UNIVERSITY OF CAPE COAST

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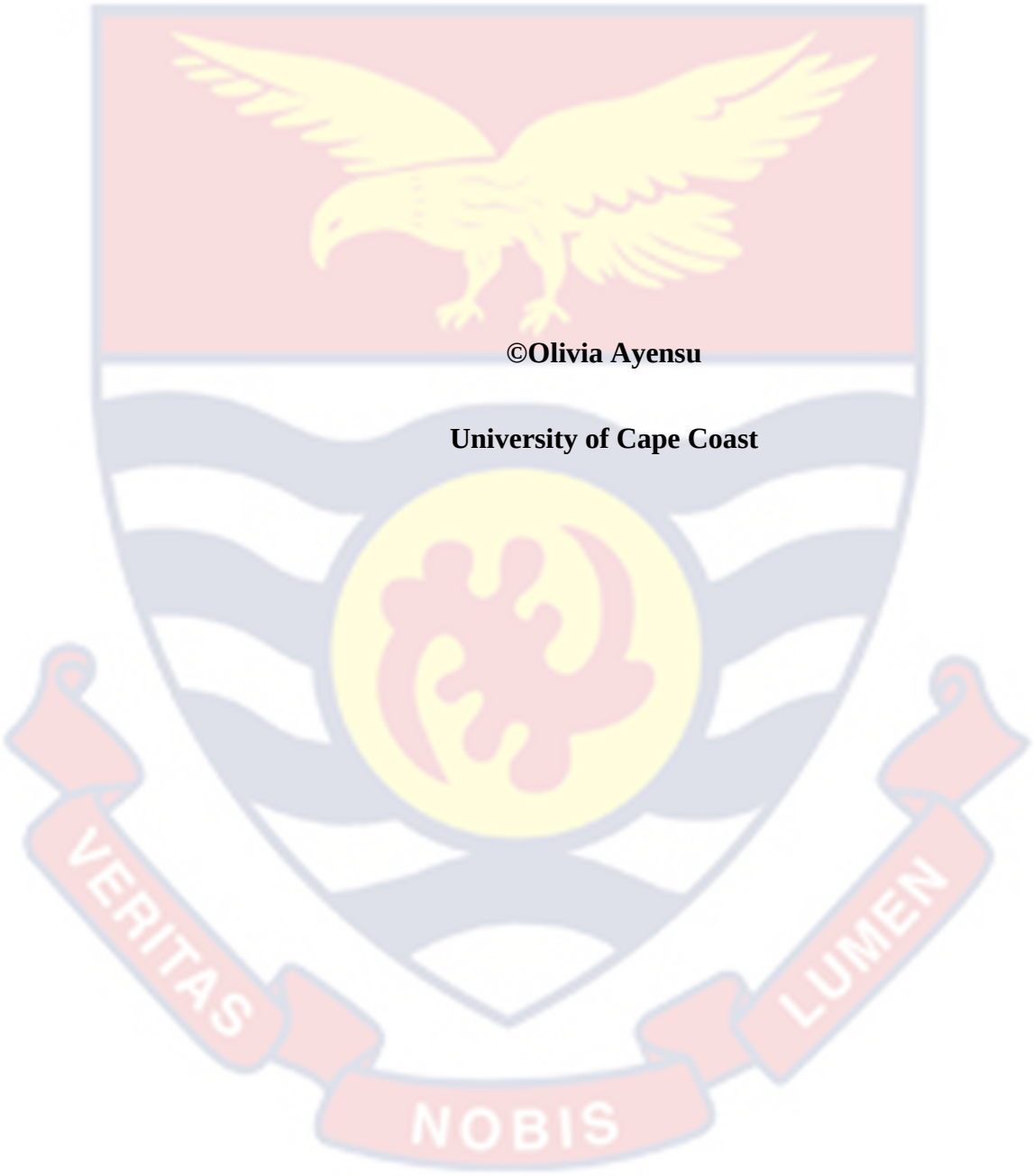
OLIVIA AYENSU

2023



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DEPRESSION, ANXIETY AND STRESS LEVELS AMONG STUDENTS IN A GHANAIAN PUBLIC UNIVERSITY DURING THE COVID-19 PANDEMIC

BY

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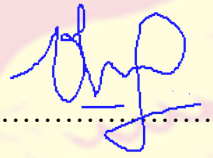
Thesis submitted to the Department of Guidance and Counselling of the Faculty of Educational Foundations, College of Education Studies, University of Cape Coast, in partial fulfillment of the requirements for the award of Master of Philosophy degree in Guidance and Counselling

NOVEMBER 2023

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in thus University or elsewhere.



Candidate's Signature: …….... Date…….....

Name: …….

Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature: …… Date…….....

Name: …….

ABSTRACT

The purpose of the study was to determine the level of mental health conditions such as depression, anxiety and stress among Kwame Nkrumah University of Science and Technology (KNUST) students, the differences between the conditions with respect to gender, age, level of study and identify the correlation between the conditions during the COVID-19 pandemic. The study applied a cross-sectional research design and quantitative approach on an accessible population of 2,844 students at the College of Health Sciences, KNUST, Kumasi aged between 18 years to 45 years. A purposive sampling technique was employed with a sample size of 350 administered with the structured DASS-21 data collection instrument online via emails and WhatsApp from Google forms. Data processing and analysis included descriptive statistical procedures with Office word, Excel and IBM's SPSS. Correlations between the conditions were determined by Pearsons' correlation and Sperman's rho. Reslts indicated that 60% of the respondents had depression, 65% for anxiety and 37% with stress. The male and female respondents represented 45.1% and 54.9% respectively however, the difference between the mean mental health conditions was not statistically significant at a confidence interval of 95%. A strong correlation was observed between depression, anxiety and stress among the students. The current study has identified students who have reported mental health conditions requiring psychiatric, psychological and counselling interventions. It is recommended that the university management should put in place interventions to address the mental health challenges among the students.

KEYWORDS

Anxiety

COVID-19

Depression

Mental health

Pandemic

Stress

ACKNOWLEDGEMENTS

I am most grateful to the Lord God almighty for life and grace through my Lord and saviour Jesus Christ. I appreciate the guidance, advice and training offered by my supervisor, Prof. Godwin Awabil. A special thanks goes to my Head of Department, Dr. Stephen Doh Fia. I am extremely thankful to my husband, Prof. Isaac Ayensu and my children for all the encouragement and support. I further wish to acknowledge the contribution by my course mates who always kept me on my toes throughout the study period.

Finally, thanks to all the students who spent precious time responding to the questionnaires of this study. May the Lord bless you all.

DEDICATION

I wish to wholeheartedly dedicate this thesis to my Lord and Saviour Jesus Christ and to my family; Prof., Irene, Kezia, Olivia and Samuel Ayensu.

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CHAPTER ONE

INTRODUCTION

The World Health Organisation (WHO) declared COVID- 19 as a public health emergency of international concern (PHEIC) on 30th January, 2020. PHEICs may present communities with significant mental health risk (David, Cristea & Hofmann, 2018). The non-discriminatory outcomes of COVID-19 affects the physical health and wellbeing of students as well as their mental health and psychological status. These psychological effects are characterized by severe symptoms of mental trauma including depression, anxiety and stress (Zhang, Lu, Zeng, Zhang, Du & Jiang, 2020). Without the benefit of being armed with a repertoire of healthy coping strategies, students at KNUST stand the risk of experiencing increased mental health challenges. The research aims to determine the prevalence of depression, anxiety and stress among students at KNUST in order to obtain data that will be useful in constituting early interventions to support victims identified with mental health issues.

Background to the study

Starting in December 2019 in the city of Wuhan, China, a number of people reported rare cases of pneumonia infection by the novel Coronavirus (COVID-19), which became a global health issue upon the rapid spread (Bai, Yao, Wei, Tian, Jin & Chen, 2020). Currently all nations across the globe are experiencing the devastating effect of the pandemic, requiring emergency approval of some vaccines to curb the effect of the virus. The first two confirmed COVID-19 cases in Ghana were reported on 12th March, 2020, spreading to 5,530 cases by 15th May, 2020 in thirteen out of the sixteen regions

(https://ghs.gov.gh/covid19, 2020) with 24 deaths. People with compromised immunity were at risk of death if they contracted the virus.

During the past two decades, viral diseases such as Middle East Respiratory Syndrome (MERS) in 2012, influenza virus (H1N1 subtype) in 2009, severe acute respiratory syndrome (SARS) in 2003, and Ebola virus in 2014 have been known (Feldmann, Jones, Klenk, & Schnittler, 2003: Team, Dawood, Jain, Finelli, Shaw & Lindstrom, 2009: Ashour, Elkhatib, Rahman & Elshabrawy, 2020). Severe illnesses including MERS and SARS have been associated with COVID-19 with symptoms such as sore throat, cough, fever, chills, myalgia, nausea, vomiting and diarrhoea. Patients battling underlying conditions such as hypertension, kidney damage and asthma may be infected with resultant worse outcomes (Chen, Zhou, Dong, Qu, Gong & Han, 2020). In some severe cases, organ failure and acute respiratory syndrome leads to death (Holshue, DeBolt, Lindquist, Lofy, Wiesman, & Bruce., 2020).

COVID-19 pandemic leaves in its wake physical and a number of psychological impacts that affect the mental health of people at the personal, community, national and international levels. The fear of contracting the disease with subsequent death and stigmatization by others leads to psychological crises that harmfully affect public mental health (Huang & Zhao, 2020: Xiang, Yang, Li, Zhang, Zhang, & Cheung, 2020). Identifying individuals with psychological disorders at an early stage is however critical in providing effective intervention strategies. The psychological challenges that are observed in health crises as in COVID-19 are non-discriminatory, affecting all calibre of people from students, parents and even medical workers. These psychological effects are characterized by anxiety, fear, insecurity and depression (Zhang, Lu, Zeng,

Zhang, Du. & Jiang, 2020). Isolation, social distancing and quarantine experience result in anger, confusion, anxiety and stress. Current studies reported on the psychological effect of COVID-19 indicate that patients are presented with severe symptoms of mental trauma including stress, post-traumatic stress, depression, irritability, insomnia, emotional distress, mood-swings, anger and attention deficit hyperactivity disorder (Rubin & Wessely., 2020). Reports from China show that mental disorders have resulted from the terror of the virus which is previously unknown in nature (Shigemura, Ursano, Kurosawa & Benedek, 2020) while exposure to media reportage may be causing much distress.

In Ghana, the contemporary issues surrounding the COVID-19 pandemic include the imposition of movement restriction and the closure of schools and universities by mid-March 2020 which led to fate of BECE and WASCCE candidates in a mirage with parents getting confused as the Ministry of Education had no solution to the pandemic. Over 90,000 private school teachers in Ghana lost their jobs as a result of the COVID-19 pandemic as at May, 2020 (Nantwi & Boateng., 2020). As an emergency, the pandemic exposed the unpreparedness of the educational sector, drawing the educational system backward, deepening the psychological wounds of the youth and vulnerable children in the country (UNESCO, 2020). Adding to the mental health pressure of tertiary students in Ghana is the introduction of virtual lectures, requiring the use of sophisticated mobile phones, laptops and data acquisition to remain active on-line. Till date, the emotional and psychological outcomes of COVID-19 have been elusive due mainly to the pathogenesis of virus, the spreading rate and the high rate of mortality. This requires studies to

determine the psychological consequences as well as to obtain statistical data to support the creation of appropriate intervention.

Statement of the problem

There has been an increase in anxiety and tension among the entire citizenry of the world not excluding Ghana due to the COVID-19 pandemic. The severe signs and symptoms associated with infection of the corona virus is unprecedented. Provision of good education and psychosocial well-being is in limbo as both educators and students' readiness to respond to the pandemic is currently unpredictable. Research data to help plan educational programmes along with guidance and counselling to ameliorate the effects of the pandemic is lacking. Such data would encourage an all-inclusive planned investment in education that will ensure psychosocial care, emotional and social learning for children and youth as society wades through the disaster. In addition, the closure of schools and universities from mid-March, 2020 along with imposition of restriction on movement led to the suspension of examinations. These brought untold hardship to the students, their parents and teachers as well.

The pandemic clearly exposed the unpreparedness of the educational sector towards the disaster. The extent of these mental health effects of the pandemic on students is not adequately documented. It is prudent that data be gathered as early as possible to help the educational sector adequately plan and be on top of the situation.

The pandemic made the use of remote learning tools such as Zoom, Telegram, Google classroom and others popular at the basic schools and the universities. The traditional face-to-face interaction for teaching and learning was severely challenged requiring greater effort in sustaining standards of

academic performance. Till date, students abhor the use of online tools for receiving educational instruction due to stress of continuous use of internet data that comes at a cost. In addition, teachers, lecturers and instructors needed an upgrade in knowledge to handle emergency remote on-line teaching. Infrastructural changes in information, communication and technology are now necessary to accommodate the new normal in teaching and learning at the universities. Planning for the future of education in Ghana would mean obtaining data to support informed decision making to minimize mental stress to both students and lecturers. Son et al. (2020) studied the effects of COVID-19 on college students' mental health in the United States using an interview survey and reported the negative impacts on higher education. The study however was limited as it did not consider geographic differences as well as gender, age and level of study. The current study is filling the gap as such data on the effect of the pandemic on students is not available in Ghana. This research is necessary as limited data exists currently to support the students who may be identified with mental health issues at KNUST due to COVID-19.

Purpose of the study

The study is to determine the psychological impact of the COVID-19 pandemic on KNUST students with respect to levels of depression, anxiety and stress.

Specifically, the study sought to:

1. determine the levels of psychological impact such as depression, anxiety and stress among KNUST students, during the COVID-19 pandemic.

2. determine the differences between the mental health conditions experienced by students with respect to gender.
3. examine the psychological effect of the COVID-19 pandemic on the age of KNUST students,
4. examine the psychological effect of COVID-19 pandemic on the various level of study of KNUST students,
5. identify the correlation between the prevalence of depression, anxiety and stress among KNUST students.

Specific objectives

1. To determine the levels of psychological impact such as stress, depression and anxiety on KNUST students during the COVID-19 pandemic
2. To investigate the difference in impact of COVID-19 pandemic on depression, anxiety and stress with respect to gender of students.
3. To investigate the relationship that exists in COVID-19 impact on depression, anxiety and stress levels on the basis of age of students.
4. To investigate the impact of COVID-19 pandemic on depression, anxiety and stress levels on the basis of students' level of study.
5. To identify the correlation between COVID-19 impact on depression, anxiety and stress level of students.

Research questions

1. What are the levels of psychological impact such as stress, depression, and anxiety on KNUST students during the COVID-19 pandemic?

2. What is the difference in impact of COVID-19 pandemic on depression, anxiety and stress with respect to gender of students?
3. What relationship exists in COVID-19 impact on depression, anxiety and stress levels on the basis of age of students?
4. What is the relationship in impact of COVID-19 pandemic on depression, anxiety and stress levels on the basis of students' level of study?
5. What is the correlation between COVID-19 impact on depression, anxiety and stress level of students?

Significance of the study

The major outcome of early intervention in crisis such as that of COVID-19 among students at KNUST is to enhance students' academic, personal, emotional and social adjustment. Mental health disorders may aggravate as a result of fear emanating from mental stress and severe anxiety due to COVID-19. It has been reported that among the survivors of the SARS-CoV-2 epidemic, there was a high prevalence post-traumatic stress disorders and depression (Zheng, 2020). It is, therefore, imperative to emphasize the need for actualizing early interventions such as screening, preventing and treating of psychological disorders associated with COVID-19 among KNUST students. In addition, the absence or the poor intervention in the area of psychological stress would mean students will miss out on positive self-image development and not be able to actualize their adjustment needs that will guide them in the future. The current research will open up the door for discovering the usefulness of instituting early interventions during a pandemic.

The outcome of this research will showcase the value of proposition of determining the psychological state of students with the prevailing COVID-19 disease. The results of this work will help identify students that have been affected mentally by the COVID-19 disease and contribute to the need of a policy that will make guidance and counselling service an essential part of the education of students in the area of pandemic diseases that have psychological consequences. The data obtained could serve as a stepping stone to repackage programmes to support capacity building in the field of counselling and guidance. The body of knowledge in existence for counselling programmes during pandemics could be comprehensively expanded to include the data as a reference material to develop the field of guidance and counselling.

Delimitations

The study was delimited to the determination of the prevalence of mental health issues such as stress and depression, anxiety among students at KNUST during the COVID-19 pandemic. Specifically, the study focused on mental health status of students from the College of Health Sciences who are likely to become front-line medical personnel during pandemics of this nature. It must however be noted that other mental health issues may be related to the present pandemic but this study was on identifying students whose mental health may have been affected during the COVID-19 pandemic. It also measured the differences in prevalence, if any, between gender, age and the level of study of the students. The study was geographically delimited to KNUST in the Kumasi Metropolis in Ghana.

Limitations

The study basically relied on the use of structured questionnaires of Depression, Anxiety and Stress Scales (DASS-21) which has imbedded deficiencies including poor understanding of content by respondents, loss of copies through email or WhatsApp and no responses from respondents. This resulted in the low response rate. The study might need to be repeated when the entire COVID-19 crisis is over. Also, the study may be limited in generalization beyond the confines of KNUST in the Ashanti Region of Ghana since other public universities in Ghana were excluded from the study.

Operational definition of terms

COVID-19: An infectious disease characterized by mild to moderate respiratory illness caused by the SARS-COV-2 virus and causing panic due to its high rate of infection among people of all nations that begun in the year 2019.

Pandemic: Describes a disease such as COVID-19 that has capacity to affect a large group of people with a wide geographic area occurrence.

Mental Health condition: A description of psychological effects such as depression, anxiety and stress that affects one's ability to cope with the normal stresses of life, productively and is unable to support his/her community.

Psychological Disorders: These are abnormalities associated with the mind leading to patterns of persistent behaviours affecting daily life and function.

Depression: A student with depression is who is constantly feeling sad with loss of interest in normal activities.

Anxiety: Anxiety in a student is a disorder that involves the experience of panic, fear or anxiety in circumstances where the majority of people will not feel threatened or anxious with a constant worry, nagging or anxiousness.

Stress: Stress is a response to threatening circumstances or daily stressors that ultimately disturbs mental health. When the stressors are removed, the stress disappears.

Organisation of the study

The study presents five (5) chapters including chapter one which is the introduction and involves background of the study, statement of the problem, purpose of the study, research objectives, research questions, significance of the study, delimitations of the study, limitations of the study and definition of operational terms. Chapter two is the literature review which covers the theoretical framework, conceptual and empirical reviews. The research methods are presented in chapter three which describes the study area, study design, population, sample and sampling technique and data collection instrument. Data collection procedure, data processing and analysis and ethical consideration are other subsections. Data analysis and the discussion of major findings are found in chapter four along with descriptive statistics in tabular forms and figures. The final chapter five covers the major findings, conclusion and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

The aim of this chapter is to consider relevant insights into existing literature based on the objectives of the study. The researcher identified research gaps, from around the world and specifically in Ghana, using the comprehensive review of materials in the literature. This chapter mainly outlines existing theories, concepts and perspectives that are essential to the objectives of the study. The objective of this chapter is to review relevant literature from other researchers on the topic of mental health conditions as a result of the COVID-19 pandemic. This literature review consists of three main parts; theoretical framework, conceptual review and empirical review.

Theoretical framework

This part of the review described in general terms, the three theories underpinned for the study (Borsboom, 2017). These include Behavioural theories, Humanistic theories and Cognitive behavioural therapy.

Behavioural Theories

Behaviour results not from an unconscious mind but from life experiences. Learning occurs via experiences with the environment that is due to conditioning and present-focus (Hayes et al., 2011). Therefore, behavioural psychology results from a theory of learning that is built on the idea that all behaviours are acquired via conditioning. Postulated by renowned psychologists including B.F. Skinner and John B. Watson, psychology was dominated in the early twentieth century by the behavioural theories. Currently,

therapists employ behavioural techniques to widely help patients acquire novel behaviours and skills (McLeod, 2018).

Behavioural Theories and depression

In behaviour therapy, the emphasis is placed on observable, measurable behaviour and the alteration of maladaptive behaviours through punishment and rewards (Ainsworth, 2000). The use of behaviour therapies in depression treatment had earlier focused on improving social skills through positive group reinforcement in the mid-1960s. Anti-depression usage was encouraged to overcome depression. Behavioural therapy has been demonstrated to be as effective as antidepressants and cognitive therapy in the treatment of depression. The benefits of behavioural therapy have also been shown to persist after the end of therapy (Seitz, 1971).

The links between mood and behaviours has been for behavioural theories of depression The dysfunctional connections results in an excess of activities and behaviours that illicit depressed mood and a deficit in activities and behaviours that produce positive mood. This disconnect between behaviour and positive mood can occur because of inadequate engagement in pleasurable activities and/or deficiencies in interpersonal skills. Depressed individuals therefore find themselves participating in less relationships and activities that enhance positive mood. This avoidance and withdrawal of pleasurable activities results in increased depressed mood, which then contributes to a cycle of continued lack of skill deficits and engagement.

Depression, the most common mental health problem, affects around 300 million people of all ages globally (WHO, 2020a). Depression is shown in cognition, overt behaviour and somatic symptoms including an extensive range

of functioning. Behaviourism highlights the importance of the environment in forming behaviour. The focus is on observable behaviour and the conditions through which individuals learn behaviour, namely operant conditioning, classical conditioning and social learning theory. It therefore suggests that depression is due to a person's interaction with their immediate environment. Behavioural theory suggests that the development and maintenance of depressive symptoms is as a result of certain environmental changes and avoidant behaviours that inhibit individuals from experiencing environmental reinforcement and reward (Carvalho & Hopko, 2011).

Behavioural theories and anxiety

Behavioural theories contend that conditioning mostly cause anxiety disorders through modelling or by experiences activating their development, such as in specific phobias. Behavioural therapies often work together with cognitive therapies (including CBT), others like exposure treatment systematic desensitization and flooding. The behavioural approach is wedged in the impression that the neighbouring situation affects the victim, which can help in recognizing their decision. Behavioural therapists with a client would look at the client's adjacent environment and evaluate whether there is a need for any changes. This method could posit the formation of study groups to help clients lessen the aggression they have towards the conditions (Michiko, 2018).

Behavioural theories and stress

A long exposure to hormones that help in overcoming stressors in the body eventually lead to damaging effects on the body culminating in stress disorders. Behavioural symptoms of stress include poor sleep, avoidance of task, difficulty completing work, strained face, fidgeting, tremors, clinching

fists, crying, changes in drinking and eating behaviours. The use of behaviour therapy presents set of therapeutic interventions that aim to eliminate maladaptive self-defeating behaviours and replace them with adaptive behaviours that are healthy and have capacity to reduce or to manage stress. These are learned behaviours with the understanding that responses to stress by a client can be constructive to achieve an intended goal that overcomes maladaptive behaviours that leads to excessive stress. It is also used in therapeutic communities to motivate adaptive behaviours using token economies.

Behaviour therapy has the foundation aiming to transform the client's behaviour so that their actions align with their desired life goals free from stress. Behavioural extinction is achievable via aversive conditioning and ignoring the behaviour. Behavioural scientists have recently found that learning new behaviour can change the neural pathways in the brain due to neuroplasticity. This has many implications for behaviour therapy interventions that require a client to take action by learning new skills that helps with the elimination of stress. Specific phobias are maintained by the avoidance of phobic stimuli from a behavioural perspective. However, the avoidance prevents the phobic client from learning new, adaptive behavioural responses to the feared stimuli or stressor. Exposure therapies support a phobic client's re-engagement with feared stimuli or stressor to desensitize them over time. Exposure-based behavioural therapy has demonstrated its efficacy for treating PTSD, anxiety, and depression. Clients are supported by behaviour therapists to achieve their personal and professional goals by collaborating with them to set mutually agreed goals, eliminate maladaptive behaviours and replace maladaptive

behaviours with constructive behaviours consistent with agreed goals.

Humanistic Theories

In the 1950s, the humanistic theories in psychology began to emerge and stabilize. The focus was on the basic good of humanity instead of earlier theories emphasizing psychological problems and abnormal behaviours. Abraham Maslow and Carl Rogers are some of the major humanist theories proponents. Clients can achieve their highest potential through three varying therapies; (i) Client centred therapy which allows the person to examine himself from the inner core where the therapist presents an atmosphere filled with acceptance, genuineness and empathy, thus mooting the client to self-exploration. This was developed by Carl Rogers, (ii) Frederick Perls developed the Gestalt therapy that is present focussed involving role play. (iii) The existential theory allows the client to have responsibility of one's own life with all the mis-happenings (McLeod, 2018).

Humanistic Theories and depression

Major depression may be characterized by persistent low mood and loss of interest in pleasurable activities, with a range of symptoms including insomnia, weight loss, loss of energy, fatigue, inappropriate guilt, morbid thoughts of death and poor concentration (APA, 2013). It is the third leading cause of disease burden worldwide. Depression is related to marked social, economic and personal morbidity as well as significant increase in risk of mortality (Cuijpers et al., 2008). Pharmacological and psychological interventions alone or in combination have been recommended by Clinical guidelines in the management of moderate to severe depression. Over the past two decades, the use of antidepressants has dramatically increased across the

globe however, the rate of adherence has characteristically been low due mainly to client's concern about dependency and side effects. In this work, the use of Humanistic theory to underpin its use in the treatment of depression is considered as students who might suffer depression may be counselled using this approach as therapy in combination with other treatment options such as pharmacology during the COVID-19 pandemic.

Humanistic Theories and anxiety

Anxiety has been described as persistent worry or fear about perceived danger. At mild to moderate levels of anxiety, it is manageable and may be useful to alert one for possible danger, preparing one to take effective action. Humanistic-experiential psychotherapists distrust psychiatric diagnosis as unnecessarily biological, politically oppressive and conceptually flawed. There is evidence from diagnostic literature that the conditions of anxiety is problematic (APA, 2013). Concerning anxiety disorders, humanistic-experiential therapies are under-represented even though it is attractive to significant groups of practitioners and subgroups of the population against CBT. This situation may in part be due to the overall sparsity of outcome research of humanistic therapies on mental health conditions.

Humanistic theorists tend to be critical of the mainstream classification systems therefore have not historically aligned their research activity directly with the mainstream classification systems. In addition, the under representation of researchers working from the humanistic perspective in disciplines such as clinical psychology which have significantly played a leading role in research developing and studying the efficacy/ effectiveness of psychological therapies per classified mental health condition may also be blamed.

The effectiveness of humanistic therapies for anxiety disorders have mainly risen from CBT research that evaluated CBT with a form of psychotherapeutic placebo such as supportive therapy or nondirective therapy but were regarded as synonymous with humanistic psychotherapy. However recently, a meta-analysis conducted by humanistic researchers has led to a slight superiority of CBT over humanistic-experiential therapies in the treatment of anxiety disorders. This suggestion has led the researchers to postulate specific humanistic approaches aimed at undertaking specific anxiety presentations. Furthermore, there is less of programmatic research among humanistic psychotherapy researchers.

The development of humanistic therapies for managing anxiety disorders may focus on identifying how to mobilize clients' efforts to overcome anxiety and avoidance and symptoms. The recent developments with respect to humanistic-experiential therapies, especially in emotion-focused therapy, share similar thrust with CBT, but do so in experiential and client-centred manner. Humanistic approaches to anxiety include person-cantered, focusing-oriented, and emotion-focused therapy.

Humanistic Theories and stress

Humanistic approach to counselling doesn't address problems directly as does other therapies. The focus is on building supportive relationship between the client and the counsellor. Less emphasis is placed on client's past history but there is exploration to allow for person identity, meaning of life and how potentially live life to the fullest. Humanistic therapy is non-directive guiding the client to understand self and discover meaning. Unlike structured approaches such as CBT, Humanistic approach to managing stress does not

involve formal assessment or diagnosis. Common grounds are however shared with positive psychology by promoting ideals that are optimistic in seeing people as strong, good and capable fundamentally. A number of difficulties including post-traumatic stress disorder, depression and anxiety can be helped with humanistic therapy. Stressed clients have benefited from the use of humanistic therapy through empowerment, promotion of freedom and reduction of stigma of therapy. For COVID-19 induced stress, clients may be helped based on the good relationship with the client and the counsellor applying humanistic therapy.

Cognitive-behavioural therapy (CBT)

Cognitive-behavioural therapy has been described as the gold standard in the field of psychotherapy. It helps clients to focus on moving away from destructive thoughts and behaviours. This type of psychotherapy enables persons in identifying and managing problems quickly by having a goal that may involve homework that reinforces in-person schedules (David, Cristea, & Hofmann, 2018).

CBT assists clients to identify and modify disturbing or destructive thought patterns with capacity to negatively impact on emotions and behaviours. CBT as a typical psychotherapeutic treatment aims to enhance the mental health, challenge and change disturbing behaviours and cognitive distortions, improve emotional regulation (Beck, 2011) and the strategic development of personal coping skills that resolves current issues. In addition, CBT more than identifies thought patterns by focusing on the use of other wide range strategies that help people conquer such thoughts (Brewin, 1996). The use of journaling, role-play, relaxation techniques and mental distraction are

popular with CBT. A number of behaviour or cognitive psychotherapies are included in CBT to treat defined psychopathological conditions with evidence-based strategies and techniques. (Johansson & Andersson, 2012). The researcher will adopt CBT as a major theory in this work.

Although differences exist behavioural and cognitive elements, the generalized term is the cognitive behavioural therapy. The focus of the behavioural therapies earlier had exclusively been on reinforcement, associations and punishment to change behaviour. The cognitive on the other hand focused on how feelings and thought. CBT has since then become an effective first-line therapy for several conditions and disorders. The therapy that is mostly researched is CBT due to the specific goals and outcomes that are easily measurable. It has been severally tried scientifically by many researchers at different places and has been found effective and applied to a variety of conditions (Beck, 2011).

Cognitive-behavioural therapy (CBT) and clinical uses

Many neurotic disorders were successfully managed by earlier behavioural techniques but there was negligible success when it came treatment of depression. Cognitive revolution also led to behaviourism losing popularity to an extent that the approaches applied by Beck and Ellis became more accepted by behaviour therapists irrespective of an earlier rejection of mentalistic concepts such as cognition and thoughts by behaviourists (Trull, 2007). The two systems combined behavioural interventions and elements and essentially focused on present problems. In early works, behavioural therapy and cognitive treatments were compared to determine the most effective. However, in the 1980s to 1990s, the merger of cognitive and behavioural

therapies gave birth to cognitive behavioural therapy. The treatment developed and offered by David H. Barlow in the US and David M. Clark in the UK for panic disorders was quintessential for the merger (Rachman, 1997). CBT has not only been considered as a therapy but a generic term for all psychotherapies that are cognitive-based. Among these therapies are; acceptance-and-commitment therapy, rational-emotive therapy (REBT), multimodal therapy, dialectical behavioural therapy, choice theory/reality therapy, and cognitive-processing therapy. These therapies are a blend of cognitive and behaviour-based elements (Trull, 2007). The following clinical uses are apparent with CBT:

i. CBT has been demonstrated to have a role with effectiveness in anxiety (Lazarus & Abramovitz, 2004), depression, chronic low back pain, eating disorders, body dysmorphic disorder, psychosis and personality disorders (Lincoln et al., 2017), substance use disorders, schizophrenia, in the adjustment, anxiety and depression linked with fibromyalgia and with post-spinal cord injuries treatment plans

ii. In children and adolescents, CBT is essential component of the treatment plans for depression, body dysmorphic disorder and suicidality, obsessive–compulsive disorder (OCD), eating disorders, obesity, anxiety disorders, posttraumatic stress disorder, tic disorders, repetitive behaviour disorders as well as trichotillomania (Rudd, 2012; Robertson, 2007).

iii. CBT has been adapted for suicide prevention (CBT-SP) and designed specifically as treatment for severely depressed youth with recent history (past 90 days) of attempted suicide. It has been discovered to be feasible, acceptable and effective (Rnic et al., 2016).

iv. In very young children (3-6 years), CBT has shown effectiveness in posttraumatic stress disorder. Childhood disorders such as anxiety disorders and various depressive disorders have been treated with CBT (Sburlati, Lyneham & Schniering, 2014).

v. Self-reported pain found in children has been reduced by combining hypnosis and distraction with CBT. In shuttering anxiety, CBT has been found to be an effective aid in the treatment offered.

CBT is most suitable for people who frequently describe specific problems as the approach works with specific goals and focus. For clients who report vague feeling of unfulfillment and unhappiness, CBT is less appropriate since their situation does not involve troubling symptoms or an area of their life that they want to bring about a change (Tsitsas & Paschali, 2014). The need for practical self-assessment promoted by CBT becomes more helpful in the problem-solving ideals of the approach. For more practical treatment, CBT is preferable above the mere head knowledge of the aims of treatment. The interest in the use of CBT along with medication application has recently experienced an exponential growth in clients with issues of delusion and hallucination, and people with relationship problems (Kumar et al., 2017). Short-term therapy happens to be more easily applicable for long standing and severely disabling issues. However, the quality of life of people can be enhanced when they acquire new knowledge in principles that further increases their chance of progress. Several self-help reading materials are available that present information on treatment options for specific problems as well as ideas as to what one can do by him/herself or with family and friends.

In summary, feelings and thoughts form the underlying concept for CBT as they play a significant role in behaviour. The aim of CBT is to make clients recognise their inability to control all aspects of the space around them but rather deal and interpret things in the environment in a controlled manner. CBT has recently become very popular with both treatment professionals and consumers of mental health. By recognising unrealistic and often negative thoughts that stifle the moods and feelings of clients, thinking patterns that are healthier are engaged by people. For a short-term therapy that is effective, CBT is highly recommended, especially for emotional distress types that preclude the use of psychotropic drugs. A wide range of maladaptive behaviours in clients may be surmounted with CBT which is effective and empirically supported.

In addition, other therapies are more expensive than CBT which is further advantaged by providing clients with coping skills that are applicable now, as well as the future. CBT as a theory for the management of mental health conditions such as depression, anxiety and stress comes in handy for clients experiencing these conditions during the COVID_19 pandemic. The research has considered CBT as the main theory to underpin the current study (Murphy, Calugi, Cooper & Grave, 2020).

Conceptual review

The novel coronavirus disease COVID-19 caused by the SARS COV-2 is associated with severe health problems that may be fatal. The World health Organization has described the pandemic as public health emergency of international concern (PHEIC) (WHO, 2020b) due to the worrying economic consequences and the social disruptions. The resultant effect of increasing numbers of the infection, coupled with discrimination, stigmatization and

deaths leads to mental health disorders including psychological distress and physical problems (Ransing, Adiukwu, Pereira-Sanchez, Ramalho, Orsolini, Schuh, Gonzalez-Diaz, Pinto da Costa, Soler-Vidal, Bytyçi, El Hayek, Larnaout, Shalbafan, Syarif, Nofal & Kundadak, 2020: Badrfam & Zandifar, 2020: Bo, Li, Yang, Wang, Zhang & Cheung, 2020). The current state of uncertainty and unpredictability of the disease condition exposes the pubic to stressful situation. There is the need for appropriate and active interventions in the area of the negative effects of the pandemic on people including tertiary students. These are vibrant youth that Ghana will require to be psychologically sound for national development (Nantwi & Boateng, 2020).

COVID-19 will certainly number among the greatest public health concerns of the 21st century. Living in the 21st century has got so much blessing in store for world's populace. With advancement in technology, health and education, living in the 21st century could certainly be said to be blissful so far as one has the means to afford the pleasure. However, the greatest threat of the 21st Century struck the universe and it does not seem evident when the world is going to recover from this gruesome plague known as COVID -19 (Stanton et al., 2020).

The present time crisis of the 21st century is the COVID-19 pandemic. It is the present time migraine of world leaders, scientists, public health experts and the lay person. All these categories of individuals are threatened by the existence of this virus with little or no clue to mitigating its spread (Shigemura et al., 2020). In this review, a look at the various mosaics of the COVID-19 pandemic from its scientific background, the psychosocial impact, the effect on gender, age and level of study of students are considered. The nation in

perspective is Ghana. An analysis of the effect of the pandemic on mental health conditions of students is presented.

What is COVID-19 (SARS COV-2)?

Corona virus disease is caused by SARS- COV-2 and it is the causative organism of the world's recent and widespread public health concern. Coronaviruses are non-segmented positive-sense, enveloped RNA viruses derived from the order noroviruses that form the largest genome within RNA viruses (WHO, 2020b). Recent evidence indicates that the transmission of SARS-COV-2 occurs basically between people via indirect, direct, or close proximity with infected people by their respiratory droplets and secretions such as saliva and respiratory secretions, which are ejected when an infected person, coughs, sneezes, talks, or sings (WHO, 2020c). There is evidence of airborne virus transmission that may occur in clinical settings where particular medical procedures termed aerosol generation procedures result in tiny droplets known as aerosols. The droplets settle on surfaces of inanimate objects from an infected person and hence any individual who comes into contact with these surfaces stands the risk of infection. Presently available evidence communicates that transmission of the corona virus is active when the infected individuals start manifesting symptoms or right before they start manifesting symptoms (WHO, 2020c).

There are a number of comprehensive measures suggested by the world health organization (WHO) to curb the transmission of the coronavirus. Suspected cases must be identified as quickly as possible, tested and isolated in the appropriate facilities. Close contacts of infected people ought to be isolated and quarantined and tested so that upon discovery of infection, the requisite care

can be given to them. The use of a fabric nose mask and regular hand washing is also a recommended measure to minimize spread of the disease, also the use of alcohol-based hand rubs (sanitizers) is highly recommended (WHO, 2020b).

COVID-19 symptoms lie within a spectrum of mild to severe illnesses. The COVID-19 symptoms appear 2-14 days after infection or exposure to the virus. The following groups of people might have COVID-19; cough, fever/chills, fatigue, sore throat, difficulty in breathing, muscle ache, new loss of taste and smell, runny nose or congestion, nausea/vomiting and diarrhoea. One may want to contact the healthcare provider if one catches any of the emergency symptoms such as persistent pain, troubled breathing or chest pressure, inability to stay awake or wake.

Global view on COVID-19

The COVID-19 pandemic is one of the world's deadliest pandemics ever experienced. Its ramifications have produced very difficult times in all parts of the world. The pandemic has stirred up discussions for its curbing by all groups of people ranging from governments, to scientists, integral stake holders like the African Union, European Union etc (WHO, 2020a). It is very evident before their eyes and they cannot communicate hope when they are so much enveloped in fear. According to Xiang et al. (2020), the statistics of the present COVID-19 pandemic on a global scale is quite alarming. Tables 1 shows that the US had the highest number of infected individuals, followed by India as at 21st June 2021.

Table 2 shows that South Africa is in the lead with Ghana at the eleventh position in Africa. Figures 1 and 2 show the total number of cases and deaths recorded in Ghana respectively.

Table 1: Real-time data on the global spread of the COVID-19 disease. Collected from https://www.worldometers.info

#	Country, Other	Total Cases	New Cases	Total Deaths	New Deaths	Total Recovered	New Recovered	Active Cases	Serious, Critical	Tot Cases/ 1M pop	Deaths/ 1M pop	Total Tests	Tests/ 1M pop
	World	179,287,781	+41,910	3,882,808	+888	163,850,309	+45,653	11,554,664	82,524	23,001	498.1		
1	USA	34,406,001		617,166		28,711,315		5,077,520	3,959	103,358	1,854	499,061,725	1,499,218
2	India	29,935,221	+860	388,164		28,844,199	+7,670	702,858	8,944	21,488	279	392,407,782	281,675
3	Brazil	17,927,928		501,918		16,220,238		1,205,772	8,318	83,767	2,345	52,714,701	246,306
4	France	5,757,311		110,738		*5,556,586*		89,987	1,703	88,014	1,693	90,785,682	1,387,875
5	Turkey	5,370,299		49,185		5,232,638		88,476	813	63,020	577	58,552,783	687,107
6	Russia	5,334,204	+17,378	129,801	+440	4,878,333	+8,361	326,070	2,300	36,537	889	145,700,000	997,979
7	UK	4,630,040		127,976		4,301,985		200,079	210	67,858	1,876	200,024,844	2,931,573
8	Argentina	4,268,789		89,043		3,890,213		289,533	7,366	93,620	1,953	15,840,430	347,402
9	Italy	4,252,976		127,270		4,037,996		87,710	389	70,442	2,108	69,916,221	1,158,021
10	Colombia	3,945,166		99,934		3,667,161		178,071	8,155	76,743	1,944	18,849,191	366,664
11	Spain	3,757,442		80,652		3,544,205		132,585	793	80,335	1,724	51,240,666	1,095,534

Table 1: Cont'd

12	Germany	3,730,115		90,966		3,605,200	+2,200	33,949	1,210	44,383	1,082	63,091,197	750,698
13	Iran	3,095,135		82,965		2,748,320		263,850	3,279	36,400	976	22,321,457	262,508
14	Poland	2,878,840	+73	74,829	+1	2,650,648	+172	153,363	242	76,147	1,979	16,990,594	449,410
15	Mexico	2,477,283	+1,578	231,187	+36	1,971,470	+2,333	274,626	4,798	19,021	1,775	7,332,752	56,301
16	Ukraine	2,229,846	+323	52,032	+16	2,152,140	+677	25,674	177	51,286	1,197	10,679,015	245,614
17	Peru	2,029,625		190,425		N/A	N/A	N/A	2,521	60,739	5,699	13,773,500	412,189
18	Indonesia	1,989,909		54,662		1,792,528		142,719		7,201	198	18,670,621	67,569
19	South Africa	1,823,319		58,702		1,647,503		117,114	546	30,373	978	12,549,484	209,049
20	Netherlands	1,678,983		17,726		*1,601,922*		59,335	207	97,777	1,032	14,596,733	850,051

Table 2: Real-time data on the spread of the COVID-19 disease in Africa. Collected from https://www.worldometers.info

#	Country, Other	Total Cases	New Cases	Total Deaths	New Deaths	Total Recovered	New Recovered	Active Cases	Serious, Critical	Tot Cases/ 1M pop	Deaths/ 1M pop	Total Tests
	Africa	5,249,418		137,856		4,645,632		465,930	4,098			
1	South Africa	1,823,319		58,702		1,647,503		117,114	546	30,373	978	12,549,484
2	Morocco	526,651		9,238		513,681		3,732	107	14,107	247	6,713,760
3	Tunisia	382,950		14,038		332,962		35,950	424	32,078	1,176	1,611,363
4	Egypt	277,288		15,859		205,613		55,816	90	2,661	152	2,869,589
5	Ethiopia	275,194		4,283		254,948		15,963	201	2,338	36	2,824,993
6	Libya	190,748		3,174		176,217		11,357		27,400	456	1,088,962
7	Kenya	179,075		3,456		122,704		52,915	113	3,261	63	1,904,519
8	Nigeria	167,206		2,117		163,557		1,532	11	792	10	2,231,409
9	Algeria	135,821		3,631		94,571		37,619	29	3,044	81	230,861
10	Zambia	129,033		1,644		108,960		18,429	983	6,835	87	1,771,358
11	Ghana	94,913		793		92,881		1,239	9	2,994	25	1,230,125

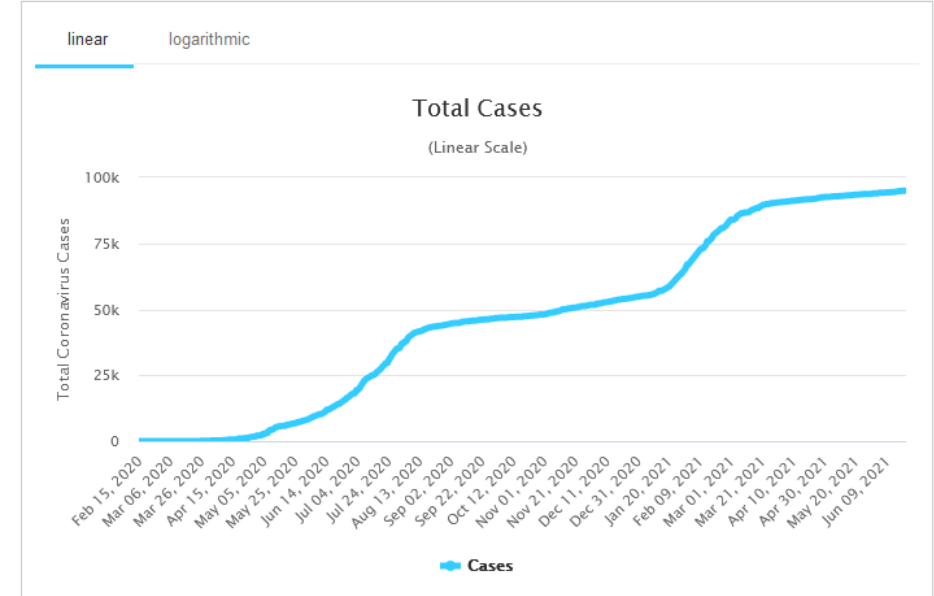

Figure 1: Total Coronavirus Cases in Ghana (https://www.worldometers.info)

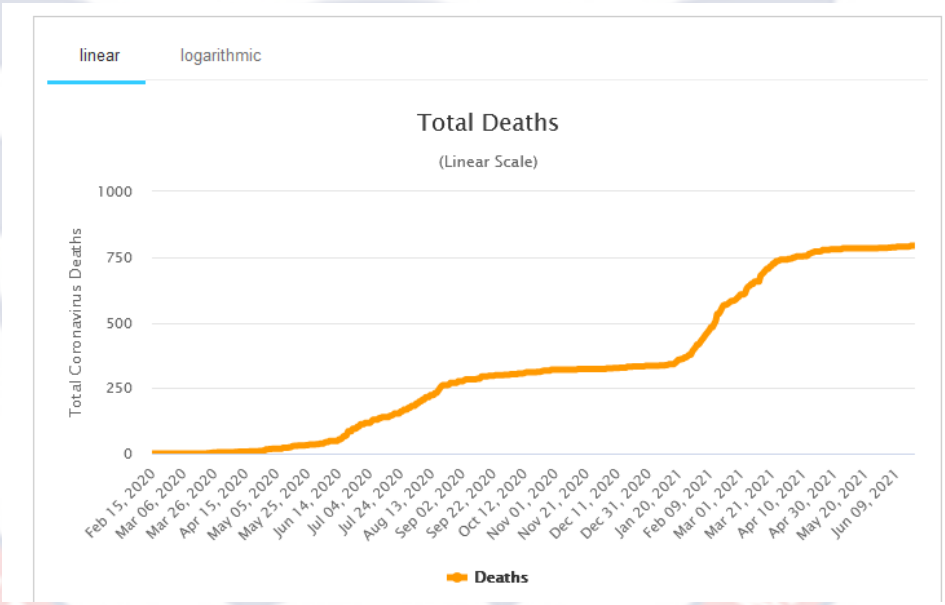

Figure 2: Total Coronavirus Deaths in Ghana (https://www.worldometers.info)

Treatment guidelines (WHO)

The COVID-19 pandemic has sparked up a search for a cure to tackle the virus and its damage. The WHO in collaboration with scientists in other parts of the world have been able to come up with some treatment protocols worth looking at (*Clinical Management Clinical Management Living Guidance*

COVID-19, 2021).

The clinical management and clinical living guidelines for the treatment of COVID-19 has been brought up by the WHO to give direction to health personnel in the treatment of infected patients. The guidelines for therapeutic management of COVID-19 made the following recommendations:

The guidelines provided among others the following recommendations

1. Regardless of severity of disease, patients with COVID-19 are strongly recommended not to be administered Lopinavir/Ritonavir and Hydroxychloroquine (17/12/2020)
2. Systemic corticosteroids strongly recommended for patients with critical and severe COVID-19.
3. People with non-severe COVID-19 with systemic corticosteroids as conditional recommendation
4. People with COVID-19 having conditional recommendation contrary to remdesivir

(*Clinical Management Clinical Management Living Guidance COVID-19,2021)*

The depth of coverage of the guidelines provided for the management of COVID-19 is quite broad and covers almost every possible scenario of co-morbidity ever presented with COVID-19 including mental health challenges. Mental health could easily be affected given the fact that being COVID-19 positive could easily bring anxiety and depression to patients even though now COVID-19 can be well handled if detected early. People are still not certain and are quite scared to catch the disease which is to be expected given the fact that

people still lose their lives and sometimes are unable to respond to therapy as anticipated (Löler, Ravens-Sieberer, Kaman, Erhart, Otto, Devine, Wieler, Hurrelmann, Bullinger, Barkmann, Siegel, Simon, Schlack, & Hölling, 2023).

Mental Health conditions

The WHO has defined Mental health as "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community", making it an essential and integral part of health (WHO, 2020b). This is consistent with the WHO constitution that states "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" making mental health no less than the mere absence of mental disabilities and disorders (WHO, 2020b).

The collective and individual ability of humans to think, emote, inter relate with each other, earn a living and enjoy life is a function of mental health. It then becomes essential that the promotion, restoration and protection of mental health be seen as critical concern of people, communities and societies everywhere in the world. At any point in time, a person's level of mental health is determined by multiple social, biological and psychological factors. For instance, pandemics, consistent socio-economic pressures and violence known risks to mental health. Stressful work settings, unhealthy lifestyle, violation of human rights, physical ill health, gender discrimination, social isolation and change are also associated with poor metal health (Salari et al., 2020). Protection and promotion of mental health would involve activities that enhance psychological well-being.

The creation of an environment that supports mental health is needed where respect for cultural, basic civil, socio-economic and political rights are fundamentally protected to maintain a reasonable height of mental health. In addition, national policies on mental health must be concerned with broader issues and mental disorders that

ensures mental health promotion. Other sectors such as the education, justice, environment, housing, welfare and labour must in addition to the health sector be involved in mainstream governmental programmes that promote mental health (Faisal et al., 2022).

Academic success has been impeded by mental health issues in the areas of students' concentration, social interaction and motivation (Unger, 2007). Anxiety has been identified as a leading problem reported among students who complete counselling centre assessment of psychological symptoms as well as clinicians' report of students who seek the university counselling centre at Texas A & M University (Son et al., 2020). Up to 50% of students seeking services in 2018 reported anxiety disorders. The stigma attached to mental health diagnosis does not help many students to access help (Shuchman, 2007). The pandemic has however brought into sharp focus the effect on mental health of various populations. New stressors emerge with the prevalence of pandemics.

Many challenges have been presented to educators, students and parents by the COVID-19 pandemic. Students already managing with underlying mental conditions have been exposed to a new normal with broad impacts due to physical distancing, isolations, school closures and unintended changes to lifestyle (Hariprasad, 2021). In their work, Son et al. (2020) reported a 71% increase in stress and anxiety in 195 students due to COVID-19, identifying multiple stressors that added up to the increased anxiety, stress and depressive thoughts by students in America. 91% expressed negative impact of the pandemic in fear and worry about personal health and that of their loved ones. In addition, 89% had difficulty in concentration, 85% with sleep disruption patterns and 82% showing increased concern on academic performance (Son, et al., 2020). Positive and negative coping mechanisms were employed by the

respondents in the report with some seeking support from others. They concluded that COVID-19 pandemic has brought long lasting negative impact on higher education and that preventive and intervention strategies need be urgently developed to speak to the mental health of students (Hariprasad, 2021).

There is more to be systematically studied concerning mental health risks related to COVID-19 however current literature on the pandemic and previous information on the outbreak of infectious disease indicate that the possible risk factors point to psychological distress and mental health challenges that may be chronic. Unstable financial situations for parents, suspended recreational sites and school closures have contributed additional psychological stress for certain groups of the society including students, parents and workers (Fontanesi et al., 2020). Therapeutical interventions may need to be instituted for the vulnerable, identified with psychological needs and mental health issues after COVID-19. In this, consideration for serviced based funding, accessibility and integrated interventions will be needed (Vostanis & Bell, 2020).

Depression, Anxiety and Stress

A diagnosis of anxiety disorder or depression may be as a result of anxious or depressed feeling or both. One may suffer both concurrently however both conditions are treatable, sometimes with same medication. The two diseases have different causes but share symptoms that are identical including irritability, problem concentrating, insomnia and nervousness (White, 2020).

In depression, the entire quality of life is affected including how one feels, thinks, function and behave. The following symptoms become apparent: sadness, anger, lack of interest in life, poor motivation, discouragement, hopelessness, low energy, insomnia and feeling overwhelmed by simple tasks

(Kindler, 2016). One or more of these persisting for more than a couple of weeks and interfering with mundane activities such as care for family members, time spent with friends or making it to work, is a sign of major depression. Up to 50% of depression patients comorbid with anxiety disorder (Wasmer, 2010).

Anxiety disorder patients may experience panic, fear or anxiety in circumstances where the majority of people will not feel threatened or anxious with a constant worry, nagging or anxiousness (Adam, 2021). Anxiety attacks or sudden panic with no apparent trigger occurs. If the disorder is untreated, the ability of one to maintain relationships, leave the house or even work becomes limited (Adam, 2021).

Although a number of similarities may be drawn between stress and anxiety, the two are not the same. Whereas stress is a response to threatening circumstances or daily pressure, anxiety comes through as a reaction to stress with no clear cause and may be difficult to treat, lasting longer. Many people including students, workers and parents are affected by stress that ultimately disturb mental health (Adam, 2020). Some typical symptoms include: insomnia, skin rashes, chest pain, heart palpitations, headaches and high blood pressure. When the stressors are removed, the stress disappears (Fink, 2009). It is essential to take away or reduce stress as continued stress elevate to depression or anxiety. Help must be sought from a care provider as early as practicable when one is not sure of suffering from depression, anxiety or stress.

Conceptual Framework

Figure 3 shows the conceptual framework for the study where the impact of COVID-19 leads to mental health issues such as depression, stress and anxiety. The determination of the level of mental health conditions among

students during the COVID-19 pandemic may be apparent with scales already described in literature (Chandu, Marella, Panga, Pachava, & Vadapalli, 2020). The scales for the measurement of mental health with regards to the COVID-19 infection are quite limited.

According to a database study done by Chandu et al., (2020) to run a scoping review of the tools available for measuring the mental health impact of the COVID -19 among middle aged adults in Turkey, the scales employed were based on coping strategies/behavioural responses or suicidal tendencies. Participation excluded groups exposed to CVID-19, different geographic regions and diverse age. In the above referenced material, some of the scales of measurement include; Depression Anxiety and Stress Scale (DASS-21), Post-Traumatic Stress Disorder (PTSD-8), Perception of Stigma Questionnaire (PSQ), Fear of COVID-19 scale (FCV-19S), Perceived Vulnerability to Disease Scale (PVDS) and Obsessive-Compulsive Scales (OCS). It has been discovered that most of the scales of measurement were biased towards the somatic senses.

FCV-19S, a unidimensional scale has only seven items that offers a unique chance for busy healthcare setting screening, allowing for comparison across countries due to its multi-lingual availability and validity. FCV-19 COVID-19 anxiety scale is a psychometric scale that has been validated in India and for other Indian languages (Chandu et al., 2020). Mental health disorders have also been determined using the Patient Health Questionnaire (PHQ-9), the Generalized Anxiety Disorder scale (GAD-7) and the PTSD checklist for DSM-5 (PCL-5) (Williamson, Greenberg, & Stevelink, 2021). In addition to the determination of the levels of depression, anxiety and stress using DASS-21, analysis to determine the differences in the mental health conditions between

the gender, the age and the level of study of students was conducted. The correlation between the mental health conditions was also determined.

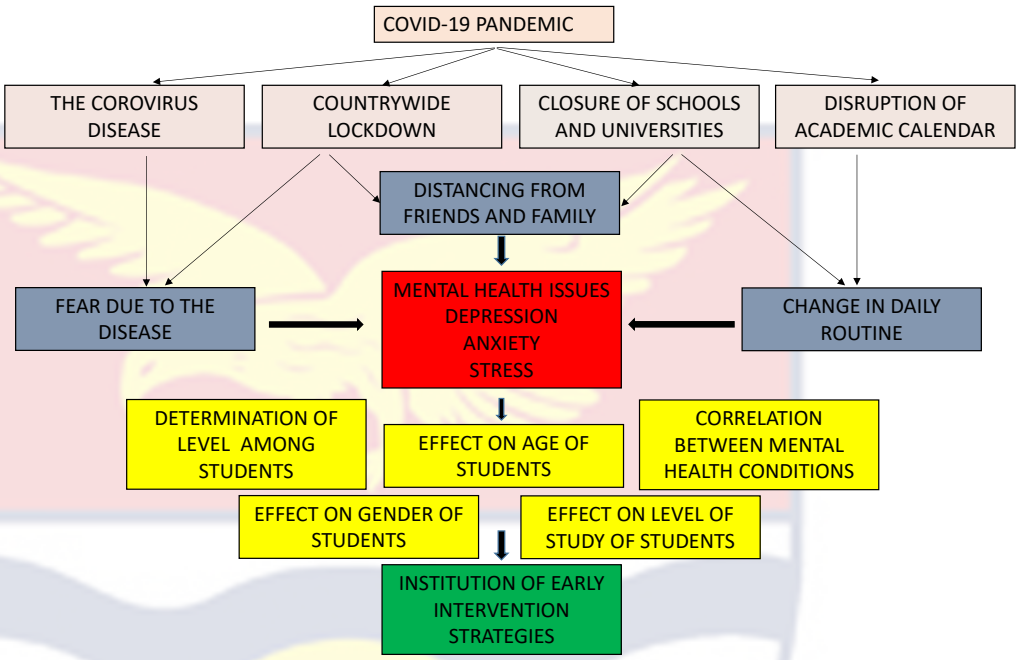

Figure 3: Conceptual Framework for study.

Empirical review

Impact of COVID -19 on mental health of global students

The effects of the COVID-19 are widespread and it is very evident that the tentacles of its effects have touched on the global educational sector. The impact of COVID-19 on the educational sector really hit hard but the mental health damages for the different continents of the world quite vary. In a survey by the International Association of Universities to investigate the impact of COVID-19 on higher educational institutions (HEIs) the results were quite interesting. From the survey only 2% of higher education institutions were not affected by the COVID-19 pandemic. However, the study revealed that two-thirds of HEIs had to move their teaching and learning to distance learning whiles one –fourth of the HEIs revealed that they were making provisions to

facilitate learning by digital or video means but at the time of the survey, they were closed down (Marioni, 2020). A further 7% of the HEIs had cancelled teaching activities.

Whereas a very low percentage teaching cancellation was observed from most regions, Africa recorded 24% cancellation of teaching with the majority of the HEIs in Africa suspending teaching and now developing solutions. Compared to a swift response of 85% HEIs in Europe, only 29% of HEIs in Africa moved teaching and learning to online platforms.

In another study done in Oman Sultan Qaboos University College of Education was used to investigate the effects of the COVID-19 pandemic on education in the Sultanate of Oman. Due to the high rate of mortality of the pandemic in that region, lockdown was initiated causing all schools to closedown including the Sultan Qaboos University. In this dilemma the university initiated an emergency teaching and learning plan for the spring semester (Osman, 2020). There were several amendments to their teaching plan in order to make teaching and learning work easy, since they were massively hit by the COVID-19. An institution with over 24,000 people interacting had to reorganize themselves to have lessons. It took the planning of the Supreme council of the Sultanate, collaboration between vice chancellors and various university stake holders, the telecommunication industry of the Sultanate to make sure that this remote teaching was possible. This is great feat giving the fact that this is a government institution. All categories of students were able to benefit ranging from the disabled to those living in rural areas. In the report, there was adequate planning and laid down procedure for each step of the process to be successful (Osman, 2020).

In-person lectures were suspended by many universities across the globe in response to the concerns surrounding COVID-19 pandemic. Many university students may experience negative psychological consequences such as frustration, anxiety, and betrayal. Some may have difficulties with isolation and loneliness due to disconnections from partners and friends. The psychological symptoms for those who receiving counselling services on campus, may increase putting them at risk of substance abuse and suicide. With the advent of remote learning, some students may suffer from poor mental health as a result of the disruption of academic calendar (Agnew et al., 2019 cited in Zhai & Du, 2020). Research projects as well as internships will be affected when the universities asked students to move from campus. Moreover, these disruptions negatively impact the program of study, delaying graduation and undermining students' competitiveness on the job market, which in turn sparks anxiety among the students. They may also struggle with the cost of returning home and managing belongings. There are concerns and fears arising from possible infection and transmission of COVID-19 to other family members upon returning home.

The impact of the COVID-19 pandemic on university students' mental health seriously suggests the pressing need to understand these concerns and challenges so as to development action and public health messaging that will support college students during this difficult time (Zhai & Du, 2020). Wathelet et al., (2020) determined the mental health state of university students in France who were confined during the coronavirus disease 2019 (COVID-19) pandemic and the factors that are associated with the development of mental health symptoms. They observed from their survey of 69,054 students on quarantine a

high prevalence rates of severe self-reported mental health symptoms. The identified risk factors included symptoms compatible with COVID-19, social isolation and low quality of information received were linearly related with altered mental health. Thus, the study findings suggested that students' mental health is a public health issue that has become even more crucial in the era of a pandemic (Wathelet et al., 2020).

In another study in Bangladesh during the COVID-19 pandemic, assessment of anxiety, depressive symptoms, and mental health status among university students was carried using the Generalized Anxiety Disorder-7, Centre for Mental Health Inventory-5 and Epidemiological Studies Depression Revised Scale in the Bangla language (N = 874) online. The study found that 40% of the respondents had moderate to severe anxiety, 72% had depressive symptoms and 53% had moderate to poor mental health status. This has revealed that mental health issues were on the rise and COVID-19 concerns showed mental health conditions symptoms among Bangladeshi university students (Faisal et al, 2022). In a study to understand the mental health status of university students at the early stage of the COVID-19 pandemic and to investigate factors associated with higher levels of distress, an online survey including questions relating to COVID-19, brief mental well-being history of depression, anxiety, resilience and quality of life was filled by 1173 students in the North of England. It was observed that high levels of anxiety and depression existed during the pandemic with females significantly scoring more than males (Chen & Lock, 2022).

An analysis to determine the effects of the COVID-19 pandemic on a Texas college students' stress and anxiety levels was carried out using the

Perceived Stress Scale-10 (PSS). The results showed that 71% of students had an increase in stress and anxiety. In addition, the respondents reported increased fear for their friends, families and themselves with regard to the spread of COVID-19 (Salimi et al., 2023). Soria & Horgos, (2021) observed a number of stressors including academic, financial, health and safety were associated with mental health conditions during the COVID-19 pandemic. The results indicated that significant differences exist between students' GAD and MDD based on demographic characteristics. At Texas A & M University, an attempt to document the effect of the COVID-19 pandemic on university students in the United States was made by Wang et al. (2020) using the Patient Health Questionnaire-9 and the General Anxiety Disorder-7—for depression and anxiety, and other open-ended and multiple-choice questions with respect to coping and stressors. The online survey on 2031 respondents showed 48.14% moderate to severe depression level and 38.48% moderate to severe anxiety level. A significant proportion of the participants (71.26%) indicated that during the pandemic, their anxiety/ stress level increased. With this alarm rate, it is prudent to make such measurement in Ghana where there is the evidence of the presence of COVID-19 among students.

The negative effects of the COVID-19 were also recorded by Student Experience in the Research University (SERU) Consortium survey at 9 public universities involving 30,725 undergraduate students and 15,346 graduate and professional students using PHQ-2 and GAD-2 assessment tools. For MDD, 35% of undergraduates and 32% graduate and professional students was observed. For GAD, 39% of undergraduate and graduate and professional students screened positive. The study further found that the pandemic has

resulted in up to two times increment of mental health disorders as against previous years (Chirikov et al., 2020)

The situation in Ghana may be similar but there is no data to support any course of action. The current research sought to provide answers to the level of mental health conditions among Ghanaian students.

Impact of COVID -19 on mental health of student in Africa

The COVID-19 pandemic impact on students at a global scale did not affect the well-advanced and resource endowed nations as compared to that for the continent of Africa. Amongst all the countries of the world were severely affected by the COVID-19 but Africa seems to take the hit of the COVID-19 pandemic on students greatly. Close to 10 million students from Africa have experienced disruption in their education as a result of higher education institution closures during the COVID-19 pandemic (UNESCO, 2020). Many institutions have migrated their courses to online lectures to prevent contamination and multiple infections among students. The challenge of online subscription is an arduous task given that in Africa, only 24% of the people have good internet access which is also riddled with high cost, persistent power interruptions and poor connectivity (Tamrat et al., 2020).

This changes the whole dynamics of the import of the COVID-19 pandemic on the landscape of the African continent. The underlying problems of the continent coupled with the surge of the COVID-19 pandemic makes it a really bad scenario for the continent of Africa. Underlying problems such as high poverty rate, poor health facilities, bad road networks etc. placed demands on the government of African nations to focus on other priorities than education in other to keep the countries running.

It is more likely for governments to be concerned about the efficacy of their health care systems, stabilising the economy and other prioritising areas before the sector of education would be addressed and this would affect all kinds of students. Over 90% of students in 192 countries around the world were temporarily made to stay off school as a result of the pandemic (UNESCO, 2020). In some parts of Europe, South America and Africa the lockdown of schools was very prominent. Long periods of learning will certainly be lost so far as the closure of schools continued and this translates to permanent and temporal damages to the educational system (Mahaye, 2020)These will to changes in mental health status.

However, in the light of these events, some solutions have sprung up in an attempt to manage the discouraging situation upon the face of the continent of Africa. In a study by Mahaye, (2020) to analyse the pedagogy of blended learning as an approach for curbing the situation of a total cut-off from education, one of the discoveries was that blended learning enhanced learning. Irrespective of the distance in such a time as the COVID-19 pandemic, it could be implemented to facilitate studies while making sure that students and faculty personnel are safe. However, to implement such a system demands a digitally developed society. In his study the country of study was South Africa and for a conclusion such a feat was achievable for South Africa (Mahaye, 2020).

Impact of COVID -19 on mental health of students in Ghana

Ghana has received a fair share of the negative burden of the COVID-19 pandemic in all areas including its educational sector. A study by Upoalkpajor and Upoalkpajor, (2020) investigated the relationship between COVID-19 and education. The final conclusions established that a relationship

exists between the COVID-19 pandemic and the education in that the presence of the COVID-19 pandemic greatly hampered the continuation of schooling in Ghana. The closing down of schools have also caused a blockade in assessing students.

Until January 2021, all schools in Ghana were completely closed, forcing all learners to stay out of school to enforce social distancing to curb the spread of the COVID-19 pandemic. In addition to the close down of educational institutions, many examinations including the WASSCE and the BECE in Ghana have had to be postponed with cancellation of several Universities' examinations since the close-down period coincided with the period of assessment (Upoalkpajor & Upoalkpajor, 2020).

Where traditional examinations set-up in HEIs were substituted with the online versions, measures employed posed a greater tendency of assessment error in that with online assessments one cannot be exert the role of supervision, and as a consequence result generated may not be a true reflection of the students' performance. In another study to review the impact of COVID-19 on learning using a survey as a simple study design with questionnaires, Ofori et al., (2021) reported the issues encountered by students during the schools close down as a result of the pandemic. The online system of studies was very ineffective as majority of students could not study from home. Many parents could as well not efficiently support their wards with the online platforms for learning and found the process of monitoring tedious and complex.

With the advent of COVID-19, the closure of schools demanded that all kinds of students be able to learn on their own and this is realistically not possible for some groups of students especially those in Senior high school and

below, given the fact that it takes a high amount of discipline to engage in personal studies and self-motivation was really needed. The ability to study with online technology showed that more males (53) than females (47%) participated. The study, published in the European Journal of Education Studies further identified 68% of the respondents as tertiary level students, 20% as College students and 12% at the Senior High level, an indication that tertiary students are more acquainted with current educational innovative technologies than those at the College and Senior High levels (Owusu-Fordjour et al., 2020).

This comes through the consistent use of the internet for research activities, self-learning and e-learning by the tertiary students. Tertiary students are familiar with research; hence, their much knowledge in the application of internet technology for learning than the other levels in Education. Eventually the effect of the COVID-19 pandemic on students will lead to mental health conditions such as depression, anxiety and stress, which are the fulcrum of this study.

Impact of COVID -19 on mental health of students with respect to gender

The COVID-19 pandemic has been found to affect the mental health status of the general population with respect to gender, age and ethnicity. In the UK household longitudinal study to quantify and assess changes in mental health, data from pre-COVID-19 pandemic (2017-2019) was compared with that during the COVID-19 pandemic in April, 2020. Using the GHQ-12 (General Health Questionnaire) it was confirmed that that there was average reduction in mental health in participants before and during the COVID-19 pandemic (Opanasenko et al., 2021). In addition, there was variation in mental distress in terms of gender. Women were observed to have more mental distress

than men. Furthermore, men from India, Bangladesh and Pakistan experienced high increase in distress than British men. The researchers however failed to work with gender from Africa and specifically from Ghana. This gap is what this study has filled. Gender-based violence has been associated with poor mental health during the COVID-19 pandemic in Bangladesh. Through the confinement of the pandemic, abusive partners, economic and social disruptions and restricted access to healthcare provision contributed significantly to gender-based violence (Opanasenko et al., 2021).

Victimization based on gender was on the rise with evidence of a complex association between COVID-19 stressors such as health anxiety, gender-based violence and mental health issues. COVID-19 pandemic triggered aggression, physical and psychological violence in victims (Opanasenko et al., 2021). Recent contributions to knowledge have cited gender differences in the mental health consequences of COVID-19 lockdowns. However, the cross-sectional designs used have not been able differentiate between pre-existing gender differences and differences induced by lockdowns.

On the other hand, using a longitudinal data from the cohort study and Lifelines biobank with mental health measurements to estimate fixed-effects throughout the lockdown, the caveat has changed. Men experienced less depression disorders than women with more anxiety disorders due to the lockdown during the COVID-19 pandemic (Vole & Alessie, 2021). The need to determine the difference if any in mental health disorders with respect to gender among students is helpful in designing appropriate interventions. In a recent work, a cross sectional designed survey with 593 cis-gender and 29 gender diverse and transgender youth was conducted during early COVID-19

pandemic to examine the mental health challenges. The results indicated that gender diverse and transgender youth are strongly affected by mental health challenges than cis gender youth. Whereas 68% of the gender diverse and transgender youth reported unmet needs in substance use mental health during the COVID-19 pandemic, 28% of the cis gender youth reported same (Hawke et al., 2021).

The need for understanding the effects of the pandemic with respect to gender is underscored. The COVID-19 pandemic has caused unprecedented mental health effects and isolation. However, few studies have reported this in sexual and gender (SGM) minority young people. This cross-sectional study by Kamal et al., (2021) sought to determine the mental health effects on of SGM young people during the early stages of the COVID-19 pandemic in the United States and to discover how factors related to SGM identity impacted mental health. The online survey collected data and assessed for both COVID-19-related outcomes (COVID-19-related worries and COVID-19-related grief) and mental health (depression (PHQ-8), anxiety (GAD-7), PTSD (PCL-C)). For the 981 respondents, 32% identified as SGM and showed high levels of PTSD and depression symptoms as well as COVID-19-related worries and grief than non-SGM people.

Using data from the Life during Pandemic survey in Chile, with 2,545 adult participants, an econometric-models was estimated to determine gender differences in mental health and psychological well-being during the COVID-19 pandemic. With the adult respondents, females reported higher levels of bad mental health and poor well-being. These are apparent as the women are likely to have increased household chores and loss of income due to lockdown during

the COVID-19 pandemic (Borrescio-Higa & Valenzuela, 2021).

Another cross-sectional study during the lockdown of COVID-19 pandemic among adults in Spain with an online survey took a gender-biased approach that employed GAD scale to measure anxiety and PHQ to determine depression. With 7053 participants, 31.2% and 17.7% reported anxiety in females and males respectively. Depression levels were 28.5% and 16.7% respectively for females and males. In addition, higher levels of depression and anxiety were reported for the younger age population between 18 and 35 years and these mostly were females. The study concluded that these were mainly due to fear of the COVID-19 pandemic and that females and younger people had bad mental health conditions during the lockdown period (Jacques- Aviñó et al., 2020).

Kolakowsky-Hayner et al., (2021) found in their study that more women reported mental health challenges such as depression, anxiety and post-traumatic distress than men during the COVID-19 pandemic. They examined data from 59 countries involving 6882 participants around the world but no data was reported from Ghana using standardized and adapted measures. The measuring tools were translated into several languages excluding any Ghanaian language. Using an online survey at the University of Salerno Italy, females were found to be more sad, lonelier, more fearful and insecure than males who recorded more sleep disorders. There was difference in awareness on COVID-19 pandemic on the part of the females than men (Giudice et al., 2022)

From the review so far, most data are foreign based with respect to gender and less reports from Ghana and Africa where the COVID-19 has a significant effect on the population.

Impact of COVID -19 on mental health of students with respect to age.

The extent to which different groups of people are affected by mental health conditions differs among the different age ranges. For instance, the level of depression, anxiety and stress among a population significantly differs according to age groups. It is also known that the level mental health conditions might change in the prevalence of a pandemic such as the COVID-19. However, the extent to which the mental health condition might differ among different age groups during the current COVID-19 pandemic among different age groups has only received little or no attention to help in instituting the appropriate intervention to help a vulnerable group. In their study, Schmidt, Barblan, Irina Lory, & Landolt, (2021) investigated the effects of the COVID-19 pandemic on mental health in three age groups (1–6 years, 7–10 years, 11–19 years) and to evaluated the associations with psychological factors.

The cross-sectional design involved a population-based sample from Germany, Austria and Switzerland with caregivers that spoke the German language to provide informed consent. They reported a 9.9% and 2.2% behavioural and emotional problem above the clinical cut-offs of mental health disorders respectively. An increase in these conditions of 43.0% and 15.3% respectively was recorded during the COVID-19 pandemic. They concluded that these vulnerable people need monitoring and support during the COVID-19 pandemic. Their study was limited as it depended on capacity of participant to speak the German language.

Again, there are other age groups that are vulnerable but were excluded in this study. The study lacked generalization since not all the accessible population was involved. These gaps allow this researcher to consider the

expanding the age brackets and to reach an accessible population whose target population will be a good representation for easy generalization. To maintain an individual's mental well-being in the midst of the COVID-19 pandemic, different cohorts of the population were studied to identify strategies that will enhance self-directed behaviours.

In a longitudinal study in the UK, the impact of COVID-19 pandemic on the mental health status focused on age, personality traits and gender using individual fixed effects models with an unbalanced participants of 373,555 observed from 2009 to 2020. The results indicated that the negative impact of the COVID-19 pandemic was severe on young adults aged 16-25 years. A worsening psychological distress level increased feelings of loneliness was also observed among this group. The conclusion that the psychological and behavioural responses of people differs is consistent with the theoretical knowledge and that there is the need to have public health programmes that can assist distressed young people during such crucial conditions such as the COVID-19 pandemic. The data observed indicates that such studies have been carried out from a long time till the advent of the COVID-19 pandemic in the UK. Not same can be said of Ghana's population. This is an essential gap that need filling and this research considered studying the effect of the COVID-19 pandemic among students with respect to age.

A study of the general Japanese population was conducted to identify the most vulnerable group with respect to deteriorating mental health conditions during the COVID-19 pandemic. The study measured among other factors the mental health status of depression and anxiety disorders using logistic regression analysis to examine the associations with 2000 participants. It was

observed that the mental health disorders among middle-aged and young individuals was significantly higher that older person during the COVID-19 pandemic.

High levels of depression and anxiety symptoms were recorded among the working group and therefore the need to monitor the mental health of young adults was found to be very important (Ueda, Stickley, Sueki, & Matsubayashi, 2020). Most students in Ghana fall in this age group and therefore the need to monitor their mental health status during the COVID-19 pandemic is in the right direction. This work focused on students whose age fall with the group that was studied in Japan. The first German COPSY longitudinal study which was population-base examined the mental health impact of the COVID-19 on changes in mental health and health-related quality of life in adolescents and children. Measurement was done during two waves of the COVID-19 pandemic with a total of 1923 adolescents and children aged from 7 to 17 years. With a response rate of 85%, anxiety and depressive symptoms were determined with CES-DC, PHQ-2) and psychosomatic complaints with HBSC-SCL.

Analyses conducted with mixed model panel regression to evaluate the longitudinal changes in mental health indicated that the adolescents and children increased in depressive, anxiety and psychosomatic disorders during the COVID-19 pandemic. The difference in the mental health challenges between the two waves of the COVID-19 pandemic were not statistically significant (Löler *et al*., 2023). The need however, to appropriately support adolescents and children during a pandemic is very important.

The current work takes cognizance of the fact that age related mental stress is real and that the gap that not much literature exists among Ghanaian

students need to be addressed is the one of the objectives of this research. The longitudinal research involving 258 Caucasian young adults to examine the psychological impact of the COVID-19 pandemic in respect of mental health was conducted over two time points before the COVID-19 and two months into the government restrictions. The online survey measured anxiety and depressive symptoms and COVID-19 related stress. Consistent with literature, it was observed that significant increment in anxiety and depressive symptoms were experienced by the adolescents.

The decline in adolescent mental health as evidenced from this longitudinal research indicates that more concerns are with the restrictions than the spread of the virus itself. The psychological effects of the COVID-19 pandemic on Ghanaian students are unknown with respect to age and this research focused on the use of cross-sectional design instead of the longitudinal design reported by Magson, Freeman, Rapee, Richardson, Oar, & Fardouly, (2021).

Impact of COVID -19 on mental health of students with respect to level of study.

Different assessment tools including the Generalized Anxiety Disorder 7-item (GAD-7) and the Patient Health Questionnaire (PHQ-9) have been employed in Kuwait to measure mental health status of undergraduate students and healthcare professionals with respect to impact of the COVID-19 pandemic. Factors such as gender and age of the participants associated high levels of mental health disorders were also explored. The online cross-sectional study revealed significant increase in severe depression of 66% among the respondents with females having a greater proportion than males when the

PHQ-9 was used. Severe anxiety measured with GAD-7 showed 36.5% among the participants. Respondents aged 18-29 rather showed increased mental health burden compared to those above 29 years (Alsairafi, Naser, Alsaleh, Awad, & Jalal, 2021). The researchers however, did not consider effect of the pandemic with respect to the level of study of the undergraduates. The level of study would have helped to discover any differences in the mental health burdens among the students as a result of the pandemic. This research has investigated among the other factors mentioned in this work under review in order to fill the gap identified to help institute interventions that will be appropriate to a level of study if determined.

Current literature relating the effects of COVID-19 on mental health outcome has been systematically reviewed by Xiong et al., (2020) from Embase, PubMed, Web of Science, Medline, and Scopus from the start till May 2020 following the guidelines of PRISMA. Their results indicated high levels of depression up to 48.3%, PTSD of 53.8%, psychological stress 38% and stress 81.9% in the general population during the COVID-19 pandemic in Spain, Iran, Italy, China, Turkey, US, Turkey Denmark and Nepal. Obviously missing in the list of countries is Africa and for that matter, Ghana. The review considered factors such as gender, age, student status and consistent exposure to social media with respect to COVID-19 pandemic. These reports are consistent with others which have indicated high levels of psychological distress during the pandemic. The scores showed no significant difference between males and female and similarly no difference was statistically found for the different level of education. A Ghanaian report is appropriate focusing on factors as the gender, age and the level of study of students relating to the pandemic and going

forward.

Impact of COVID -19 on correlation of mental health conditions

The comorbidity of depression, anxiety and stress during the COVID-19 pandemic has been reported widely in literature (Bayram & Bilgel, 2008). Passos, Prazeres, Teixeira, & Martins, (2020) have reported significant correlation between depression and anxiety to the point that up to 45.7% of depressed people at one time in life would have experienced anxiety. Similarly, 42% of people with anxiety have at least had one episode of depression. In this work, the researcher determined the correlation between depression, anxiety and stress to understand how intervention might be developed to help clients requiring treatment that might consider an approach that works well with comorbid situations. The Pearson's r correlation was used by Rutkowska, Cieslik, Tomaszczyk & Szczepanska-Gieracha, (2022) to measure the association between stress and depression levels to observe a strong correlation between the two during the COVID-19 pandemic.

In another study from Australia, an online study measured the association between the mental health conditions during the COVID-19 pandemic and observed high depression and stress as a result of negative physical activity and sleep (Stanton et al., 2020). The researchers however, did not determine the direct impact of the relation between depression and stress. In an investigation on depression, anxiety and stress during the early days of the COVID-19 pandemic in New Zealand, similar results were compared from the UK that used a cross-sectional design. Depression and anxiety were significantly observed to exceed normal levels. The correlation in the study only considered young adults' positive mood and alcohol consumption against

mental health conditions (Gasteiger et al., 2021). The correlation between depression, anxiety and stress was not determined, a gap that has been considered in this work.

The empirical review shows that several studies have been conducted globally on the issue of Mental Health instigated by the COVID-19 pandemic. Little or no report on the mental health status of Ghanaian tertiary level students exists. The empirical review has further indicated that the COVID-19 pandemic has attained public health concern and has impacted the global, continental and national communities including Ghana. The negative effect of the pandemic has resulted in stresses that has led to mental health issues among the populace. Tertiary students who are a potential human resource for the nation's economic build-up and significant health work-force may have been affected. However, data to support the institution of interventions to avoid scaling of mental health issues is scanty and therefore the current study will be valuable in providing the data necessary to fill the significant pit-falls and gaps in literature.

Chapter summary

The relevant literature pertaining to this study has been reviewed. The theoretical review generally discussed the three main theories on mental health including Behavioural, Cognitive and Humanistic theories but focussed on the Cognitive Behavioural Therapy as a main theory underpinning the study. The conceptual review defined COVID-19 and gave a global perspective of the pandemic as well as the WHO guidelines for treatment. Further concepts reviewed were the mental health issues including the conditions of depression, anxiety and stress as they relate to COVID-19 and tertiary students of Ghana. The variables relating to the prevalence of depression, anxiety and stress among

students are presented in the conceptual framework for determination using DASS-21. The empirical review described literature on the global, continental and national perspectives on the impact of COVID-19 on mental health in relation to gender, age, level of study and the correlation of the mental health conditions. The next chapter presents the research methods.

CHAPTER THREE

RESEARCH METHODS

The study is aimed at measuring the psychological impact of COVID-19 on the level of depression, anxiety and stress among KNUST students. Chapter two reviewed literature focusing on theories and concepts related to the study and also empirical studies that have been conducted in the area of study. The current chapter outlines the various research methods to be applied in the study, explaining the procedure for data collection and analysis.

Research design

This study was a descriptive survey that applied a cross-sectional design that sought to provide systematic information about mental health status of students at KNUST. This cross-sectional design which was based on positivist paradigm helped to showcase the profile of the psychosocial situation of the students at the institutional level (Saunders, Lewis, & Thornhill, 2009) while offering the researcher an opportunity to sample data from a wider respondent of students to make results generalized for a larger population with exact characteristics (Faulkner & Faulkner, 2018).

On the contrary, the flaws identified with the use of the cross-sectional design revolves around participants that may not be truthful with responses and the limited control due to large sample sizes. To avoid prejudices and vulnerabilities linked with the cross-sectional design, a test of validity and reliability was conducted to ensure dependability and soundness of collected data. The cross-sectional design is most appropriate as the study was conducted at the same time to measure the prevalence of depression, anxiety and stress among tertiary students during the COVID-19 pandemic.

Research Approach

The quantitative approach was employed for the study. The researcher used numbers, percentages, or statistical information in the determination of the levels of psychological impact such as stress, depression, and anxiety on KNUST students during the COVID-19 pandemic. The ultimate concern was the fact that the measurement should be reliable, valid and generalizable. The quantitative method helps researchers to obtain a more reliable data with objectivity, which helps in minimizing subjectivity to the lowest level (Creswell & Creswell, 2020).

Study Area

Kumasi, the Ashanti regional capital is the study area. With a population nearing 1,500,000 (Ghana Statistical Service, 2021), Kumasi ranks second as a large Ghanaian metropolitan city. The city centre comprising Bantama, Adum, Bompata and Pampaso booms with department stalls, hotels and a large concentration of commercial banks. Major trading activities include pottery, textiles and clothing. In addition, Kumasi hosts a magnificent community for timber processing that serves the entire country's need for wood product. Both private and public schools provide the educational needs of the people of Kumasi. At the senior high school level, some elite schools such as Opoku Ware and Prempeh for boys and St, Louis and Yaa Asantewaa for girls are worth mentioning.

The study was sited at a public university in the Kumasi Metropolis of the Ashanti Region of Ghana namely Kwame Nkrumah University of Science and Technology (KNUST). The study was delimited to KNUST in the Kumasi Metropolis due to the fact that it bears all the characteristics and dynamics of all

other universities in the country. Other private and public universities are also located in Kumasi. With a land area covering 2412.96 acres, the main campus of KNUST measures close to seven (7) square miles, lying about 13 km east of Kumasi. The current decentralized collegiate system was started in January 2005, condensing faculties and schools to six (6) colleges (Figure 4).

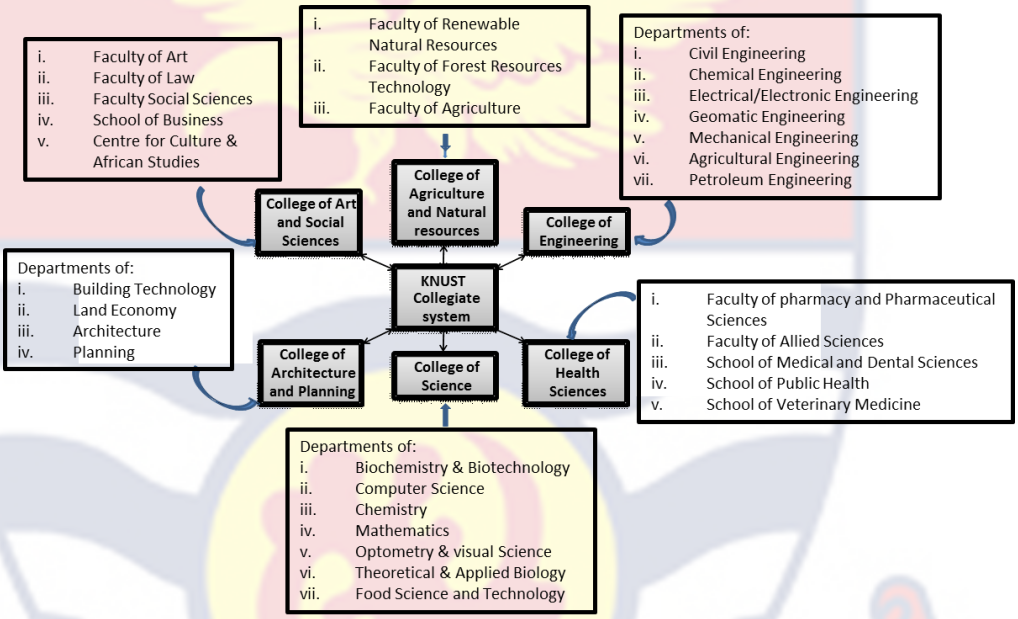

Figure 4: KNUST decentralised collegiate system.

Population

Target Population

The target population for this study consisted of all undergraduate students registered at KNUST in the Ashanti Region of Ghana. The target population was 24,744 tertiary students of both sexes with age range from 18 years to 45 years, offering different courses at different levels of their education at KNUST, Kumasi, Ghana.

Accessible Population

The accessible population that the researcher generalized the finding consisted of 2844 students of the College of Health Sciences at KNUST. These included students from the School of Medicine and Dentistry (SMD) and the Faculty of Pharmacy and Pharmaceutical Sciences (FPPS) levels 100, 200, 300 and 400. The aims of the research as well as all relevant information concerning the psychometric instrument were relayed to all the participants whose participation was purely voluntary, haven been assured of confidentiality.

Sampling Procedure

Purposive sampling technique was used to select KNUST because the students exhibit the same characteristic with other students in the various universities in Ghana and also for proximity's sake. The reason for selecting students from the College of health Sciences was because they are the most likely to be the front-line caregivers during a pandemic such as COVID-19. Proportionate stratified sampling requires that the size of each sub-population is proportionate to the total population size of the strata. This means that each sub-population has the same sampling fraction. College of Health Sciences KNUST was stratified as level 100 to level 400. From Table 3, 2,844 was the total number of students from the College of Health Sciences forming the accessible population from which the study sample was obtained.

Table 3: Number of students at various levels in the sampled college

College of Health Sciences	Number of students
FPPS	
Level 100	393
Level 200	369
Level 300	336
Level 400	337
SMD	
Level 100	476
Level 200	453
Level 300	480
Total	2844

Source: Examinations office of College of Health Sciences, KNUST (2021)

The sample size for the study was determined by the Krejcie and Morgan (1970) Table. Therefore, with an accessible population of 2,844 the sample size for the study was determined to be 339. However, it was increased to 350 to cover for non-response rate of some questionnaires after online distribution as recommended by Cohen, Manion and Morrison (2018) that the sample size can be increased up to half of the original sample size. To have a fair distribution of all the levels in the sample, the proportion for each subgroup was determined as illustrated in Table 4. Thus, proportional stratified sampling was used.

Data Collection Instrument

The instrument adapted for this study was Depression, Anxiety and Stress Scale (DASS-21). Participants were to answer in relation to their experience during the COVID-19 pandemic. A letter of introduction from the

Department Guidance and Counselling UCC (Appendix C), accompanied the Data collection instrument (Appendix A). The instrument was divided into two (2) parts. Part one (1) involved three (3) items that covered respondents' bio-data such as Q1: Gender, Q2: Age and Q3: level at tertiary education. The rest of items in Part one (1) (Bio-data of Research Instrument may be found in Part 1 (Appendix A). Part Two (2) comprised the DASS-21 instrument.

Table 4: Proportional distribution of participants for the various levels

College of Health Sciences	Number of students	Percentage (%)	Proportion
FPPS			
Level 100	393	12	48
Level 200	369	12	44
Level 300	336	11	37
Level 400	337	11	37
SMD			
Level 100	476	13	62
Level 200	453	13	59
Level 300	480	13	63
Total	2844	100.0	350

Table 5 indicates the distribution of the 21 specific items for Depression, Anxiety and Stress. The rest of items in Part two (2) instrument are found in Part 2 (Appendix A). Respondents were required to describe the prevalence of symptoms experienced within the previous week when DASS-21 was being completed. An item score ranges from 0 (did not apply to me) to 3 (applied to me very much or most of the time). The final figure was multiplied by 2 for each domain.

Table 5: Item description for Depression, Anxiety and Stress Scale

	Depression	**Anxiety**	**Stress**
Items	3	2	1
	5	4	6
	10	7	8
	13	9	11
	16	15	12
	17	19	14
	21	20	18

A normal score from 0-9 is for the depression domain with pathological values ranging from 10-28. The anxiety domain has score 0-7 for normal situation and 8-20 for pathological score. Normal range score from 0-14 for stress domain and 15-34 for pathological condition in the stress domain (Table 6).

Table 6: Conventional severity cut-off scores for DASS=21

	Depression	**Anxiety**	**Stress**
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

Source: Lovibond & Lovibond (1995).

Validity of instrument

The validity of the psychometric tool was defined by its capacity to show that it measures the indicators it is envisioned to measure, in this situation, depression, anxiety and stress. This was determined by ensuring the elimination of uncertainties with concepts and words to improve clarity (Polit, 2008). Pretesting the items of the questionnaire on 35 peers on post graduate studies at University of Cape Coast (UCC) was done to assure validity.

Reliability of Research

The reliability of this study was evaluated with Cronbach's alpha at 0.7 which measured internal consistency of the study. Cronbach's Alpha reliability coefficient values of 0.70 and higher, according to Creswell and Creswell (2020), was considered reliable.

Ethical Considerations

The respondents were guaranteed confidentiality and anonymity by ensuring that the Google form for the data collection excludes revealing of identify while protecting their opinion. Respondents' right was not violated since confidentiality was accorded to ensure trustworthiness. Informed consent forms were read and filled by the participants to validate their willingness to partake in the study while informing them of their right to opt out of the study at any time without affecting their statutory rights. Furthermore, the content of the survey results will be kept in an online safe repository (Google Drive) for three years by this researcher before discarding in accordance with the University of Cape Coast Institutional Review Board (Appendix B).

Data Collection Procedure

Quantitative data was obtained by administering the structured DASS-

21 questionnaire to all the 350 purposively selected survey participants using online based Google forms through WhatsApp and emails. Access to the structured DASS-21 instrument was via clicking the web-link: https://forms.gle/FXXGq2pEswLgcKjm6 from the Google form platform for collection of data. Participants were supposed to select the most appropriate answer by clicking the dropdown numbers that will be automatically logged and recorded in Google drive software (online data storage programme). The questionnaire was designed to allow for each participant to answer the structured DASS-21 only once to assure validity. The software also instructed respondents to compulsorily answer every question before leaving a page. For this, each item was designated "required". For a respondent to submit the completed form, the progress bar at the bottom of the page indicates 100%.

All answered items were received immediately online for instant analysis with other previously data collected. The tool bar on the Google form interphase also shows "Responses" with a drop-down switch that displays acceptance period for respondents' responses. The switch was turned off after two (2) weeks of data collection.

Data Processing and Analysis

The section refers to how the obtained data was processed and analysed. The study was a descriptive survey and therefore the data analysis was descriptive and inferential statistics involving mean scores and standard deviations applied (Awabil & Akosah, 2018). The quantitative data was sorted, coded and analysed using SPSS. When analysing quantitative data, the SPSS Version 25, which is one of the social scientists and other experts most widely used statistical software packages, would be used (Wang et al., 2020). The

researcher entered the quantitative data into the software's data display to complete the keying-in procedure. Descriptive statistical and inferential analysis techniques were used to analyse the quantitative data.

Data on research questions one to four were analysed using percentages and research question five was by Pearson correlation and Spearman's rho at 0.01 level of significance.

Data Analysis Plan

Google forms has imbedded tools for data analysis which were used in carrying out the analysis of the quantitative data. The survey tool permits survey validation of responses through web-link sorting. The response switch was turned off after the two (2) week data collection period. The "Response" tool bar's dropdown had links for "view response" and "summary of response". To obtain the mean and standard deviation, the raw data from the view response (data matrix) were analysed. Data was analysed using percentages from the summary responses. For items from part 1 of the questionnaire, continuous data was processed with percentages determined from the summary and further transferred to Excel spreadsheet for univariate analyses. The spreadsheet calculator in the Google form was used for the univariate analysis of the primary data. This allowed for analysing the mean and standard deviations for each item found in the Part two (2) of the questionnaire to give the quantitative description of the data.

Chapter Summary

Chapter three presented the research methodology for the study including the research design, study area, population, sampling procedure, data collection instrument, data collection procedure and data processing analysis.

The study was cross-sectional design with an accessible population of 2,844 students at various levels of study from the College of Health Sciences, KNUST, Kumasi. The sample size of 350 was based on the Table by Krejcie and Morgan (1970). DASS-21 was the data collection instrument administered online via emails and WhatsApp platforms from Google forms. Data processing and analysis included descriptive statistical procedures with the aid of Office word, Excel and IBM Statistical Product for Scientific Solution.

CHAPTER FOUR

RESULTS AND DISCUSSION

Chapter four describes the results obtained from the DASS-21 instrument used for data collection and the discussion thereof. Briefly, the purpose of this study was to determine the psychological impact of the COVID-19 pandemic on KNUST students with respect to levels of depression, anxiety and stress. The chapter also shows the relationship between gender, age and the level of study of the respondents. Finally, the correlation between the mental conditions measured are captured using the Pearson coefficient and Spearman's rho.

The current study determined the prevalence of Depression, Anxiety and Stress among tertiary level students of KNUST during the COVID-19 pandemic. A total of 193 participants responded to the online questionnaire administered via Google forms giving a response rate of 55%. The results from part 1 of the questionnaire indicated that approximately 55% of the respondents were females as against 45% males (Table 7). The age of the respondents ranged from 18 years to 45 years at a mean age of 22. Close to 96% were between 18-25 years. The current educational system Ghana has it that by age 22, one would have completed the tertiary institution. It is, therefore, in order that the majority of the respondents were of that age range and pursuing courses at the tertiary level.

The study also linked the study level at which the respondents were at with their Depression, anxiety and stress levels. Up to 46% of the respondents were at level 200, 27% at level 300, 24% at level 400 and only 2.6% at level 100. This depicts that the level 100 respondents are new on campus and not very

much accustomed to campus systems and therefore majority refrained from participating in the research.

Table 7: Total number of participants in various categories (n=193)

Participant category	Total number	Percentage (%)	Distribution
Gender			
Males	87	45.1	
Females	106	54.9	
Age			
Age (18-25)	185	95.85	
Age (26-35)	7	3.63	
Age (36-45)	1	0.52	
Age (mean ± SD)	21.92 ± 2.16		
Tertiary level			
Level 100	4	2.6	
Level 200	89	46.1	
Level 300	51	26.9	
Level 400	47	24.4	

Results and findings by research questions

Research question one: What are the levels of psychological impact such as stress, depression, and anxiety on KNUST students during the COVID-19 pandemic?

The research question one sought to determine the levels of psychological impact such as depression, anxiety and stress on KNUST students during the COVID-19 pandemic. The results are presented in Table 10. From the standard DASS-21 questionnaire, 60% of the total respondents were found to be depressed to different extents. For anxiety, 65% of the total respondents

were affected while 37% of them were stressed. Respondents not affected were 40%, 35% and 63% for depression, anxiety and stress respectively.

The extent to which the total respondents were affected by the mental health conditions were segmented to show the mild, moderate, severe and extremely severe cases according to Lovibond & Lovibond, (1995) as found in Table 6. For Depression, the segmented total found 11.40% of the respondents to be mild while 21.76%, 10.36% and 16.58% of them reported to be moderate, severe and extremely severe respectively. Moderate Depression was found to be the highest among the respondents. For Anxiety, the segmented total was 9.33%, 21.76%, 9.84% and 24.35% respectively for mild, moderate, severe and extremely severe. The majority of the segmented total for anxiety were at the extreme severe stage.

The Stress levels measured was low among the three mental health conditions being determined and in accordance, the segmented total for stress were as follows; 9.33%, 11.92%, 8.81% and 6.74% for mild, moderate, severe and extremely severe respectively. The highest reported for stress in the segmented total was that of the moderate condition. The research further considered only the affected respondents and segmented Depression, Anxiety and Stress as in Table 8. The segmented Depression as has been indicated had 116 respondents among which 18.98%, 36.21%, 17.24% and 27.59% had mild, moderate, severe and extremely severe depression respectively. The trend observed for the segmented Anxiety had extremely severe cases in the lead with 37.30% followed by moderate at 33.33%, severe at 15.08% and mild at 14.29%. The segmented Stress trend had moderate in the significant lead at 32.39% followed by mild (25.35%), severe (23.94%) and extremely severe at (18.31%).

Table 8: Summary results of standard DASS-21 questionnaire

TOTAL [n (%)]					
DEPRESSION		**ANXIETY**		**STRESS**	
Total Affected	116 (60%)	Total Affected	126 (65%)	Total Affected	71 (37%)
Total Not Affected	77 (40%)	Total Not Affected	67 (35%)	Total Not Affected	122 (63%)
SEGMENTED TOTAL		**SEGMENTED TOTAL**		**SEGMENTED TOTAL**	
MILD	22 (11.40%)	MILD	18 (9.33%)	MILD	18 (9.33%)
MODERATE=	42 (21.76%)	MODERATE	42 (21.76%)	MODERATE=	23 (11.92%)
SEVERE	20 (10.36%)	SEVERE	19 (9.84%)	SEVERE	17 (8.81%)
EXTREMELY SEVERE	32 (16.58%)	EXTREMELY SEVERE	47 (24.35%)	EXTREMELY SEVERE	13 (6.74%)
SEGMENTED DEPRESSION		**SEGMENTED ANXIETY**		**SEGMENTED STRESS**	
MILD	22 (18.97%)	MILD	18 (14.29%)	MILD	18 (25.35%)
MODERATE	42 (36.21%)	MODERATE	42 (33.33%)	MODERATE	23 (32.39%)
SEVERE	20 (17.24%)	SEVERE	19 (15.08%)	SEVERE	17 (23.94%)
EXTREMELY SEVERE	32 (27.59%)	EXTREMELY SEVERE	47 (37.30%)	EXTREMELY SEVERE	13 (18.31%)

Research question two: What is the difference in impact of COVID-19 pandemic on depression, anxiety and stress with respect to gender of students?

The research question two sought to examine the difference in impact of COVID-19 pandemic on depression, anxiety and stress with respect to gender of students. The results are presented in Tables 11 and 12. A total of 87 males participated in the research with 38% not experiencing any depression symptoms during the Covid-19 era. Similarly, 37% and 59% did not experience anxiety and stress respectively. 62% of the male respondents reported having depression, 63% with Anxiety and 41% with stress (Table 11). For the segmented total of 54 males, those experiencing moderate depression were 23%, followed by 17% at extremely severe depression, 11.5% at severe depression and 10.34% at mild depression. As much as 25% reported within the segmented total of extremely severe anxiety with 19.5% showing moderate anxiety followed by mild and severe anxiety at 11.5% and 7% respectively.

The stress segmented total showed 13.79%, 11.49%, 9.20% and 6.90% for mild, moderate, severe and extremely severe stress observed for male respondents respectively. Table 11 also shows the pattern for the segmented depression, anxiety and stress. With same numbers as in the segmented total, the percentage of affected respondents shows clearly the increase in the segmented depression, anxiety and stress with same patterns observed for the segmented total (Table 9). For the segmented total, 20.75% of the female respondents had moderate depression, 16.98% had extremely severe depression, 12.26% had mild depression and 8.49% had severe depression. In the segmented total for anxiety, 23.58% had extremely severe anxiety and moderate anxiety while 12.26% had severe anxiety and 7.55% had mild anxiety.

Table 9: Response from male respondents to the standard DASS-21 questionnaire

MALES					
DEPRESSION		**ANXIETY**		**STRESS**	
Affected Males	54 (62%)	Affected Males	55 (63%)	Affected Males	36 (41%)
Not Affected	33 (38%)	Not Affected	32 (37%)	Not Affected	=51 (59%)
SEGMENTED TOTAL		**SEGMENTED TOTAL**		**SEGMENTED TOTAL**	
MILD	9 (10.34%)	MILD	10 (11.49%)	MILD	12 (13.79%)
MODERATE	20 (22.99%)	MODERATE	17 (19.54%)	MODERATE	10 (11.49%)
SEVERE	10 (11.49%)	SEVERE	6 (6.90%)	SEVERE	8 (9.20%)
EXTREMELY SEVERE	15 (17.24%)	EXTREMELY SEVERE	22 (25.29%)	EXTREMELY SEVERE	6 (6.90%)
SEGMENTED DEPRESSION		**SEGMENTED ANXIETY**		**SEGMENTED STRESS**	
MILD	9 (16.67%)	MILD	10 (18.18%)	MILD	12 (33.33%)
MODERATE	20 (37.04%)	MODERATE	17 (30.91%)	MODERATE	10 (27.78%)
SEVERE	10 (18.52%)	SEVERE	6 (10.91%)	SEVERE	8 (22.22%)
EXTREMELY SEVERE	15 (27.78%)	EXTREMELY SEVERE	22 (37.30%)	EXTREMELY SEVERE	6 (16.67%)

For the stress segmented total, 12.26% reported moderate stress, 8.49% had severe stress, 6.60% had extremely severe and 5.66% had mild stress. Table 10 also shows the segmented depression, segmented anxiety and segmented stress. In this, indication becomes clearer as mental health issues are reviewed individually and shows in a greater percentage but follows the same pattern as the segmented total.

Comparison of Means of Mental Health conditions between Males and Females (Unpaired t-test)

	Males	Females
Depression	62	58
Anxiety	63	67
Stress	41	34
Mean	55.33333	53
SD	12.4231	17.05872
SEM	7.17069	9.84844
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.8576. The mean of Group One minus Group Two equals 2.33000

Intermediate values used in calculations:

t = 0.1913 df = 4 Standard error of difference = 12.182

By conventional criteria, this difference between the means between male and female mental health conditions is considered to be not statistically significant.

Table 10: Response from female respondents to the standard DASS-21 questionnaire

FEMALES					
DEPRESSION		**ANXIETY**		**STRESS**	
Affected Females	62 (58%)	Affected Females	71 (67%)	Affected Females	36 (34%)
Not Affected	44 (42%)	Not Affected	35 (33%)	Not Affected	70 (64%)
SEGMENTED TOTAL		**SEGMENTED TOTAL**		**SEGMENTED TOTAL**	
MILD	13 (12.26%)	MILD	8 (7.55%)	MILD	6 (5.66%)
MODERATE	22 (20.75%)	MODERATE	25 (23.58%)	MODERATE	13 (12.26%)
SEVERE	9 (8.49%)	SEVERE	13 (12.26%)	SEVERE	9 (8.49%)
EXTREMELY SEVERE	18 (16.98%)	EXTREMELY SEVERE	25 (23.58%)	EXTREMELY SEVERE	7 (6.60%)
SEGMENTED DEPRESSION		**SEGMENTED ANXIETY**		**SEGMENTED STRESS**	
MILD	13 (20.97%)	MILD	8 (11.27%)	MILD	6 (17.14%)
MODERATE	22 (35.48%)	MODERATE	25 (35.21%)	MODERATE	13 (37.14%)
SEVERE	9 (14.52%)	SEVERE	13 (18.31%)	SEVERE	9 (25.71%)
EXTREMELY SEVERE	18 (29.03%)	EXTREMELY SEVERE	25 (35.21%)	EXTREMELY SEVERE	7 (20%)

Research question three: What relationship exists in COVID-19 impact on depression, anxiety and stress levels on the basis of age of students?

The research question three sought to examine the relationship that exists in COVID-19 impact on depression, anxiety and stress levels on the basis of age of students. The results are presented in Tables 11 to 13. The respondents were aged between 18-25 years representing 96% of total participants. For depression, 59% were affected whereas anxiety affected 65% with 37% affected by stress (Table 11). In the segmented total analysis for depression, 21.62% had moderate depression, 16.22% had extremely severe depression and 10.81 % recorded for both mild and severe depression.

For the segmented total in the case of anxiety, extremely severe anxiety was 24.32% followed by the moderate anxiety at 21%, severe anxiety at 10.2% and mild anxiety at 9.73%. Lower percentages were recorded for the segmented total for stress. Moderate stress had 11.89%, mild stress had 9.73%, severe stress had 8.65% and extremely severe stress had 6.49%. Focusing on segmented depression, anxiety and stress, the observed patterns were repeated as with the segmented totals but with greater percentages as observed in Table 11 for the age bracket 18-25. Table 12 shows the responses of the seven (7) respondents aged 26-35 with a total of 71% affected by depression, 57% affected by anxiety and 43 affected by stress.

In addition, the segmented total indicated 28.57% for moderate and extremely severe depressions, 14.29% for mild depression and none for severe depression. For segmented total anxiety, it was 28.57% each for moderate and extremely severe anxiety and none recorded for mild and severe anxiety. The

segmented total stress was 14.29% for moderate, severe and extremely severe stress while none was recorded for mild anxiety. Similar patterns are in the segmented depression, segmented anxiety and segmented stress. From Table 13, only one respondent's responses were recorded for the age group 36-45. The participant has been affected by depression and anxiety but not stress. In the segmented total, it was mild depression and moderate anxiety. It was same for segmented depression at mild and segmented anxiety at moderate with no stress.

Table 11: Response from respondents based on age (18-25) to the standard DASS-21 questionnaire

AGE (18-25)					
DEPRESSION		**ANXIETY**		**STRESS**	
Affected Age	110 (59%)	Affected Age	121 (65%)	Affected Age	68 (37%)
Not Affected	75 (41%)	Not Affected	64 (35%)	Not Affected	117 (63%)
SEGMENTED TOTAL		**SEGMENTED TOTAL**		**SEGMENTED TOTAL**	
MILD	20 (10.81%)	MILD	18 (9.73%)	MILD	18 (9.73%)
MODERATE	40 (21.62%)	MODERATE	39 (21.08%)	MODERATE	22 (11.89%)
SEVERE	20 (10.81%)	SEVERE	19 (10.27%)	SEVERE	16 (8.65%)
EXTREMELY SEVERE	30 (16.22%)	EXTREMELY SEVERE	45 (24.32%)	EXTREMELY SEVERE	12 (6.49%)
SEGMENTED DEPRESSION		**SEGMENTED ANXIETY**		**SEGMENTED STRESS**	
MILD	20 (18.18%)	MILD	18 (14.88%)	MILD	18 (26.47%)
MODERATE	40 (36.36%)	MODERATE	39 (32.23%)	MODERATE	22 (32.25%)
SEVERE	20 (18.18%)	SEVERE	19 (15.70%)	SEVERE	16 (23.53%)
EXTREMELY SEVERE	30 (27.27%)	EXTREMELY SEVERE	45 (37.19%)	EXTREMELY SEVERE	12 (17.65%)

Table 12: Response from respondents based on age (26-35) to the standard DASS-21 questionnaire

AGE (26-35)					
DEPRESSION		**ANXIETY**		**STRESS**	
Affected Age	5 (71%)	Affected Age	4 (57%)	Affected Age	3 (43%)
Not Affected	2 (29%)	Not Affected	3 (43%)	Not Affected	4 (57%)
SEGMENTED TOTAL		**SEGMENTED TOTAL**		**SEGMENTED TOTAL**	
MILD	1 (14.29%)	MILD	0 (0%)	MILD	0 (0%)
MODERATE	2 (28.57%)	MODERATE	2 (28.57%)	MODERATE	1 (14.29%)
SEVERE	0 (0.00%)	SEVERE	0 (0.00%)	SEVERE	1 (14.29%)
EXTREMELY SEVERE	2 (28.57%)	EXTREMELY SEVERE	2 (28.57%)	EXTREMELY SEVERE	1 (14.29%)
SEGMENTED DEPRESSION		**SEGMENTED ANXIETY**		**SEGMENTED STRESS**	
MILD	1 (20%)	MILD	0 (0.00%)	MILD	0 (0%)
MODERATE	2 (40%)	MODERATE	2 (50.00%)	MODERATE	1 (33.33%)
SEVERE	0 (0%)	SEVERE	0 (0.00%)	SEVERE	1 (33.33%)
EXTREMELY SEVERE	2 (40%)	EXTREMELY SEVERE	2 (50.00%)	EXTREMELY SEVERE	1 (33.33%)

Table 13: Response from respondents based on age (36-45) to the standard DASS-21 questionnaire

AGE (36-45)					
DEPRESSION		**ANXIETY**		**STRESS**	
Affected Age	1 (100%)	Affected Age	1 (100%)	Affected Age	0 (0%)
Not Affected	0 (0%)	Not Affected	0 (42%)	Not Affected	1 (100%)
SEGMENTED TOTAL		**SEGMENTED TOTAL**		**SEGMENTED TOTAL**	
MILD	1 (100%)	MILD	0 (0%)	MILD	0 (0%)
MODERATE	0 (0%)	MODERATE	1 (100%)	MODERATE	0 (0%)
SEVERE	0 (0%)	SEVERE	0 (0%)	SEVERE	0 (0%)
EXTREMELY SEVERE	0 (0%)	EXTREMELY SEVERE	0 (0%)	EXTREMELY SEVERE	0 (0%)
SEGMENTED DEPRESSION		**SEGMENTED ANXIETY**		**SEGMENTED STRESS**	
MILD	1 (100%)	MILD	0 (0%)	MILD	0 (0%)
MODERATE	0 (0%)	MODERATE	1 (100%)	MODERATE	0 (0%)
SEVERE	0 (0%)	SEVERE	0 (0%)	SEVERE	0 (0%)
EXTREMELY SEVERE	0 (0%)	EXTREMELY SEVERE	0 (0%)	EXTREMELY SEVERE	0 (0%)

Research question four: What is the relationship in impact of COVID-19 pandemic on depression, anxiety and stress levels on the basis of students' level of study?

The research question four sought to determine the relationship in impact of COVID-19 pandemic on depression, anxiety and stress levels on the basis of students' level of study. The responses from level 100 to level 400 students are summarised in Tables 14 -17. The results in Table 16 shows responses from the four (4) participants at level 100. Irrespective of the low number of participants, it is obvious that care must be taken to address the psyche as 75% are depressed, all of them have anxiety and again 75% are stressed. The segmented total for depression also indicates 50% and 25% severe and extremely severe respective cases of depression. For the segmented total anxiety, 50% indicated extremely severe anxiety and 25% each for mild and moderate anxiety. The segmented total for stress shows 50% mild and 25% severe stress. The segmented depression, anxiety and stress follows the same pattern but considered the mental health conditions as stand-alone for the analysis.

As much as 89 participants were from level 200, representing 46% of the study sample. Up to 64% of this group indicated they have depression, 65% have anxiety and 37% are stressed. The segmented total for depression showed 21.35% moderate depression, 18% extremely severe depression, 15.73% mild depression and 9% severe depression. Segmented total for anxiety shows 28% extremely severe anxiety, 19.1% moderate anxiety and 9% mild and severe anxiety. For segmented total stress, 10.11% were showed for mild and severe stress, 9% for moderate stress and 8% for extremely severe stress.

Table 15 further shows that of segmented depression, segmented anxiety and segmented stress with their various indications of percentage for mild, moderate, severe and extremely severe depression, anxiety and stress. Table 16 shows the results for respondents at level 300. They represent 26% of total participants with 57% affected by depression, 65% affected by Anxiety and 35% affected by Stress. For the segmented total 19.61% reported moderate depression, 17.65% reported extremely severe depression, 11.76% reported mild depression with 7.84% reporting severe depression.

The segmented total for anxiety records 23.53%, 21.57%, 11.76% and 7.84% for moderate anxiety, extremely severe anxiety, mild anxiety and severe anxiety respectively. Segmented total for stress shows 11.76% for mild stress, 9.8% for moderate stress, 7.84% for extremely severe stress and 5.88% for severe stress.

The segmented depression with same number of respondents as with the segmented total has the percentage occurrence for mild, moderate, severe and extremely severe as 20.69%, 34.48%, 13.79% and 31% respectively. With a total of 47 participants representing 24%, the level 400 respondents had 55% affected by depression, 64% affected by anxiety and 34% affected by stress (Table 17). The segmented total for depression showed 46.15% for moderate depression, 23% for severe and extremely severe depression and 7.69% for mild depression. Segmented total for anxiety recorded 23.40%, 16.15%, 15% and 6.38% for moderate anxiety, extremely severe anxiety, severe anxiety and mild anxiety respectively.

Table 14: Response from respondents based on level of study (level 100) to the standard DASS-21 questionnaire

LEVEL 100					
DEPRESSION		**ANXIETY**		**STRESS**	
Affected Level 100	3 (75%)	Affected Level 100	4 (100%)	Affected Level 100	3 (75%)
Not Affected	1 (25%)	Not Affected	0 (0%)	Not Affected	1 (25%)
SEGMENTED TOTAL		**SEGMENTED TOTAL**		**SEGMENTED TOTAL**	
MILD	0 (0%)	MILD	1 (25%)	MILD	2 (50%)
MODERATE	0 (0%)	MODERATE	1 (25%)	MODERATE	0 (0%)
SEVERE	2 (50%)	SEVERE	0 (0%)	SEVERE	1 (25%)
EXTREMELY SEVERE	1 (25%)	EXTREMELY SEVERE	2 (50%)	EXTREMELY SEVERE	0 (0%)
SEGMENTED DEPRESSION		**SEGMENTED ANXIETY**		**SEGMENTED STRESS**	
MILD	0 (0%)	MILD	1 (25%)	MILD	2 (75%)
MODERATE	0 (0%)	MODERATE	1 (25%)	MODERATE	0 (0%)
SEVERE	2 (66.67%)	SEVERE	0 (0%)	SEVERE	1 (25%)
EXTREMELY SEVERE	1 (33.33%)	EXTREMELY SEVERE	2 (50%)	EXTREMELY SEVERE	0 (0%)

Table 15: Response from respondents based on level of study (level 200) to the standard DASS-21 questionnaire

LEVEL 200					
DEPRESSION		**ANXIETY**		**STRESS**	
Affected Level 200	57 (64%)	Affected Level 200	58 (65%)	Affected Level 200	33 (37%)
Not Affected	32 (36%)	Not Affected	31 (35%)	Not Affected	56 (63%)
SEGMENTED TOTAL		**SEGMENTED TOTAL**		**SEGMENTED TOTAL**	
MILD	14 (15.73%)	MILD	8 (8.99%)	MILD	9 (10.11%
MODERATE	19 (21.35%)	MODERATE	17 (19.10%)	MODERATE	8 (8.99%)
SEVERE	8 (8.99%)	SEVERE	8 (8.99%)	SEVERE	9 (10.11%)
EXTREMELY SEVERE	16 (17.98%)	EXTREMELY SEVERE	25 (28.09%)	EXTREMELY SEVERE	7 (7.87%)
SEGMENTED DEPRESSION		**SEGMENTED ANXIETY**		**SEGMENTED STRESS**	
MILD	14 (24.56%)	MILD	8 (13.79%)	MILD	9 (27.27%)
MODERATE	19 (33.33%)	MODERATE	17 (29.31%)	MODERATE	8 (24.24%)
SEVERE	8 (14.04%)	SEVERE	8 (13.79%)	SEVERE	9 (27.27%)
EXTREMELY SEVERE	16 (28.07%)	EXTREMELY SEVERE	25 (43.10%)	EXTREMELY SEVERE	7 (21.21%)

Table 16: Response from respondents based on level of study (level 300) to the standard DASS-21 questionnaire

LEVEL 300					
DEPRESSION		**ANXIETY**		**STRESS**	
Affected Level 300	29 (57%)	Affected Level 300	33 (65%)	Affected Level 300	18 (35%)
Not Affected	22 (43%)	Not Affected	18 (35%)	Not Affected	33 (65%)
SEGMENTED TOTAL		**SEGMENTED TOTAL**		**SEGMENTED TOTAL**	
MILD	6 (11.76%)	MILD	6 (11.76%)	MILD	6 (11.76%)
MODERATE	10 (19.61%)	MODERATE	12 (23.53%)	MODERATE	5 (9.80%)
SEVERE	4 (7.84%)	SEVERE	4 (7.84%)	SEVERE	3 (5.88%)
EXTREMELY SEVERE	9 (17.65%)	EXTREMELY SEVERE	9 (21.57%)	EXTREMELY SEVERE	4 (7.84%)
SEGMENTED DEPRESSION		**SEGMENTED ANXIETY**		**SEGMENTED STRESS**	
MILD	6 (20.69%)	MILD	6 (18.18%)	MILD	6 (33.33%)
MODERATE	10 (34.48%)	MODERATE	12 (36.36%)	MODERATE	5 (27.78%)
SEVERE	4 (13.79%)	SEVERE	4 (12.12%)	SEVERE	3 (16.67%)
EXTREMELY SEVERE	9 (31.03%)	EXTREMELY SEVERE	11 (33.33%)	EXTREMELY SEVERE	4 (22.22%)

Table 17: Response from respondents based on level of study (level 400) to the standard DASS-21 questionnaire

LEVEL 400					
DEPRESSION		**ANXIETY**		**STRESS**	
Affected Level 400	26 (55%)	Affected Level 400	30 (64%)	Affected Level 400	16 (34%)
Not Affected	21 (45%)	Not Affected	17 (36%)	Not Affected	31 (66%)
SEGMENTED TOTAL		**SEGMENTED TOTAL**		**SEGMENTED TOTAL**	
MILD	2 (7.69%)	MILD	3 (6.38%)	MILD	1 (2.13%)
MODERATE	12 (46.15%)	MODERATE	11 (23.40%)	MODERATE	9 (19.15%)
SEVERE	6 (23.08%)	SEVERE	7 (14.89%)	SEVERE	4 (8.51%)
EXTREMELY SEVERE	6 (23.08%)	EXTREMELY SEVERE	9 (19.15%)	EXTREMELY SEVERE	2 (4.26%)
SEGMENTED DEPRESSION		**SEGMENTED ANXIETY**		**SEGMENTED STRESS**	
MILD	2 (7.70%)	MILD	3 (10%)	MILD	1 (6.25%)
MODERATE	12 (46.15%)	MODERATE	11 (36.67%)	MODERATE	9 (56.25%)
SEVERE	6 (23.08%)	SEVERE	7 (23.33%)	SEVERE	4 (25%)
EXTREMELY SEVERE	6 (23.08%)	EXTREMELY SEVERE	9 (30%)	EXTREMELY SEVERE	2 (12.5%)

Segmented total for stress had 19% for moderate stress, 8.51% for severe stress, 4.26% extremely severe stress and 2.13% for mild stress. Segmented depression as in mild, moderate, severe and extremely severe along with values for segmented anxiety and segmented stress are indicated in Table 17.

Research question five: What is the correlation between COVID-19 impact on depression, anxiety and stress level of students?

The research question five sought to determine the correlation between impact of COVID-19 impact on depression, anxiety and stress levels of students. The results based on Pearson coefficient and Spearman's rho are presented for depression vs anxiety, depression vs stress, anxiety vs stress and depression vs anxiety vs stress in Tables 18 to 25 and Figures 5 to 8.

Depression vs Anxiety

Figure 5 shows the correlation plot of Depression against Anxiety. The R^2 linear was found to be 0.651, an indication that a positive relationship exists between depression and anxiety. Table 18 illustrates the Pearson Correlation that further shows a coefficient of 0.807, a value demonstrating a very strong linear relationship between depression and anxiety. Similarly, the Spearman's rho of 0.788 showed a strong relationship between Depression and anxiety (Table 19).

Depression vs Stress

Figure 6 similarly showed R^2 linear of 0.767 between Depression and Stress, an indication that as depression increases, so does Stress. Both the Pearson correlation coefficient and the Spearman's rho from Tables 20 and 21 of 0.876 and 0.865 respectively indicate the strong linear relationship between depression and

stress.

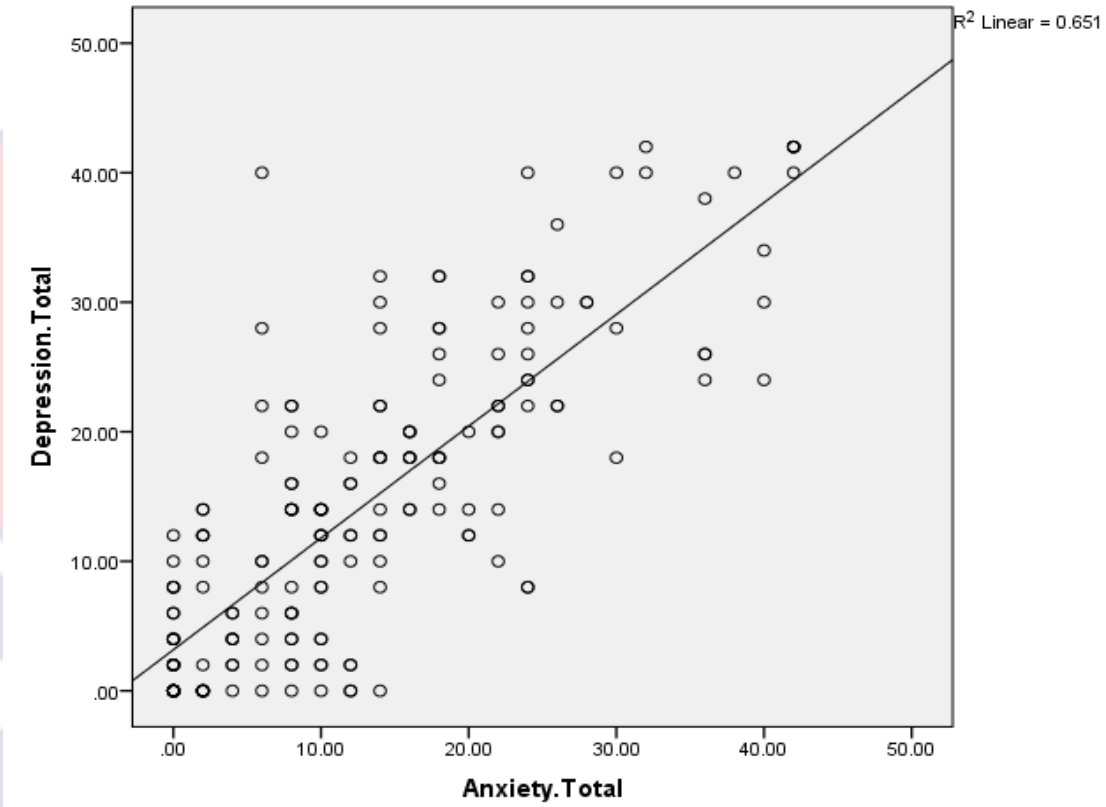

Figure 5: Linear plot of Depression versus Anxiety

Table 18: Pearson correlation between Depression and Anxiety

		Depression.Total	Anxiety.Total
Depression.Total	Pearson Correlation	1	.807**
	Sig. (2-tailed)		.000
	N	193	193
Anxiety.Total	Pearson Correlation	.807**	1
	Sig. (2-tailed)	.000	
	N	193	193

**. Correlation is significant at the 0.01 level (2-tailed).

Table 19: Spearman's rho correlation between Depression and Anxiety

			Depression.Total	Anxiety.Total
Spearman's rho	Depression.Total	Correlation Coefficient	1.000	.788**
		Sig. (2-tailed)	.	.000
		N	193	193
	Anxiety.Total	Correlation Coefficient	.788**	1.000
		Sig. (2-tailed)	.000	.
		N	193	193

**. Correlation is significant at the 0.01 level (2-tailed).

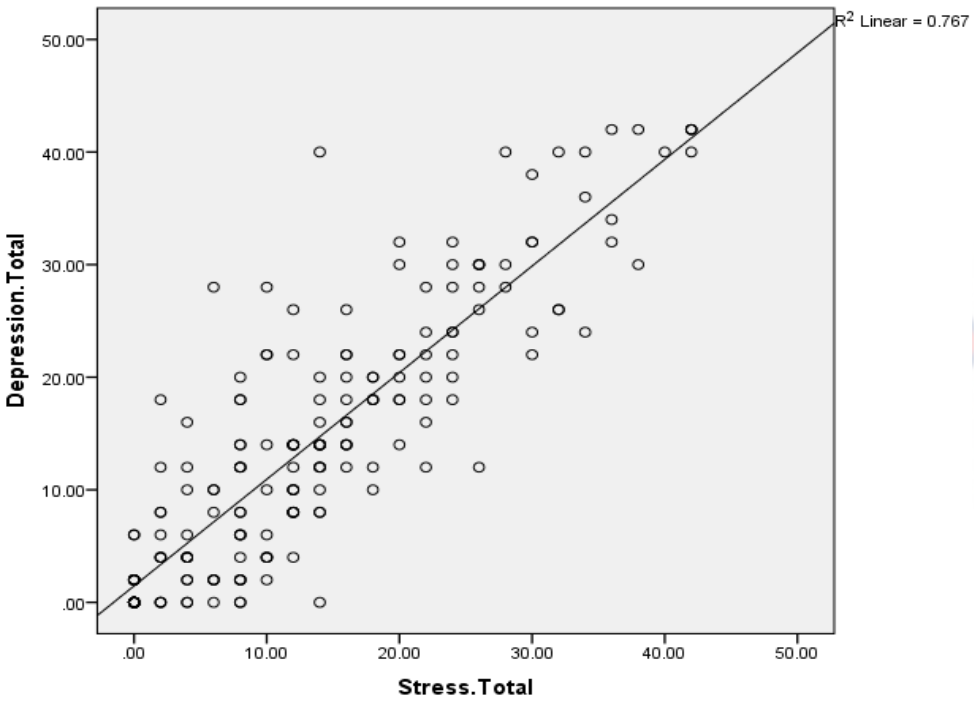

Figure 6: Linear plot of Depression versus Stress

Table 20: Pearson correlation between Depression and Stress

		Depression.Total	Stress. Total
Depression.Total	Pearson Correlation	1	.876**
	Sig. (2-tailed)		.000
	N	193	193
Stress. Total	Pearson Correlation	.876**	1
	Sig. (2-tailed)	.000	
	N	193	193

**. Correlation is significant at the 0.01 level (2-tailed).

Table 21: Spearman's rho correlation between Depression and Stress

			Depression.Total	Stress. Total
Spearman's rho	Depression.Total	Correlation Coefficient	1.000	.865**
		Sig. (2-tailed)	.	.000
		N	193	193
	Stress. Total	Correlation Coefficient	.865**	1.000
		Sig. (2-tailed)	.000	.
		N	193	193

**. Correlation is significant at the 0.01 level (2-tailed).

Anxiety vs Stress

The linear plot observed in Figure 7 with R^2 of 0.718 also indicates a strong relationship between anxiety and stress. The same trend of strong relationship is

observed with the Pearson correlation coefficient of 0.847 and Spearman's rho of 0.809 in Tables 22 and 23 respectively.

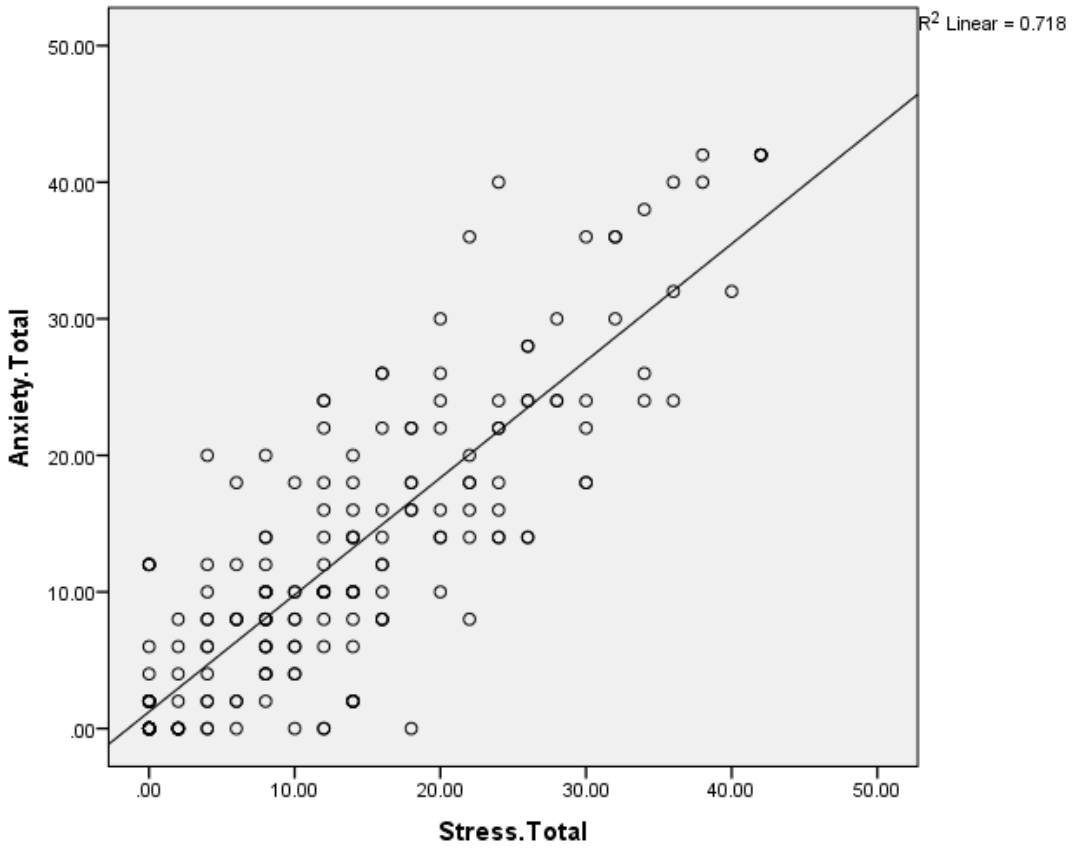

Figure 7: Linear plot of Anxiety versus Stress

Table 22: Pearson correlation between Stress and Anxiety

		Stress. Total	Anxiety.Total
Stress. Total	Pearson Correlation	1	.847**
	Sig. (2-tailed)		.000
	N	193	193
Anxiety. Total	Pearson Correlation	.847**	1
	Sig. (2-tailed)	.000	
	N	193	193

**. Correlation is significant at the 0.01 level (2-tailed).

Table 23: Spearman's rho between Depression and Stress

			Stress. Total	Anxiety.Total
Spearman's rho	Stress. Total	Correlation Coefficient	1.000	.809**
		Sig. (2-tailed)	.	.000
		N	193	193
	Anxiety. Total	Correlation Coefficient	.809**	1.000
		Sig. (2-tailed)	.000	.
		N	193	193

**. Correlation is significant at the 0.01 level (2-tailed).

Depression vs Anxiety vs Stress

The correlation analysis was carried out on the three variables and the R^2 linear of 0.651 observed in Figure 8 depicts a strong relationship among depression, anxiety and stress. Additionally, Tables 26 and 27 show Pearson correlation

coefficients and spearman's rho close to one (1) to support the strong relationship between depression, anxiety and stress.

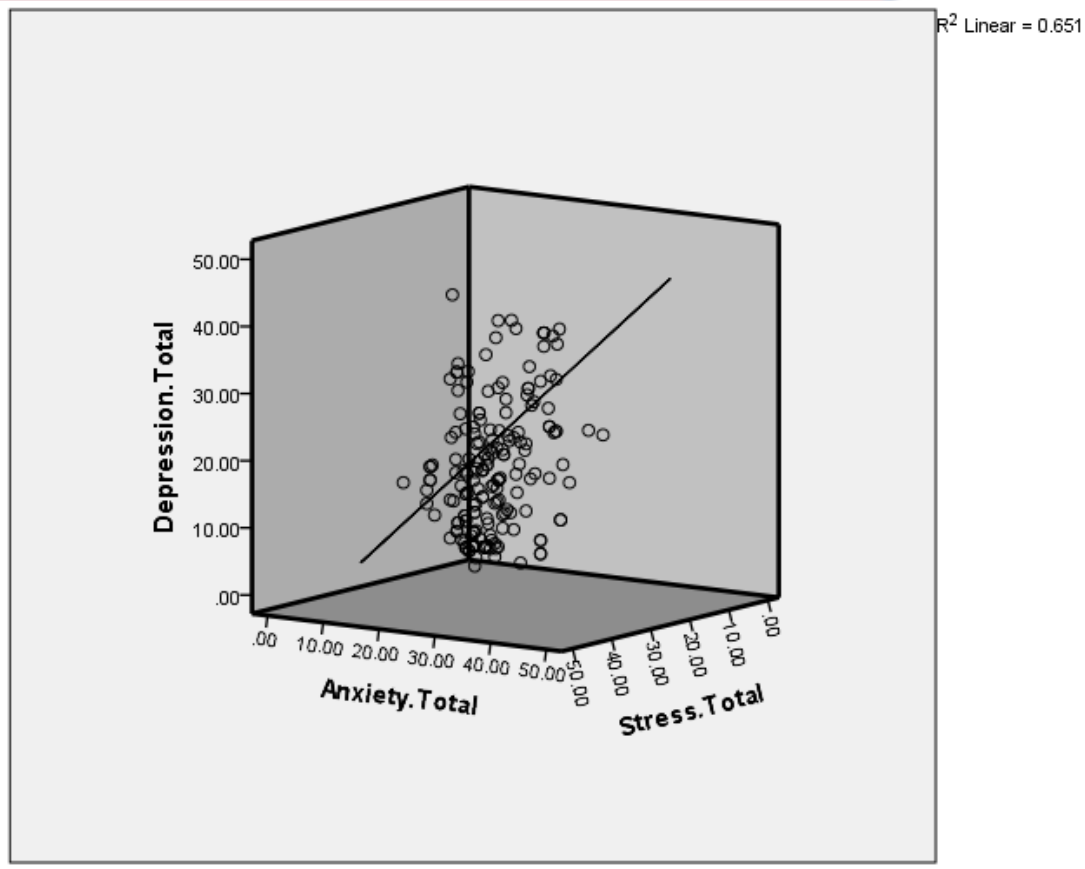

Figure 8: Linear plot of Depression versus Anxiety versus Stress

Tables 24: Pearson correlation coefficients between depression, anxiety and stress.

		Stress. Total	Anxiety.Total	Depression. Total
Stress. Total	Pearson Correlation	1	.847**	.876**
	Sig. (2-tailed)		.000	.000
	N	193	193	193
Anxiety.Total	Pearson Correlation	.847**	1	.807**
	Sig. (2-tailed)	.000		.000
	N	193	193	193
Depression.Total	Pearson Correlation	.876**	.807**	1
	Sig. (2-tailed)	.000	.000	
	N	193	193	193

**. Correlation is significant at the 0.01 level (2-tailed).

Tables 25: Spearman's rho coefficient between depression, anxiety and stress.

			Stress. Total	Anxiety. Total	Depression Total
Spearman's rho	Stress. Total	Correlation Coefficient	1.000	.809**	.865**
		Sig. (2-tailed)	.	.000	.000
		N	193	193	193
	Anxiety.Total	Correlation Coefficient	.809**	1.000	.788**
		Sig. (2-tailed)	.000	.	.000
		N	193	193	193
	Depression.Total	Correlation Coefficient	.865**	.788**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	193	193	193

**. Correlation is significant at the 0.01 level (2-tailed).

Discussion of Results

Levels of psychological impact such as stress, depression, and anxiety on KNUST students during the COVID-19 pandemic.

Accruing evidence indicates that mental health symptoms of psychosis, anxiety, suicidal thoughts, panic attacks, trauma and depression are being experienced by people (Taylor, Agho, Stephen, & Raphael, 2022) as a result of the COVID-19 pandemic. Results from this study adds to the growing knowledge of

the effect of the COVID-19 on the mental health status of the participating students. Other recent studies have shown that mental health outcomes including anxiety, depression and post-traumatic stress symptoms have resulted from COVID-19's effect (Ahmed et al., 2020: Zhou et al., 2020). A recent publication has posited that the prevalence of depression, anxiety and stress, as a result of the COVID-19 pandemic in the general population, are 33.7%, 31.9% and 29.6% respectively (Salari et al., 2020). However, the values recorded in this report are excessively high at 60%, 65% and 37% prevalence for depression, anxiety and stress respectively.

The unexplored nature of novel COVID-19, coupled with its high mortality rate, future concerns and rapid transmission is a cause for depression, anxiety and stress. From the DASS results, depression was observed in 60% of the respondents and segmented in the mild, moderate, severe, and extremely severe states. For mild depression which is characterised by low mood and changes in behaviour that must last for about two weeks (White, 2020), 11% of the respondents fell into this category. These may be due to other causes including but not limited to bad grades, low self-esteem and the prevailing stress imposed by the COVID-19 pandemic. Mild depression expresses in feelings of sadness, sleeping problems, reduced energy, feeling unmotivated and difficulties concentrating among others. In essence, these weaken the body's immune system that consequently increases vulnerability to be infected by the virus. Treatment options available include counselling to treat mild depression. Techniques such as cognitive-behavioural therapy (CBT) may be applied. Life style modification including diet, exercise,

recreational and relaxation activities may be employed. When these fail, drug therapy at early diagnosis may be used (White, 2020).

The results indicated 21.76% of respondents having moderate depression. This is classical for young adults that formed the largest population of the respondents. It has been found that traumatic and stressful life events, inability to cope, heredity and personality are probable cause of moderate depression. Therefore, the presence of COVID-19 could be a direct stimulant for the respondents showing the expression of moderate depression. The symptoms are similar to mild depression but the level of intensity differs with feeling of guilt, feeling hopeless, wanting to be alone and difficulty focusing. Counselling techniques such as CBT, Mindfulness-based Cognitive Therapy (MBCT), Behavioural activation and psychodynamic psychotherapy may be used to help client. It is, however, important that students are made aware of counselling services available on campus so they can access at an early stage. In addition, life style modification as already mentioned for mild depression may be employed while intake of alcohol and tobacco should be limited. Antidepressants may help clients after diagnoses (Aherne et. al., 2017).

Severe depression was recorded among 10.36% of the respondents. COVID-19 represents an upsetting physical health condition and a difficult life event that has capacity to cause severe depression. It must be noted that people with depressed mood, reduced interest in activities that they usually enjoy, significant changes in sleep patterns, fatigue, feelings of worthlessness, difficulty making decisions and suicidal tendencies are showing symptoms of severe depression.

Such studies are important in picking people who may not even know that what they are experiencing are signs of severe depression. The number of respondents observed with severe depression in this study must be taken into serious consideration by authorities as this could lead to other mental health conditions with devastating consequences.

The institution needs to institute measures that will readily pick clients that may be at the edge. Counselling programmes that include CBT, MBCT and psychodynamic psychotherapy will be needed to support clients that may be showing symptoms of severe depression. Clients may have to include life style modification including sleep habits and being in contact with people who can provide emotional support. Alcohol and tobacco consumption must be reduced if not ceased. Anti-depressants may be prescribed upon diagnoses.

A significant number of the respondents have extremely severe depression. With 16.58% of the respondents recording extremely severe depression, it becomes very alarming to the extent that if remedial measures are not put in place in good time, there can be a mental health disaster. This is of public health concern since this condition requires hospitalisation. All respondents with extremely severe depression must be identified as a matter of urgency to avert harm to self and others on the campus. Although the current research focused on the effect of COVID-19 on mental health, other causes of extremely severe depression including unchecked trauma from childhood, work related stress and difficult life event may be a cause of the condition (Midgley, 2017). People with extremely severe depression usually think of death or suicide in addition to all the other symptoms of depression

mentioned earlier but to a very deep extent. Help could come from counselling, life style modification, drug therapy or a combination of these based on diagnosis and the state of the mental health of client.

Recent reports indicate that people who follow COVID-19 news tend to experience more anxiety (WHO, 2020c) as most published news on COVID-19 are troubling and may be associated with rumours, making anxiety levels increased with consistent exposure to COVID-19 information. More respondents showed anxiety (65%) than the other mental health conditions measured in this presentation. With the segmented total for anxiety, people with mild anxiety (9.33%) were fewer compared to the other forms of anxiety. Environmental factors, life stressors, medical factors and anxiety disorders have been identified as causes of mild anxiety. Mostly the symptoms are vague and unsettling as found in uncontrollable feelings of worry, increased irritability, concentration difficulties and sleep apnoea (Adam, 2020). People diagnosed with mild anxiety may receive psychological counselling that will include CBT, psychotherapy or a combination therapy. Life style modification such as sleep habits, relaxation, diet and exercise may be recommended. For drug therapy, some useful herbs like Nervine herbs; oat seed (*Avena* spp.), hawthorn (*Crataegus* spp.), California poppy (*Eschscholzia californica*), lavender (*Lavandula* spp.), chamomile (*Matricaria recutita*), and lemonbalm (*Melissa officinalis*) have been recommended.

Providing accurate and latest information on the progress made in medicine and vaccination can also help reduce anxiety levels (Wang et al., 2019). The percentage respondents with moderate anxiety was 21.76% which is quite high

compared with the general population anxiety prevalence of 31.9% (Abascal & Yarnell, 2004). Moderate anxiety shares similar causes, symptoms and treatment options with that of mild anxiety only that the intensity of the symptoms differs with much gravity on the side of the moderate.

Severe anxiety, on the other hand, was observed in 9.84% of the respondents. Some of the symptoms include panic attacks, restlessness and a feeling of being "on-edge". Severe anxiety is considered pathological and would require in addition to psychological counselling the use of drug therapy employing antidepressants, benzodiazepines and beta-blockers. Life style modification is always recommended as adjunct treatment for severe anxiety (Anderson & Shivakumar, 2013).

The results observed 24.35% prevalence of extremely severe anxiety among the respondents. This is serious among student population and must be immediately attended to. At this level of prevalence, the school authority must be alerted to initiate programmes that will help capture students in this category. The symptoms are extremely severe and require rapid attention to save life and prevent harm to self and significant others.

The current tool measured depression, anxiety and stress levels of the participants with the majority showing signs of anxiety, followed by depression and stress in that order. The results indicated 37% prevalence of stress among the respondents, the lowest case report among the three measured mental health conditions. The segmented total recorded for mild stress was 9.33% and may be caused generally by conditions of illness, family issues, career issues and

bereavement. The presence of COVID-19 with potential to affect anyone is a strong signal for vulnerability to being mildly stressed. The symptoms include anger, fatigue, feeling of insecurity, forgetfulness, nail biting, restlessness and sadness. Counselling, reflexology, aromatherapy, life style modification and the use of vitamin B supplements have been used in the treatment of mild stress.

Moderate stress prevalence was 11.92% and shares close causes, symptoms and treatment with mild stress but with increased intensity. Severe stress at prevalence of 8.81% is characterised by sweating, pain in the back or chest, muscle spasms, nervous twitches, sleep disorders, pins and needles sensations, craving for food, illicit drug, tobacco and alcohol abuse, social withdrawal and relationship problems. Most of these symptoms are common among students. Counselling along with lifestyle modification in exercise, priority management, breathing and relaxation techniques are very helpful in early diagnosis. Drug therapy with anti-depressants and sleeping pills for specific symptoms are highly recommended. Extremely severe stress was 6.74% among the respondents with increased intensity of symptoms compared with severe stress. Early diagnosis is very essential so treatment may be offered.

In the light of the forgoing discussion, the need to strengthen the counselling unit of the institution is key in promoting healthy behaviours among the students while the pandemic lingers on. Due to poor economic outcomes and health challenges in a developing country like Ghana, the need to lessen the psychological effects of the COVD-19 pandemic is necessary to decrease vulnerability to infection (Mazza et al., 2020).

The difference in impact of COVID-19 pandemic on depression, anxiety and stress with respect to gender of students

Recent epidemiological reports indicate that females are more susceptible to depression than males (Lim et al., 2018). The same is known for stress and post-traumatic stress disorders (Sareen et al., 2013). During the COVID-19 pandemic, the prevalence of depression, anxiety and stress have been observed more in women than in men (Wang et al., 2020). This is, however, not the case for all the mental health conditions considered in this study from KNUST. The differences between the prevalence of the mental health conditions between the males and females in this study was statistically not significant. Prevalence of depression was 62% in males and 58% in females even though more females responded than the males.

In the segmented total, it was observed that the greater number of the respondents (both males and females) reported for moderate depression as against the other forms of depression (mild, severe and extremely severe). The results observed for anxiety is consistent with current data that more females are prone to anxiety than men. While 67% prevalence was reported for anxiety in females, the males reported 64%. In the segmented total, both males and females had greater numbers reporting for extremely severe anxiety followed close by moderate anxiety. The case for stress shows 41% and 34% prevalence in males and females respectively. The segmented total for stress indicates higher prevalence for mild stress in males and moderate stress in females.

The relationship that exists in COVID-19 impact on depression, anxiety and stress levels on the basis of age of students

The age range examined in this study was from 18-45. It has been reported that the risk of COVID-19 infection and mortality increases with age (Salari et al., 2020). During the pandemic however, it was observed that the levels of mental health conditions (depression, anxiety and stress) were significantly higher in the age range 21-40 years (Salari et al., 2020). This is consistent with the results obtained in this study where the majority of the respondents were aged between 18-25 years and had 59% having depression, 65% for anxiety and 37% for stress. For the segmented totals, moderate depression and moderate stress were on the higher side but the pathological situation was observed for extremely severe anxiety with 24.32%. The other age ranges (26-35 and 36-45) had similar observations though the number of respondents were empirically low.

The observations are indication that this age group is majorly concerned with their health. The fear that future consequences of the pandemic are unpredictable, coupled with the fact that they will be in direct contact with many people who might be infected with the COVID-19 virus, could be reasons for the levels mental health conditions recorded. The economic hardship imposed by the pandemic is a cause for mental health agitation as most students depend on their parents for sustenance. Redundancies and business closures affecting working parents is a source of worry that leads to depression, anxiety and stress. Furthermore, greater anxiety is apparent in this group of young people due to ease of access to information via social media (Cheng et al., 2014).

The relationship in impact of COVID-19 pandemic on depression, anxiety and stress levels on the basis of students' level of study

The high level of prevalence of mental health conditions observed in this study (where the participants were selected from a higher education institute) has been confirmed by other recent reports that during the COVID-19 pandemic, the levels of depression, anxiety and stress among people with higher level of education has been great. For levels 200 – 400, depression was observed in the range 54% - 64%, anxiety was 64% - 65% and 34% - 35% for stress. The observations for level 100 could be considered outliers since the number of respondents is low (2.6%). The segmented totals clearly indicated more of moderate and extremely severe cases of depression, anxiety and stress. The high health self-awareness of this group of respondents could be a factor for the mental health symptoms observed.

A similar study conducted in China is consistent with this observation (Zhang et al., 2020). Even though not many researchers have conducted work during the pandemic with respect to the level of study, the current has identified students in the 200 level to show a high level of mental health conditions during the COVID-19 pandemic. This in itself suggests the institution of interventions to support this vulnerable group of students. The academic stress coupled with closure of the universities as a result of the pandemic and the precarious nature of the academic calendar is a recipe for mental health agitation among the student population.

Correlation between COVID-19 impact on depression, anxiety and stress level of students

The current study used the Pearson coefficient and Spearman's rho to evaluate the relationship and to ascertain the possible co-morbidities of depression, anxiety and stress. Though fundamental differences exist between the two as in Pearson working with a linear relationship and the Spearman with monotonic relations, the result indicate that the mental health conditions of depression, anxiety and stress share a strong relationship to one another.

It has been reported that as much as 50% of people with major depression also harbour severe anxiety (Salari et al., 2020). One condition easily triggers the other. It is not surprising to note from this study that the high prevalence of depression matches the high prevalence of anxiety and that of stress. The correlation coefficients observed for all the conditions examined using DASS were consistently high among the student respondents. The implication is that the majority of the students may be suffering from more than one of the conditions. This signifies a high state of neglect from authorities and would demand both primary and secondary measures to curb the proliferation of mental health conditions on the university campus.

The traits that signal the presence of more than one condition would include fears or irritable worries that will not diminish, physical symptoms such as rapid heartbeat, fatigue, abdominal pains and headaches. The use of CBT, antidepressants, exercises and relaxation techniques might help people to cope with co-morbid depression, anxiety and stress. The current rate of infection reduction

among the general population is likely to affect the prevalence of depression, anxiety and stress. Report on the H1N1 epidemic (Liao et al., 2014) indicated that anxiety peaked at the apex of the epidemic and decreased with its decline.

Summary of key findings

1. The level of depression, anxiety and stress have been determined among 193 KNUST students using DASS-21 instrument via online survey, Google forms. Results from the data analysis indicated that 60% of the respondents had depression, 65% for anxiety and 37% with stress. All these segmented differently for mild, moderate, severe and extremely severe conditions.
2. The male respondents (87) were less than the females (106) with 62% of the males having depression, 63% with Anxiety and 41% with stress. The female participants had 58% affected by depression, 67% with anxiety and 34 % with stress symptoms during the Covid-19 pandemic. The difference between means of all the mental health conditions affecting the males and female respondents, by conventional criteria, is considered to be not statistically significant.
3. The mean age was approximately 22 and ranged from 18 to 45 with the majority (95.85%) in the range from 18 to 25, the typical age of students. The average psychological impact of COVID-19 relating to age (18-25) is consistent with the general observation in literature
4. Their study levels of the KNUST students were from 100 to 400 with 46.1% from level 200. The average psychological impact of COVID-19 relating to

level of study except for level 100 had prevalence to be consistent with the general observation reported in literature

5. A significant number of students had levels of extremely severe cases of depression, anxiety and stress of 16.58%, 24.35% and 6.74% respectively. The results indicate the presence of co-morbidity of depression, anxiety and stress in KNUST students studied. The current study has identified students who have reported mental health conditions that may require psychiatric, psychological and counselling interventions.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study has been to determine the psychological impact of the COVID-19 pandemic on KNUST students with respect to levels of depression, anxiety and stress. The research questions that guided the study are as below:

1. What are the levels of psychological impact such as stress, depression, and anxiety on KNUST students during the COVID-19 pandemic?
2. What is the difference in impact of COVID-19 pandemic on depression, anxiety and stress with respect to gender of students?
3. What relationship exists in COVID-19 impact on depression, anxiety and stress levels on the basis of age of students?
4. What is the relationship in impact of COVID-19 pandemic on depression, anxiety and stress levels on the basis of students' level of study?
5. What is the correlation between COVID-19 impact on depression, anxiety and stress level of students?

The study employed a cross-sectional research design that sought to determine the mental health status of students at KNUST during the COVID-19. DASS-21 was the instrument that was used for data collection via online survey tool; the Google form. The effects of COVID-19 on mental health conditions of KNUST students as determined for the level of depression, anxiety and stress have been found. The chapter presents the summary in the measured mental health conditions between the sexes, the ages of the students, the level of study and the

correlation between the observed mental health conditions of depression, anxiety and stress. Finally, the conclusions made and the recommendations for further research are presented.

Summary of results

The following are the main findings from the data analysis.

1. From the DASS-21 results, depression was observed in 60% of the respondents and segmented in the mild, moderate, severe, and extremely severe states. More respondents showed anxiety (65%) than the other mental health conditions with some differences among the segmented mild, moderate, severe and extremely severe anxiety. The results indicated 37% prevalence of stress among the respondents, the lowest case report among the three measured mental health conditions. The results obtained from this study has added to the growing knowledge of the effect of the COVID-19 on the mental health status of the participating students. Comparatively higher values have been recorded in this report.
2. Irrespective of recent reports indicating that females are more susceptible to depression than males, this studies' results indicate otherwise with a prevalence of 62 % male having depression as against that of 58% for females. The observed results for anxiety on the other hand is similar to reported literature where more females (67%) had anxiety with 64% for men. The case for stress shows 41% and 34% prevalence in males and females respectively. The difference between males and females' mental health condition was not statistically significant.

3. The age range in this study was from 18-45 with the majority of the respondents in the bracket of 18-25. 59% having depression, 65% for anxiety and 37% for stress were within the ages of 18-25, an observation which is consistent with reported literature. For the segmented totals, although moderate depression and moderate stress were on the higher side, the pathological situation of 24.32% observed for extremely severe anxiety is alarming. The other age ranges (26-35 and 36-45) had similar observations but with low number of respondents.
4. The observed prevalence of depression was in the range 54% - 64%, anxiety with 64% - 65% and 34% - 35% for stress among students at levels 200 – 400. The low number of respondents (2.6%) for level 100 students may be due to not having a good understanding of campus life.
5. The Pearson coefficient and Spearman's rho were used to evaluate the relationship between depression, anxiety and stress. The correlation coefficients observed for all the conditions examined were consistently high among the student. It was observed that the high level of depression matched the high level of anxiety and that of stress. The implication is that the majority of the students may be suffering from more than one of the conditions and therefore multiple approaches may need to be employed in resolving the psychological effects of the COVID-19 on KNUST students.

Conclusions

Based on the findings obtained from the study, the following conclusions can be drawn. The study has determined that there is high incidence of mental health conditions such as depression, anxiety and stress among KNUST students during the COVID-19 pandemic. It may be concluded that during the COVID-19 pandemic, students at KNUST were psychologically impacted. The study

determined that both sexes were affected by depression, anxiety and stress to similar extents with no significant statistical difference between the mental health conditions. It therefore means that attention should be paid to all sexes in the case of instituting any intervention.

The mean age of the respondents was observed to be approximately 22 years and this represents the group significantly affected by the mental health conditions during the COVID-19 pandemic. This suggests that this age group would need greater attention. The greater majority of the respondents were found to be in level 200 of their study at KNUST however the different levels except for level 100 had average prevalence of depression, anxiety and stress to be consistent with the general observation.

The current study has identified students who have reported mental health conditions that strongly correlate with respect to depression, anxiety and stress. Therefore, any psychiatric, psychological or counselling interventions must equally tackle depression, anxiety and stress to the same extent.

Recommendations

1. The high level of depression, anxiety and stress symptoms observed among university students of the College of Health Sciences, KNUST is alarming. The researcher recommends the institution of preventive measures along with the development of appropriate and adequate support services for affected students.

2. The researcher recommends that the provision of intervention by the university management to students affected by the mental health conditions during the COVID-19 must not be gender biased.
3. Due to the greater mental health conditions observed in the group aged 19-25 alluded to ease of access to information via social media (Cheng *et al*., 2014), this researcher recommends the provision of unbiased information about the pandemic from the university management to refute inaccurate information to that age group. This will help reduce the effect of the pandemic on students and improve psychological benefits.
4. Irrespective of the level of study, the researcher recommends that all students receive counselling on the psychological effect of the COVID-19 pandemic to allay fears that result in depression, anxiety and stress.
5. It is highly recommended that any intervention be focused on preventing depression, anxiety and stress to the same extent as all these correlates strongly and might comorbid.

Implications for Counselling

1. Based on the finding of this study, the need to strengthen the counselling units of the institution is key in promoting healthy behaviours among the students while the pandemic lingers on. The provision of counselling intervention must not be gender biased as both sexes are affected to the same extent in terms of depression, anxiety and stress during the COVID-19 pandemic. Counsellors must therefore be abreast with

current issues concerning the pandemic so as to provide tailored help to support students who are affected psychologically.

2. The implication of the high correlation between depression, anxiety and stress is that the majority of the students may be suffering from more than one of the conditions. This signifies the demand for counselling interventions that will curb the proliferation of mental health conditions on the university campus.
3. There should be outreach programmes organized by the counselling centres of KNUST in order to raise awareness about counselling.
4. Positive attitude and optimistic thought patterns related to the COVID-19 pandemic could be protective variables suitable against mental health issues. The introduction of virtual counselling through electronic equipment can limit psychological damages imposed by the pandemic and subsequently improve social stability.

Suggestions for Further Research

1. Such a study is very important and it is strongly suggested that the Counselling units of sister universities conduct similar studies at the beginning of each academic year to gather data from on the effects of the COVID-19 pandemic. This will make for better generalization of the prevalence of depression, anxiety and stress among university students and help identify students who might have mental health conditions. Help might be offered earlier to avert any psychological disaster.

2. The study should include other members of the University community such as the academic and non-academic staff who might have as well been affected by the COVID-19 pandemic
3. Other scales for measuring psychological conditions should be employed to reduce the biases introduced by the use of the DASS-21.

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APPENDICES

APPENDIX A: DATA COLLECTION INSTRUMENT

This study is intended to measure the prevalence of depression, anxiety and stress among university students at various stages of education during the COVID-19 pandemic. The standardised DASS-21 is the scale that is being employed. Respondents are to relate their current experience with the presence of the COVID-19 pandemic to answer the structured questions. Respondents are assured of anonymity and confidentiality as no names will be connected to the responses they provide.

Part 1. Demographic information of participants

1. Gender
    a. Male
    b. Female
2. Age
    a. 18-25
    b. 26-35
    c. 36-45
3. Level at tertiary education
    a. 100
    b. 200
    c. 300
    d. 400

Part 2.

The Standardised DASS-21

The information in this document is not intended as a substitute for professional medical advice, diagnosis or treatment. It is to measure the level of mental health conditions experienced during the COVID-19 pandemic.

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0_ Did not apply to me at all - NEVER

1_ Applied to me to some degree, or some of the time - SOMETIMES

2_ Applied to me to a considerable degree, or a good part of time - OFTEN

3_ Applied to me very much, or most of the time - ALMOST ALWAYS

1. I found it hard to wind down

0

1

2

3

2. I was aware of dryness of my mouth

0

1

2

3

3. I couldn't seem to experience any positive feeling at all

0

1

2

3

4. I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)

0

1

2

3

5. I found it difficult to work up the initiative to do things

0

1

2

3

6. I tended to over-react to situations

0

1

2

3

7. I experienced trembling (e.g., in the hands)

0

1

2

3

8. I felt that I was using a lot of nervous energy

0

1

2

3

9. I was worried about situations in which I might panic and make a fool of myself

0

1

2

3

10. I felt that I had nothing to look forward to

0

1

2

3

11. I found myself getting agitated

0

1

2

3

12. I found it difficult to relax

0

1

2

3

13. I felt down-hearted and blue

0

1

2

3

14. I was intolerant of anything that kept me from getting on with what I was doing

0

1

2

3

15. I felt I was close to panic

0

1

2

3

16. I was unable to become enthusiastic about anything

0

1

2

3

17. I felt I wasn't worth much as a person

0

1

2

3

18. I felt that I was rather touchy

0

1

2

3

19. I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)

0

1

2

3

20. I felt scared without any good reason

0

1

2

3

21. I felt that life was meaningless

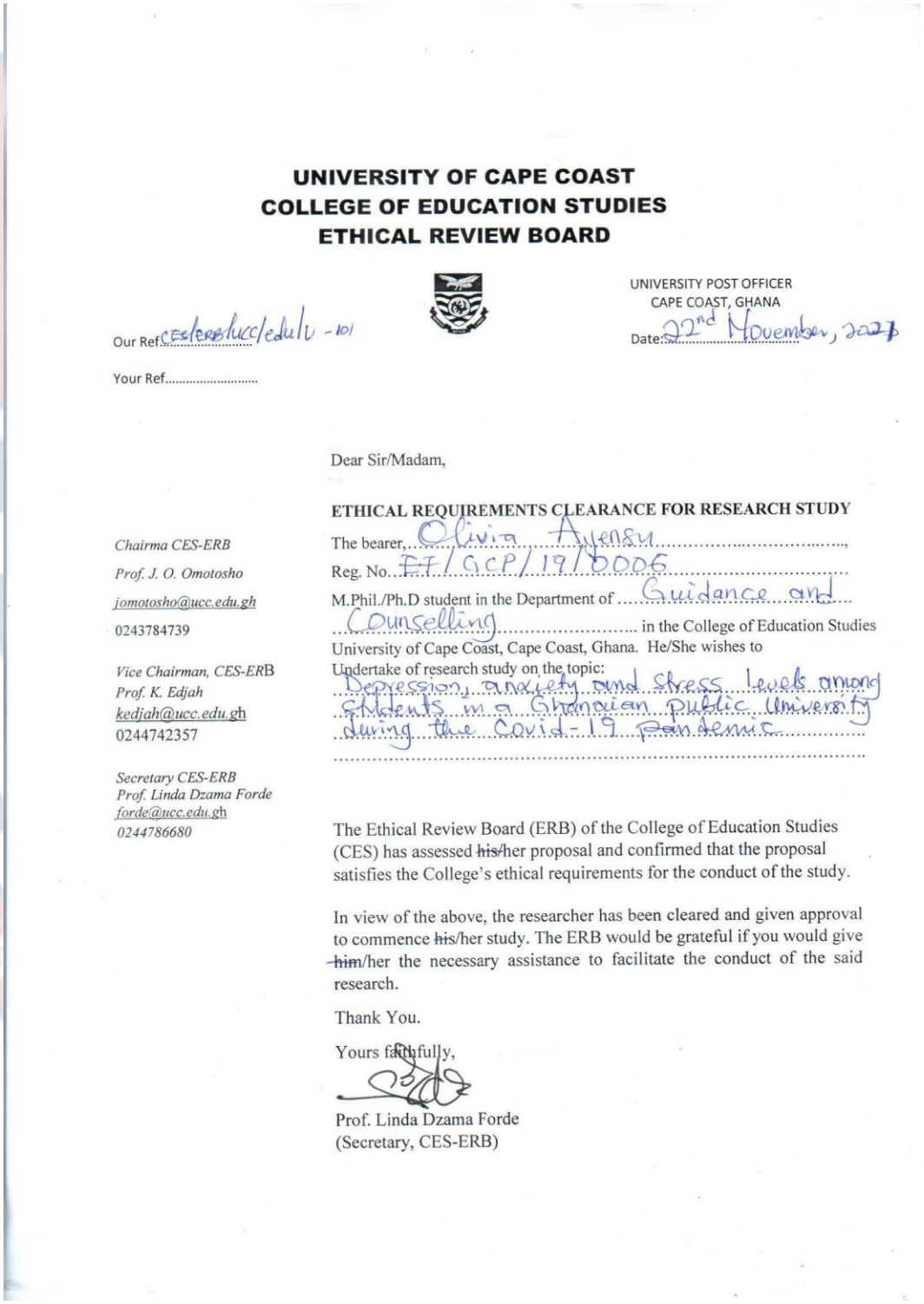
0

1

2

3

APPENDIX B: ETHICAL REQUIREMENTS CLEARANCE FOR RESEARCH STUDY



UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
ETHICAL REVIEW BOARD

UNIVERSITY POST OFFICER
CAPE COAST, GHANA

Our Ref: CES/ERB/ucc/edu/v -101

Date: 22nd November, 2022

Your Ref:

Dear Sir/Madam,

ETHICAL REQUIREMENTS CLEARANCE FOR RESEARCH STUDY

The bearer, Olivia Ayensu
Reg. No. FT/GCP/19/0006
M.Phil./Ph.D student in the Department of Guidance and Counselling in the College of Education Studies University of Cape Coast, Cape Coast, Ghana. He/She wishes to Undertake of research study on the topic:
Depression, anxiety and stress levels among students in a Ghanaian Public University during the Covid-19 pandemic

The Ethical Review Board (ERB) of the College of Education Studies (CES) has assessed ~~his~~/her proposal and confirmed that the proposal satisfies the College's ethical requirements for the conduct of the study.

In view of the above, the researcher has been cleared and given approval to commence ~~his~~/her study. The ERB would be grateful if you would give ~~him~~/her the necessary assistance to facilitate the conduct of the said research.

Thank You.

Yours faithfully,

Prof. Linda Dzama Forde
(Secretary, CES-ERB)

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APPENDIX C: LETTER OF INTRODUCTION

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
FACULTY OF EDUCATIONAL FOUNDATIONS
DEPARTMENT OF GUIDANCE AND COUNSELLING

Telephone: 0332091854
E-mail: dgc@ucc.edu.gh

UNIVERSITY POST OFFICE
CAPE COAST, GHANA

Our Ref: DGC/L.2/VOL.1/224

Your Ref:

30th November, 2021

TO WHOM IT MAY CONCERN

LETTER OF INTRODUCTION

We introduce to you, Olivia Ayensu a student pursuing an M.Phil programme in Guidance and Counselling at the Department of Guidance and Counselling of the University of Cape Coast. As a requirement, she is to submit a thesis on the topic: ***"Depressions, Anxiety and Stress Levels Among Students in a Ghanaian Public University During the Covid-19 Pandemic".*** We are by this letter affirming that, the information she will obtain from your Institution will be solely used for academic purposes.

We would be most grateful if you could provide her with the necessary assistance.

Thank you.

Dr. Stephen Doh Fia
HEAD OF DEPARTMENT