa utafiti huu, Dr. Edward Kija kwa simu nambari 0754391662

Iwapo una maswali kuhusu haki yako kama mshiriki, na uendeshwaji wa utafiti huu, ususute kuwasiliana na mkuu wa kitecho cha mashapisho na utafiti kwa mawasiliano yafuatayo
Dr Nahya Salim
Mkuu wa kitengo cha machapisho na utafiti
Chuo kikuu cha afya na sayansi shirikishi cha Muhimbili
P.O.BOX 65001,
Simu: +22 2152489
Chukua muda unaohitaji ili kuweza kufanya maamuzi.

Cheti cha ridhaa: Nimesoma/ nimesomewa maeolezo kuhusu utafiti kwa kiswahili. Nimepewa muda wa kuuliza maswali kuhusu utafiti na maswali yote nimepewa majibu ambayo yameniridhisha. Ninafahamu pia kuwa ninaweza kusitisha ushiriki wa mtoto wangu wakati wowote. Ninakubali, kwa ridhaa yangu kuruhusu ushiriki wa mtoto wangu kwenye utafiti huu.

Jina la mzazi _____

Jina la mshiriki (kijana balehe) _____

Sahihi ya mtafiti _____

_____ _____

Tarehe ***Muda***

Appendix 3: Assent form English version

Adolescent written assent Form



Study ID number:_____

Study tittle: Prevalence of mood and emotional disorders and associated factors among school attending adolescents in Dar es salaam

Introduction: My name is _____ I am here on behalf of a Dr. Getrud Joseph who is resident pursuing her Masters of Medicine in Paediatrics and child health at Muhimbili University of health and allied sciences (MUHAS). As part of her study requirements, she is conducting research to find out the burden and factors associated with depression, anxiety and emotional dysregulation among school attending adolescents in Dar es salaam.

Aim of the study: Adolescents are at high risk of suffering from mental illnesses which affects their health and transition into adulthood. We are doing this research to find out more about mental health and factors that are associated with mental illnesses among adolescents. We want to understand if there are problems that youth like you may be facing and what increases or decreases the risk of mental illnesses among adolescents like you. We will be mainly researching about depression, anxiety and emotional dysregulation

What would happen if you participate this research?: If you decide to be in the research, we would ask to ask you a set of questions about mental health, specifically about depression, anxiety, and emotional dysregulation. We will also ask a few questions about you, and your daily life in order to find out factors that increases risk of these mental illnesses among adolescents.

RisksSome of the questions may be uncomfortable to answer. But all of your answers are kept in great secret and confidentiality, no one other than you and the researcher will know what you have answered.

Benefits: This research may not help you individually. However, If we find out that you require medical help, we will give you a referral letter to the mental health facility near you. In general, this research it will help to find out the burden of mental illnesses among adolescents in general. It will help in planning how to prevent and to take care of those with mental illnesses such as depression, anxiety and emotional dysregulation.

Confidentiality: Study records that identify you will be kept confidential. You will be assigned a special identification number as a participant. You will not be identified by name, school name, address, telephone number, or any other direct personal identifier in any study records. The data you contribute will never be published with information that identifies who you are.

Other important details: We hope to enroll approximately 1700 students in Dar es salaam. We plan to include 20 schools from all five districts of Dar es salaam. This study includes both primary and secondary schools, boarding and day schools as well as private and public schools. Please ask any questions you may have in order to know more about our study

If you DO NOT agree to participate, what will be the effects?: It is solely your decision to agree or disagree to participate in this research study. There will not be any punishment, or any effects if you say NO. The study team respects your decision and we will not be upset of you say NO

Changing decision: It is OK to say yes now and change your mind at any time. You can stop being in the research at any time. If you want to stop, please tell any research staff that is with you.

Dissemination of the results: Results of this study will be communicated at health and education offices of resepective districts in Dar es salaam. We also plan to publish results of this study in scientific journals so as to communicate with the broad society of scientists and researchers about the burden and factors associated with mental illnesses among adolescents.

Contacts: You can ask questions now or any time. If you have any questions or you need to report any study related concerns you can talk to Dr. Getrud Joseph who is the main investigator when you see her physically, or contact her through phone: 0765126726 or email: g.josephmollel@gmail.com. You may also contact the main study supervisor Dr. Edward Kija through phone number 0754 391662

If you have any concerns regarding your rights as a participant, or how this study is being carried out, you may contact the director of publication and research,

Dr. Nahya Salim
Director of Research and Publications
Muhimbili University of Health and Allied Sciences
P.O.BOX 65001,
Phone: +22 2152489

Take the time you need to make your choice.

Certificate of assent: I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and all the questions I have asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Name of Participant _____

(To be written by the adolescent)

Signature of Researcher

_____

_____ _____

Date *Time*

Appendix 4: Assent form Swahili version

Fomu ya ridhaa kwa vijana balehe kushiriki wkente utafiti

Utafiti wa ukubwa wa matatizo ya akili yakiwemo sonons, wasiwasi wa kukithiri na changamoto za kudhibiti hisia, Pamoja na sababu zinazoambatana nazo miongoni mwa vijana balehe katika shule za Dar es salaam

Namba ya utambulisho:_____

Utangulizi: Jina langu ni _____. Nipo hapa kwa niaba ya Dr Getrud Joseph anayechukua masomo ya udaktari bingwa wa Watoto katika chou kikuu cha afya na sayansi shirikishi cha Muhimbili. Moja kati ya mahitaji ya masomo yake, anafanya utafiti ili kuweza kugundua ukubwa na visababishi vya matatizo ya sonona, wasiwasi uliopitiliza na changamoto za kudhibiti hisia kati wa vijana balehe wanaosoma shule za msingi na sekondari katika mkoa wa Dar es salaam.

Lengo la utafiti: Vijana balehe wapo katika hatari ya kupata magonjwa ya akili ambayo yanaweza kuathiri afya zao kwa ujumla na ukuaji wao katika kuelekea umri wa utu uzima. Tunafanya utafiti huu ili kufahamu kuhusu ukubwa wa matatizo ya sonona, wasiwasi wa kukithiri,, na changamoto katika kudhibiti hisia Pamoja na visababishi vyake. Tutanataka kutambua endapo vijana kama wewe wanakubwa na matatizo haya, na nini kinaweza kupelekea matatizo haya kuongezeka au kupungua.

Nini kitatokea endapo ukiamua kujiunga na utafiti huu?: Endapo utaamua kushiriki kwenye utafiti huu, tutakuuliza maswali kuhusu afya ya akili, hususan kuhusu sonona, wawiwasi wa kukithiri, na changamoto za uthibiti wa hisia. Tutakuuliza pia maswali kuhusu Maisha yako ya kila siku na masomo yako ili kuweza kutambua sababu zinazoweza kuongeza au kupunguza uwezekano wa vijana balehe kukubwa na matatizo haya.

Hatari: Baadhi ya maswali yanaweza yakakukwaza, au usijirikie urahisi wa kuyajibu. Tunapenda utambue kwamba majibu yote unayotoa yanatunzwa kwa usiri mkubwa, na hakuna mto yeyote Zaidi ya watafiti wanaweza kugundua moja kwa moja ulichojibu. Hakuna hatari zingine zinazoletwa na utafiti huu.

Faida: Ushiriki wako unaweza usiwe na faida ya moja kwa moja kwako. Japokuwa, endapo itagundulika kwamba unahitaji msaada wa kiafya tutakupa rufaa ya kwenda katika kito cha kutolea huduma za afya ya akili kilichopo karibu na wewe. Kwa ujumla, utafiti huu utasaidia kugundua ukubwa wa matatizo ya afya ya akili kwa vijana. Hii itasaidia katika kuweka mipango ya jinsi ya kuzuia matatizo haya, na kugundua na kuwapatia huduma stahiki wale wenye matatizo ya sonona, wasiwasi wa kukithiri na changamoto za kudhibiti hisia.

Utunzaji wa taarifa kwa usiri: Taarifa zote za utafiti huu zitatunzwa kwa usiri mkubwa. Utapewa namba maalum ya ushiriki katika utafiti huu. Mtu yeyote hataweza kukutambua wewe kwa jina, shule au anuwani yako au taarifa zozote za binafsi. Machapisho yanayotokana na utafiti huu hayatakuwa na taarifa za utambulisho wa washiriki.

Taarifa zingine za muhimu kuhusu utafiti huu: Tunatarajia kuwa na washiriki takriban 1700 kutoka katika shule ishirini za wilaya zote tano za Dar es Salaam. Utafiti huu unahisisha shule za msingi na za sekondari, za binafsi na za serikali. Vile vile, utahusisha shule za kulala (boarding) Pamoja na za kutwa. Tafadhali uliza maswali yoyote uliyonayo ili uweze kufahamu zaidi kuhusu utafiti huu.

Ushiriki wa hiari: Kwa hakika, ni maamuzi yako wewe mwenyewe, kwahiari kabbisa, kuamua kushiriki katika utafiti huu au la. Hakutakuwa na adhabu yoyote, au madhara yoyote endapo utaamua kutokushiriki. Pia, hatutakasirika endapo utasema hapana.

Kubadilisha maamuzi ya ushiriki: Unaruhusiwa kabisa kukubali kushiriki, na kuamua kubadili maamuzi hayo baadae. Unaweza ukasitisha ushiriki wako muda wowote. Endapo utaamua kubadili maamuzi na kusitisha ushiriki wako, tafadhali mfahamishe mtafiti aliyepo na wewe wakatu huo.

Taarifa za matokeo ya utafiti: Taarifa za matokeo ya utafiti huu yatawasilishwa katika ofisi za elimu na za elimu katika kila wilaya ya mkoa wa Dar es salaam. Pia tunatarajia kuchapisha matokeo ya utafiti huu katika majarida ya kisayansi ili kuweza kuujulisha umma wa watafiti na wanasayansi juu ya matatizo ya afya ya kili kwa vijana balehe. Taarifa na machapisho haya hayatakuwa na taarifa za utambulisho wa washiriki.

Mawasiliano: Unaruhusiwa kuuliza maswali wakati wowote. Unaweza kumuuliza Dr. Getrud Joseph ambaye ndiye mtafiti mkuu unapomuona wakati wowote, au ukawasiliana naye kwa simu namba: 0765126726 au barua pepe: g.josephmollel@gmail.com. Unaweza pia kuwasiliana na msimamizi mkuu wa utafiti huu, Dr. Edward Kija kwa simu nambari 0754391662
Iwapo una maswali kuhusu haki yako kama mshiriki, na uendeshwaji wa utafiti huu, ususute kuwasiliana na mkuu wa kitecho cha mashapisho na utafiti kwa mawasiliano yafuatayo
Dr Nahya Salim

Mkuu wa kitengo cha machapisho na utafiti

Chuo kikuu cha afya na sayansi shirikishi cha Muhimbili

P.O.BOX 65001,

Simu: +22 2152489

Chukua muda unaohitaji ili kuweza kufanya maamuzi.

Cheti cha ridhaa: Nimesoma/ nimesomewa maelezo kuhusu utafiti kwa kiswahili. Nimepewa muda wa kuuliza maswali kuhusu utafiti na maswali yote nimepewa majibu ambayo yameniridhisha. Ninafahamu pia kuwa ninaweza kusitisha ushiriki wangu wakati wowote. Kwa ridhaa yangu, ninakubali kishiriki.

Jina la mshiriki (kijana balehe) _____

Sahihi ya mtafiti _____

_____ _____

Tarehe

Appendix 5: PHQ-9 English version

PHQ-9: Over the last 2 weeks, how often have you been bothered by the following problems?	Si wakati wote 0	Siku chache 1	Zaidi za siku saba 2	Karibia kila siku 3
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 asleep, 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 a news paper 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 have been better off dead or hurting yourself in some way	0	1	2	3
10. To what extent have the thoughts mention above made it hard for you to accomplish your tasks, or to be in good terms with others?	0	1	2	3
11. Have you ever attempted hurting yourself, or intended to do so in the past?	1. Yes 2. No			

12. Do you still have intentions to hurt yourself?	1. Yes 2. No
13. When you feel sad, or hopeless, do you have a person you can go to for help?	1. Yes 2. No
a. If yes, who, *(You can choose more than one)*	1. A parent (father/mother) 2. Sister/brother 3. Other relatives i.e aunt, uncle, cousin, grandparent 4. Teacher 5. Friend 6. Doctor 7. Other (mention) _____

Appendix 6: PHQ-9 Swahili version

PHQ-9: Ndani ya wiki mbili zilizopita, ni mara ngapi umekuwa ukisumbuliwa na tatizo lolote kati ya haya yafuatayo?	Si wakati wote 0	Siku chache 1	Zaidi za siku saba 2	Karibia kila siku 3
1. Kuwa na shauku kidogo au kutokufurahia shughuli zako za kawaida?	0	1	2	3
2. Hisia za kutokuwa na raha, kusononeka au kukata tamaa?	0	1	2	3
3. Kukosa usingizi, kushindwa kulala, au kulala sana?	0	1	2	3
4. Kujihisi kuchoka au kukosa nguvu?	0	1	2	3
5. Kukosa hamu ya kula au kula sana?	0	1	2	3
6. Kujihisi vibaya kuhusu wewe mwenyewe--au kuhisi kushindwa au kujiangusha mwenyewe au kuiangusha familia yako?	0	1	2	3
7. Unapata shida kuwa makini, kwa mfano wakati wa kupika, kusoma gazeti au kuangalia runinga?	0	1	2	3
8. Kutembea au kuzungumza taratibu sana mpaka watu wakawa wameona tofauti, au kinyume chake kwamba hutulizani na unahangaika sana kuliko ilivyo kawaida?	0	1	2	3
9. Mawazo kuwa ni bora kufa au kujiumiza mwenyewe kwa njia fulani?	0	1	2	3

10. Kufuatia matatizo uliyoyataja hapo juu ni kwa kiwango gani yamekufanya ushindwe kufanya kazi zako, kutunza vitu vya nyumbani, au kuweza kuelewana na watu wengine?	0	1	2	3
11. Umeshawahi kufanya kitendo chochote cha kujiumiza kwa kudhamaria katika siku za nyuma?	1. Ndiyo 2. Hapana			
12. Je, kwa wakati huu una mpango wowote wa kujiumiza kwa kudhamaria?	1. Ndiyo 2. Hapana			
13. Kama unajihisi vibaya au huzuni je, kuna mtu katika maisha yako ungemwendea kwa msaada	1. Ndiyo 2. Hapana			
b. Ikiwa ndiyo, Nani? *(Tafadhali zungushia duara wote waliotajwa)*	1. Mama (mzazi) au Baba (mzazi) 2. Dada au Kaka 3. Mama mkuwa, mama mdogo, Shangazi, baba mkubwa, baba mdogo, au mjomba 4. Bibi au Babu 5. Rafiki 6. Mwalimu 7. Daktari 8. Mtu mwingine (ainisha) _____			

Appendix 7: GAD-7 English version

GAD-7 **Over the last 2 weeks, how often have you been bothered by the following problems?**	**Never**	**Sometimes**	**More than half the time**	**Almost always**
Feeling nervous, anxious or on edge	0	1	2	3
Not being able to stop or control worrying	0	1	2	3
Worrying too much about different things	0	1	2	3
Trouble relaxing	0	1	2	3
Being so restless that it is hard to sit still	0	1	2	3
Becoming easily annoyed or irritable	0	1	2	3
Feeling afraid as if something awful might happen	0	1	2	3

Appendix 7: GAD-7 Swahili version

GAD-7 **Umekereka mara ngapi na matatizo yafuatayo katika kipindi cha wiki mbili zilizopita?**	**Hapana kabisa**	**Siku kadhaa**	**Zaidi ya nusu ya siku hizo zote**	**Karibu kila siku**
1. Kuhisi hofu, wasiwasi au kufadhaika	0	1	2	3
2. Kushindwa kuuzuia au kuutawala wasiwasi	0	1	2	3
3. Kuwa na wasiwasi uliopitiliza juu ya mambo tofauti tofauti	0	1	2	3
4. Kupata shida katika kutulia	0	1	2	3
5. Kukosa utulivu kiasi kwamba inakua ngumu kutulia sehemu moja	0	1	2	3
6. Kuudhika au kukasirika kirahisi	0	1	2	3
7. Kuhisi uoga kana kwamba kitu kibaya kinaweza kutokea	0	1	2	3

Appendix 8: DERS English version

Disorders of Emotional Regulation Scale (DERS)						
		Almost never	Sometimes	Half of the time	Most of the time	Almost always
1	I pay attention to how I feel	5	4	3	2	1
2	I have no idea how I am feeling	1	2	3	4	5
3	I have difficulty making sense out of my feelings	1	2	3	4	5
4	I am attentive to my feelings	5	4	3	2	1
5	I am confused about how I feel	1	2	3	4	5
6	When I'm upset, I acknowledge my emotions	5	4	3	2	1
7	When I'm upset, I become embarrassed for feeling that way	1	2	3	4	5
8	When I'm upset, I have difficulty getting work done	1	2	3	4	5
9	When I'm upset, I become out of control	1	2	3	4	5
10	When I'm upset, I believe that I will remain that way for a long time	1	2	3	4	5
11	When I'm upset, I believe that I'll end up feeling very depressed	1	2	3	4	5
12	When I'm upset, I have difficulty focusing on other things	1	2	3	4	5
13	When I'm upset, I feel ashamed with myself for feeling that way	1	2	3	4	5
14	When I'm upset, I feel guilty for feeling that way	1	2	3	4	5
15	When I'm upset, I have difficulty concentrating	1	2	3	4	5
16	When I'm upset, I have difficulty controlling my behaviours	1	2	3	4	5
17	When I'm upset, I believe that wallowing in it is all I can do	1	2	3	4	5
18	When I'm upset, I lose control over my behaviours	1	2	3	4	5

Appendix 9: DERS Swahili version

Disorders of Emotional Regulation Scale (DERS)						
		Almost never	Sometimes	Half of the time	Most of the time	Almost always
1	Ninajali jinsi ninavyojiskia	5	4	3	2	1
2	Sijui ninavojisikia	1	2	3	4	5
3	Ninapata shida kutambua hisia zangu	1	2	3	4	5
4	Mimi ni mwangalifu juu ya hisia zangu	5	4	3	2	1
5	Sjijielewi jinsi ninavyojisikia	1	2	3	4	5
6	Ninapokasirika ninatambua hisia zangu	5	4	3	2	1
7	Ninapokasirika, ninajisikia aibu kwa kujisikia hivyo	1	2	3	4	5
8	Ninapokasirika ninapata shida kukamilisha majukumu yangu	1	2	3	4	5
9	Ninapokasirika ninashindwa kujidhibiti	1	2	3	4	5
10	Ninapokasirika ninaamini nitabaki na hisia hizo kwa muda mrefu	1	2	3	4	5
11	Ninapokasirika, ninaamini kwanba nitaishia kusononeka sana	1	2	3	4	5
12	Nikikasirika, ninapata shida kuwa makini kwenye mambo mengine	1	2	3	4	5
13	Ninapokasirika ninajisikia aibu kwa kuwa na hisia hizo	1	2	3	4	5
14	Ninapokasirika ninajilaumu kwa kujisikia hivyo	1	2	3	4	5
15	Ninapokasirika ninapata shida kuwa makini	1	2	3	4	5
16	Ninapokasirika ninashidwa kudhibiti tabia zangu	1	2	3	4	5
17	Ninapokasirika, ninachoweza kufanya ni kutotilia mkazo	1	2	3	4	5
18	Ninapokasirika ninashindwa kudhibiti hisia zangu	1	2	3	4	5

Appendix 10: Structured questionnaire English version

Questionnaire: **Assessment of the prevalence of anxiety and depression, associated factors and correlation with emotional dysregulation among school-attending adolescents in Dar es Salaam**

1. **Identification**

1.1	Study ID number	
1.2	Date of the interview	
1.3	Name of the interviewer	
1.4	District	
1.5	Name of school	

2. Socio-demographic information

2.1	Date of birth _____ Is the date estimated? 1= Yes 2= No	
2.2	Sex of the participant 1 = Male 2 = Female	
2.3	Who is your primary care taker at home? 1. Mother/Father 2. Grand parent 3. Orphanage 4. Other(Specify)_____	
2.4	Are both your parents alive? 1. Both are alive 2. Only mother is alive 3. Only father is alive 4. Both are deceased	

3. Household economic status

3.1	Please tell me about the ownership of the house that your family lives in I/we own the house We are renting We live at friends/other family for free Other specify	
3.2	How many rooms does your house have	
3.3	What are the walls of your house made of? Mud Bricks Sticks Other (Specify)	
3.4	What is the source of water used in your household? 1=Improved source with following examples *(Piped into dwelling/yard/plot ; Public tap/standpipe; Tube well/borehole; Protected well;Protected spring; Rainwater; Bottled water)* 2=Unimproved source with following examples *(Unprotected well; Unprotected spring; Tanker truck/car with small tank, Surface water)*	
3.5	What is the roof of your house made off Iron sheets Grass 3 . Other (Specify)	
3.6	What is the source of light at your household Electricity Solar lamps Kerosene lamps Candles Other (Specify)	
3.7	What fuel is used for cooking at your household? Electricity Gas Charcoal Firewood Others (Specify) 1Electricity	
3.8	Type of toilet at your household Flush toilet (inside or outside the house) Pit latrine inside Other (specify)	
3.9	Do you have health insurance 1= Yes 2= No If yes: type of insurance	
3.10	Who is the main earner in your family 1 = Father only 2 = Mother only 3 = Both 4 = Other (Specify)	

4. School-related factors

1.6	School level Primary Secondary	
1.7	School ownership 1. Private Public	
1.8	School type 2. Boarding 3. Day Mixed	
4.10	*For day scholar*, What mode of transport do you to and from school 1. School bus 2. Public transport (daladala) 3. Walking 4. Bodaboda 5. Others (Mention)	
4.11	What time do you usually leave home in the morning? Insert time on 24 hours format *e.g 0540 hrs* _____	
4.12	What time do you usually arrive at school? Insert time on 24 hours format *e.g 0540 hrs*	
4.14	At what time do you usually wake up? Insert time on 24 hours format *e.g 0540 hrs*	

4. Adverse childhood events

4.1	Did a parent or other adult in the household often … Swear at you, insult you, put you down, or humiliate you? or Act in a way that made you afraid that you might be physically hurt? 0. No 1. Yes	
4.2	Did a parent or other adult in the household often … Push, grab, slap, or throw something at you? or Ever hit you so hard that you had marks or were injured? 0. No 1. Yes	
4.3	Has anyone ever… touched or fondle you or have you touch their body in a sexual way? or Try to or actually have sex with you? 0. No 1. Yes	
4.4	Are your parents ever separated or divorced? 0. No 1. Yes	
4.5	Was your mother or stepmother: Often pushed, grabbed, slapped, or had something thrown at her? or Sometimes or often kicked, bitten, hit with a fist, or hit with something hard? 0. No 1. Yes	
4.6	Have you ever witnessed your parents fighting 0. No 1. Yes	
4.7	Is your parent a problem drinker or alcoholic 2. No 3. Yes	

5.Alcohol use and smoking

5.1	Have you ever drank alcohol 1. No 2. Yes If yes, proceed with question 6.2-6.4, If no skip to question 6.5	
5.2	What type of alcohol did you use? 1. Beer e.g Kilimanjaro, castle ets 2. Spirits e.g Konyagi 3. Local brews	
5.3	How often do you drink alcohol 0. Never 1. Monthly or less 2. 2-4 times a month 3. 2.3 times a week 4. More than 4 times a week	
5.4	How many drinks containing alcohol do you have on a typical day when you are drinking? 0. 1 or 2 1. 3 or 4 2. 5 or 6 3. 7 to 9 4. More than 10	
5.5	How often do you have 6 or more drinks in one occasion? 0. Never 1. Less than monthly 2. Monthly 3. Weekly 4. Daily or almost daily	
5.6	Do you have a friend that drinks beer 1. No 2. Yes	
5.7	Do you smoke? 1. No 2. Yes If no, skip to question 5.9	
5.8	What do you smoke ? 1. Cigaratte 2. Marijuana 3. Others (mention)	
5.9	How often do you smoke? 1. Daily 2. At least once every week 3. Occassionally 4. Other (mention)	
5.10	Do you have a friend that smokes? 1. No 2. Yes	

6 Physical health

7.2	Weight (kg)	
7.3	Length/height (cm)	

Appendix 11: FGD guide English version

Study tittle: **Assessment of the prevalence and factors associated with depression, anxiety and emotional dysregulation among school attending adolescents in Tanzania**

Introduction: Hello, we are conducting a research to find out the burden and factors associated with depression, anxiety and emotional dysregulation among school attending adolescents in Dar es salaam. One of the objectives in the study is to assess perception of parents, adolescents and teachers on mental illnesses among adolescents, especially depression, anxiety and emotional dysregulation disorders

What is mental illness? What is depression/anxiety

Probe: *What presenting features*

What is the burden of depression and anxiety among adolescents?

Probe: *What is the perceived burden, how much are adolescents affected why?*

What things increase the risk among school-going adolescents?

Probe: *Why? What can be done?*

What about readiness of adolescents to seek mental health services

Probe: *Why? Perceived as a shameful thing? Would parents take their adolescent children for mental health care?*

Let us talk about how the community sees/would see an adolescent who has suffered from depression or anxiety?

Probe: *stigma?*

How can school-factors can exacerbate the risk of depression, anxiety and emotional dysregulation among adolescents

Do you have any other comments?

Appendix 12: FGD guide Swahili version

Utafiti wa ukubwa wa matatizo ya akili yakiwemo sonons, wasiwasi wa kukithiri na changamoto za kudhibiti hisia, Pamoja na sababu zinazoambatana nazo miongoni mwa vijana balehe katika shule za Dar es salaam

Utangulizi: Habari, tupo hapa kufanya utafiti kuhusu ukubwa wa matatizo ya akili yakiwemo sonons, wasiwasi wa kukithiri na changamoto za kudhibiti hisia, Pamoja na sababu zinazoambatana nazo miongoni mwa vijana balehe katika shule za Dar es salaam. Moja ya lengo la utafiti hii ni kutambua mtazamo na mawazo ya vijana balehe, wazazi na waalimu juu ya matatizo ya akili kwa vijana. Tunaomba ushiriki kwenye mahojiano haya yakayochukua dakika 40 hadi saa moja.

Unafahamu nini kuhusu magonjwa ya akili? Sonona na wasiwasi wa kukithiri?

Dadisi: *Ukubwa wa tatizo, umuhimi, kwanini?*

Vijana balehe wanakumbwa na matatizo ya akili kwa kiasi gani katika jamii zetu?

Dadisi: *kwanini?ukubwa wa tatizo upoje?*

Ni vitu gani vinaweza kuongeza hatari ya vijana balehe waliopo shuleni kukumbwa na matatizo ya afya ya akili??

Dadisi: *kwa nini? Ni nini kifanyike?*

Vipi kuhusu utayari wa vijana kwenda kupata huduma za afya ya akili

Probe: *kwa nini? Nyanyapaa upoje? Wazazi wapo tayari kuwapeleka?*

Una maoni yoyote

Asante

Appendix 11: Ethical Clearance

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

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Ref. No.DA.282/298/01.C/ Date: 31/08/2023

MUHAS-REC-08-2023-1886
Dr Getrud Joseph
School of Medicine
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: PREVALENCE AND FACTORS ASSOCIATED WITH ANXIETY, DEPRESSION AND EMOTIONAL DYSREGULATION AMONG IN-SCHOOL ADOLESCENTS AGED 10-19 YEARS IN DAR ES SALAAM: A MIXED METHOD STUDY.

Reference is made to the above heading.

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 31/08/2023
EXPIRATION DATE OF APPROVAL: 31/08/2024

STUDY DESCRIPTION:
Purpose:
The purpose of this cross sectional study is to assess the prevalence and factors associated with depression, anxiety and emotional dysregulation among in-school adolescents aged 10-19 years in Dar es salaam Tanzania.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:
https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2014721.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

Dr. Kasusu Nyamuryekung'e
Ag. Chairperson, MUHAS Research and Ethics Committee

