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Developing and Assessing the Psychometric Properties Of a Multidimensional College Mental Health Assessment Inventory: A Mixed-Methods Study

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DEVELOPING AND ASSESSING THE PSYCHOMETRIC PROPERTIES OF A MULTIDIMENSIONAL COLLEGE MENTAL HEALTH ASSESSMENT INVENTORY: A MIXED-METHODS STUDY

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has been approved as meeting the requirement for the Degree of Doctor of Philosophy in College of Education and Behavioral Sciences in School or Department of Applied Statistics and Research Methods

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ABSTRACT

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The purpose of this study was to develop a multidimensional College Mental Health Assessment Inventory (CMHAI) specifically for the college student population.

In the first phase, a conceptual and theoretical review of general existing scales was performed, followed by conducting exploratory semi-structured interviews with twelve participants. From the interviews, I identified themes/constructs (domains) comprised of 52 items to make up the initial inventory. Participants believed these themes to be worthy of note: (a) admission to college with pre-existing mental conditions; (b) students' expectation about college versus the actual experience; (c) college as a new environment brings about feelings of loneliness; (d) ethical issues related to college students seeking mental health support; and (e) publicizing available supports on campus to students. The second qualitative research phase consisted of content and face validity processes on the 52 items developed from phase one, including conducting a readability test, expert reviews, and using think-aloud protocols. The content and face validity resulted in 45 items inventory that was then quantitatively tested in phase three and four.

The third phase consisted of conducting exploratory factor analysis (EFA) on the 45-items inventory to explore, develop and refine the measure. The 45-item inventory was

administered to the traditional college population in the United States (n=220). An EFA was conducted on the data and seven factors were extracted based on Kaiser's criteria of eigenvalue >1 rule (Kaiser, 1960). Five factors out of the seven extracted factors were identified, described, and retained based on factor loading > .40 and with loaded items four and above (Izquierdo et al., 2014). The internal consistency reliability was assessed for each of the extracted factors and were all > .70. The EFA resulted in a 34-item inventory with five factors (subscales). The fourth phase involved using the 34-item inventory from EFA. A different set of data was collected from another sample in the population of study to conduct a confirmatory factor analysis (CFA), which was used to validate how well the hypothesized model from EFA could adequately model scores from the population of study (construct validity).

The results of the model fit information on the second data indicated that the data fit very well with the developed CMHAI model. The internal consistency reliability (Cronbach's alpha) and McDonald Omega reliability were conducted on the CFA data for each of the subscale and the results met the acceptable standards. Considering the results of analyses reported by existing general measures reviewed and from the results of the analyses of this research, the developed CMHAI-34 shows a high promise of being a reliable and valid measure for college students' mental health assessment.

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In the final analysis, this is the result of perseverance. "Perseverance is not a long race; it is many short races one after the other" - Walter Elliot.

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CHAPTER I

INTRODUCTION

Mental health has been defined by World Health Organization (WHO) 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" (2004, p. 47). In addition, the WHO states that mental health is fundamental to our collective and individual ability as humans to think, emote, interact with each other, earn a living, and enjoy life. Multiple social, psychological, and biological factors determine the level of mental health of a person at any point in time. Poor mental health is also associated with rapid social change, stressful work conditions, gender discrimination, social exclusion, unhealthy lifestyle, physical ill-health, and human rights violations (World Health Organization & Calouste Foundation, 2014). College stress experience is one of the associated factors with mental health needs on college campuses in recent years (Pedrelli et al., 2015). According to data from the Healthy Minds Study, in 2007 about 6.6% of students received treatment at college counseling center, in 2017, this number jumped to 11.8% (Eisenberg et al., 2011).

Among college students, mental health problems or illness are not only common, but they often persist for several years. Lack of identification or acknowledgement (denial) of mental health symptoms and/or lack of or inadequate treatment are common problems among college students and may contribute to the persistence of mental health problems in this population. Early identification and treatment of psychopathology and substance use disorders impact the ultimate trajectory of the mental health disorder (Pedrelli et al., 2015).

Also, mental health is burdened with stigmatization and discrimination, among other variables, making it a challenging health issue among college students. Mental health stigmatization has been found by numerous studies to have effects on students with mental health needs. In a study by Kadison and DiGeronimo (2004) to examine whether college students with mental health needs campus experiences differ from the general student population, they reported students with mental illnesses were found to experience greater problems likely associated with symptoms of their illness and perceived discrimination, producing heightened distress and putting them at greater risk for dropping out.

Stigma is the most troubling aspect of psychiatric diagnoses and practice (Thirunavurakasu et al., 2013). A stigma is a negative and often unfair social attitude attached to a person or group, often placing shame on them for a perceived deficiency or difference to their existence. Individuals or groups can apply stigma to those who live a certain way, have certain cultural beliefs, or make lifestyle choices, or to people living with health conditions such as mental illnesses (Zoppi, 2020). Mental illness stigma has been identified by national policy makers as an important barrier to seeking mental health. Reducing barriers to seeking help has particular significance in college student populations for several reasons (Eisenberg et al., 2009). Eisenberg et al. (2009) stated that perceived public stigma was considerably higher than personal stigma. Personal stigma was higher among students with any of the following characteristics: male, younger, Asian, international, more religious, or from a poor family. Personal stigma was significantly and negatively associated with measures of help seeking (perceived need and use of psychotropic medication, therapy, and nonclinical sources of support), whereas perceived stigma was not significantly associated with seeking help.

Mental illness stigma is often used in a broad sense; it takes several distinct forms. Public stigma is defined as negative stereotypes and prejudice about mental illness (such as "people with mental illness are dangerous and unreliable") held collectively by people in a society or community (Corrigan, 2004). Public stigma can be thought of as the aggregate of each individual's stereotypes and prejudices referred to as personal stigma (Griffiths et al., 2004). Individual's perception of public stigma is commonly referred to as perceived public stigma (Corrigan, 2004). Finally, self-stigma occurs when an individual identifies themself with the stigmatized group (people with mental illness, in this context) and applies corresponding stereotypes and prejudices to themself. According to Mesidor and Sly (2014), most of the college students in their study reported that, because of perceived stigma associated with mental health treatment and negative attitudes towards seeking mental health services, they were more likely to rely on religion to deal with mental health issues.

College students with psychosocial issues, college stress, and disabilities from minority and marginalized groups may have unique life experiences (Ibrahim et al., 2020). As a result, when we talk about mental health from college students' perspective, we have to include these narratives that students with these markers may experience. In fact, these unique and specific experiences can alter college students' emotional well-being, psychological well-being, and social well-being, thus increasing the risk of developing a mental illness (Ibrahim et al., 2020). In recent years, universities and colleges have been dealing with substantial challenges posed by the changing mental health needs of today's college students (Kitzrow, 2003).

There have been momentous changes in the demographics of today's college student population, perhaps the greatest change in higher education in recent years (Levine & Cureton, 1998a). Today's college students are increasingly diverse. According to the National Center for

Education Statistics (NCES, 2021), there are around 20 million college students in the U.S., and campus diversity is increasing. In Fall 2019, there were 16.6 million undergraduate students and 3.1 million postbaccalaureate (graduate) students totaling 19.7 million students attending degree-granting postsecondary institutions in the United States, out of which 39.4% were minorities (Asian, Blacks, Hispanic, and American Indians), 5.4% were foreign students, 55.5% were female and 54.3% are white (NCES, 2021).

Furthermore, a review of literature indicated several mental health inventories have been developed in recent decades, but none focused specifically on the college student population. Sharkin (1997) stated there is preponderance of data supporting the trend towards more severe psychopathology in the college student population. Sharkin recommended the use of standardized instruments to assess the incidence of psychopathology and changes in symptomatology over time and to determine which disorders are most likely to be seen at college counseling centers.

Description of this Study

The Institutional Review Board (IRB) approval was obtained before beginning this research. Its purpose was to develop a self-administered mental health measure that covered key domains identified by participants, which can be applied to college students, specifically, the traditional undergraduate student population, to assess the incidence of mental health. Within the context of this research, traditional undergraduate college student population is defined as college students between the ages of 18 and 23 years who pursue their college education immediately after graduating from high school (Johnson, 2020).

This study started with conducting the qualitative research strand of the study which included interviewing selected participants from the population of interest to identify and give

contextual meaning to related merged themes/constructs. I developed the initial inventory based on the emerged constructs, conducted a readability test, and sought out expert reviews on the developed inventory, which was then followed by a think-aloud protocol by selected participants from the population of study. The resulting inventory from the qualitative research phases was quantitatively tested. I used the structural equation modeling (SEM) approaches of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to assess the psychometric properties of the scores obtained from the new inventory. After the completion of this dissertation, further research and testing will continue on the final instrument. A successfully completed measure will be further developed into mobile and desktop apps that can be easily deployed by college mental health professionals to assess the incidence of mental health among college students. It is important to emphasize that further research on validating the inventory developed in this research like convergent validity, multi-group invariance analysis, mobile and desktop apps development are not part of this dissertation research.

Efficient and effective mental health screening instruments are needed to assess the increasing mental health challenges among college students (Pedrelli et al., 2015) to prevent psychological distress, but to the best of my knowledge, there is no existing assessment inventory specifically developed for the diverse students' population as recommended by Sharkin (1997) and there is no multi-dimensional inventory including all the key mental health indicators or domains in one inventory. This study seeks to bridge that gap.

Statement of the Problem

College students' mental health is a significant and growing concern on college campuses across the United States (Lipson et al., 2019). For many years now, college counselors have contended that they are seeing growing numbers of students presenting with problems of a much

more severe nature than traditional developmental or adjustment struggles (Sharkin, 2004). Severe problems have been defined as ones that cause significant disruption to a student's ability to function within the college environment or require mental health care beyond the capacity of the average campus counseling service. Many students who join a university community have lived through a variety of difficulties such as loss of social support, financial stress, and loss of emotional support, among other issues. In these circumstances it would be expected college or university students would exhibit high levels of mental health problems (Sharkin, 1997, 2004).

Soet and Sevig (2006), in their study of college student mental issues, found that the types of psychiatric diagnosis most commonly reported by students were depression, eating disorder, anxiety, attention deficit/hyperactivity disorder, and posttraumatic stress disorder (PTSD). They further argued that prevention is essential for this population, further indicating the need for this research to develop a self-administered multi-dimensional mental health assessment inventory particularly for the college students' population.

As a result of COVID-19, children, adolescents, and college students experienced long duration of quarantine, physical isolation from their friends, teachers, and extended family members, and were forced to adapt to a virtual way of learning (Elharake et al., 2022). Due to this unexpected and forced transition, children and college students may not have adequate academic resources, social contact and support, or a home-learning environment, which may lead to a heightened sense of loneliness, distress, anger, and boredom – causing an increase in negative psychological outcomes (Elharake et al., 2022). Mental health issues may also arise from the COVID-19 disease itself, such as grief from loss of lives of their friends or family members, opportunities, and employment (Bertuccio & Runion, 2020). According to Elharake et al. (2022), additionally, inequities and disparities in the social determinants of health (e.g.,

income status, immigrant background, language barrier, parents' educational background, and access to adequate healthcare) may contribute further to the development of psychological distress among children and college students living through the COVID-19 pandemic.

Rationale of the Study

The first step to addressing the alarming mental health problems among college students' population is prevention through assessment and screening for mental health. The review of literature indicates that existing mental health assessment inventories used for the general population are equally used for the college student's population, mostly containing one or two or at most three mental health indicator variables like addiction, anxiety, depression, or stress etc. Studies have shown that the college student age bracket is the most vulnerable age range, as mental health disorders have their peak onset during young adulthood. Kessler et al. (2007) observed that by the age of 25 years, 75% of those who will have a mental health disorder have had their first onset. Among traditional college students, the significant disruptions associated with attending college may either exacerbate a current psychopathology first manifested in childhood and/or trigger its first onset.

Through my dissertation research, I am developing a college mental health assessment inventory particularly for the college student population that will contain in one inventory subscales for the major mental health assessment indicators such as addiction, anxiety, depression, campus loneliness, stress and suicidal ideation, taking into account the unique mental health challenges faced by traditional college students to serve as an additional tool in addressing the alarming challenges of mental health incidences among college students.

Purpose of this Study

The purpose of this study was to develop a multidimensional College Mental Health Assessment Inventory (CMHAI) specifically for the college student population. Particularly, the study included in one assessment inventory major themes/constructs such as addiction, anxiety, depression, stress, suicidal ideation etc. that emerged from the qualitative research phase of this study. The developed inventory's psychometric properties of the scores obtained from data collected from the population of study (undergraduate college student's population in the United States) were conducted and examined. Additionally, I explored other variables that may serve as additional mental health indicators when assessed together with the major domains identified.

Research Questions

The questions that guided this research are:

Q1 How do college students perceive mental health incidences and its indicators on campuses?

Q2 How do college students describe mental health indicators common on college campus?

Q3 How reliable and valid are scores on each of the measured constructs or variables in the proposed instrument model?

Q4 Overall, to what extent is the proposed college mental health assessment model adequate in modeling scores from the population of interest?

These questions provide an overarching look on the research problem by questions 1 and 2 addressing the qualitative contextual aspect leading to emerged themes/constructs and inventory items generation. Questions 3 and 4 address the quantitative and structural equation modeling elements of the research. In addition to addressing the purpose for this research, these research questions align with the methodological approach and design of the research.

My Story

As a student of Applied Statistics and Research Methods (ASRM), I have become interested in research in the areas of psychometrics, learning and development and the issues of mental health among young individuals. As a result, my interest and approach to this research is of unique passion to me. Since I became a consultant in the ASRM Research Consulting Lab (RCL) helping the University community clients with their research projects together with my research classes, I have had the opportunity of experiencing the importance of assessing the validity and reliability of instruments used to collect data to answer research questions. Throughout this period of my doctoral program, I have become very interested in the psychometrics aspect of research.

Also, as a student in the US who has had two children of my own, the issues of learning and development of young individuals is of great interest to me. Motivated by this interest and my desire to become a teacher after completing my doctoral program, research in the areas of learning and development have become one of my research interests that I have been working on to develop my skills and knowledge towards this goal. Additionally, the issue of mental health, particularly among young individuals and college students is very important to me. The increasing incidence and its effect on the society have increased my interest on research relating to mental health to contribute to the body of knowledge and how to address mental health, particularly among college students, being aware of unique challenges and developmental experiences faced by traditional college students.

Finally, this research came about because of my combined research interests and findings from published related studies on mental health among college students. I believe upon

completing this research successfully, it will contribute in relevant ways in helping to address the increasing challenges of mental health we face today among the college student population.

Summary

To conclude, this chapter provides the study's background and description, problem statement, purpose of the study and research questions. Mental health has been an increasing challenge, specifically on college campuses. Having an additional assessment tool that have all the major mental health assessment indicators in one assessment tool would help mental health and counseling centers professionals to better assess mental health incidence among college students as advances in medicine and technology has led to having more students today in college who would not have been able to attend college a few decades ago.

In Chapter Two, I discuss aspects of the college mental health assessment inventory, including a literature review, my conceptual and theoretical framework, and the hypothesized model that this research is testing. In Chapter Three, I describe the methodology in terms of participants, instruments, research procedures, and the analyses conducted.

CHAPTER II

LITERATURE REVIEW

In this research, I investigated both methodological and contextual questions leading to the development of the College Mental Health Assessment Inventory (CMHAI). In this review of literature, I first discuss what we know about college students' mental health and what we do not know with regards to the topic of this research. Then the theoretical frameworks, relevant constructs, and the hypothesized model from the qualitative research phase that was tested quantitatively are discussed.

College Student Mental Health

There is increasing recognition throughout the world of the need to address mental health as an integral part of improving overall health and well-being (The World Health Organization, 2001). Mental health is fundamental to good health and quality of life, it is a resource for everyday life, and it contributes to the functioning of individuals, families, communities, and society. The World Health Organization (WHO)'s phrase "there is no health without mental health" (WHO, 2004, p. 10) clearly conveys the importance of mental health. Mental health is a term used to describe either a level of cognitive or emotional well-being or an absence of mental disorders (Srivastava et al., 2017). Student mental health is a significant and growing concern on college campuses across the United States, and an estimated one in three students meets criteria for a clinically significant mental health problem (Eisenberg et al., 2013).

The pursuit of a college education can be an extremely challenging experience for young people (Salimi et al., 2021). Due to high work demands and costs associated with college, many

students experience mental health challenges such as mood disorders, anxiety, and substance use disorders (Alonso et al., 2019; Auerbach et al., 2016) that constitute a challenge to students', and overall functioning (Bruffaerts et al., 2018; Lipson et al., 2019). In recent years, concern about mental health conditions has become increasingly prominent on college campuses and a subject of much research (Lipson et al., 2019; Oswalt et al., 2020). Duffy et al. (2019) reported that serious mental health concerns such as suicidal thinking, severe depression, and self-harm behaviors have doubled among college students during the period between 2018 and 2019. The prevalence and severity of mental health issues are increasing among college students, and such issues pose a threat to health and academic performance (Wyatt et al., 2017). Wyatt et al. (2017) went on to state differences in mental health diagnoses were found by classification with first-year students reporting higher rates of self-injury and seriously considering suicide and upperclassmen reporting higher rates of academic impact from mental health factors.

Mental health problems early in life are associated with adverse academic, occupational, health, and social outcomes (Breslau et al., 2008), suggesting that timely and effective treatment may offer substantial long-term benefits. Colleges provide a unique opportunity to identify, prevent, or treat mental disorders because campuses often encompass students' residences, social networks, and many services (Eisenberg et al., 2009).

These mental health problems have always challenged mental health counselors and other professionals who work with students in the school setting and the community. The COVID-19 pandemic increased the impact of these mental health challenges, and as a result, there are additional considerations, as college students were required to adapt to a virtual learning environment, make behavioral changes such as social distancing, and deal with socioeconomic uncertainties (Salimi et al., 2021). A recent analysis of initial intake data gathered from students

who sought counseling services at a large university found that the level of severity of these concerns is much greater than the traditional presenting problems of adjustment and individuation that were seen for college students in counseling center research from the 1950s and 1960s through the early 1980s (Pledge et al., 1998). In general, students are coming to college overwhelmed and more damaged than those of previous years (Levine & Cureton, 1998b). In addition to the rise in serious mental health problems, college and university counseling centers have also been experiencing a sharp increase in the demand for counseling services (Kitzrow, 2003).

Current Demographic of College Students

Perhaps one of the greatest changes in higher education is the demographics of today's college student population (Levine & Cureton, 1998a). Around 19.7 million college students attended higher education institutions in the United States, of whom 12 million are full-time and 7.7 million are part-time. Of the total, 8.5 million are male while 11.3 million are female. Over one million international students were admitted to the US for the 2018/2019 academic year (NCES, 2021).

Just as the demographics of the current generation of college students have changed considerably from the past, so have their needs, including their mental health needs (Kitzrow, 2003). During the last decade, university and college counseling centers have reported a shift in the needs of students seeking counseling services, from more benign developmental and informational needs to more severe psychological problem (Gallagher et al., 2001). Along with the demand for counseling, the severity of mental health problems has increased. A variety of social and cultural factors such as divorce, family dysfunction, instability, poor parenting skills, poor frustration tolerance, violence, early experimentation with drugs, alcohol and sex, and poor

interpersonal attachments may account for some of the increase (Gallagher et al., 2000). The need to provide counseling for such a broad range of students and issues – including multicultural and gender issues, career and developmental needs, life transitions, stress, violence, and serious psychological problems – is one of the major challenges facing college counseling centers, a challenge that can be "daunting" at times (Archer & Cooper, 1998, p. 13). In addition, many psychological disorders such as depression, bipolar disorder, and schizophrenia first manifest themselves in late adolescence or early adulthood (Chisolm, 1998).

Students with emotional and behavioral problems have the potential to affect many other people on campus, including roommates, classmates, faculty, and staff, in terms of disruptive, disturbing, or even dangerous behavior (Kitzrow, 2003). At the more extreme end of the continuum, there is the potential that impaired students may physically harm themselves or someone else. At the very least, the needs of troubled students can be demanding and require extra attention and time from administrators, faculty, and staff (Kitzrow, 2003). Kitzrow (2003) went on to state that mental health problems can have a profound impact on all aspects of campus life: at the individual level, the interpersonal level, and even the institutional level. At the individual level, mental health problems can affect all aspects of the student's physical, emotional, cognitive, and interpersonal functioning. Common symptoms of depression may include disturbed mood, fatigue and low energy, sleep and eating problems, impaired concentration, memory, decision-making, motivation and self-esteem, loss of interest in normal activities, isolation, social withdrawal, and in some cases suicidal or homicidal thoughts (American Psychiatric Association, 1994).

Mental health problems may also have a negative impact on academic performance, retention, and graduation rates. Brackney and Karabenick (1995), researching psychopathology,

academic performance and the role of motivation and learning strategies, found that high levels of psychological distress among college students were significantly related to academic performance. Students with higher levels of psychological distress were characterized by higher test anxiety, lower academic self-efficacy, and less effective time management and use of study resources. They were also less likely to persist when faced with distraction or difficulty and less likely to use effective learning strategies such as seeking academic assistance. They concluded that individuals with high levels of psychopathology have impaired information-processing skills, which are a critical component of academic performance and success. However, when students receive help for their psychological problems, counseling can have a positive influence on personal well-being, academic success, and retention (Kitzrow, 2003).

The increased demand and the severity of student mental health problems may have the most influence on student affairs and counseling center staff, who are on the front lines of dealing with student behavioral problems. Counseling center staff cope with more cases that are serious and heavier workloads and are spread too thinly, thus raising the potential for higher levels of stress and burnout (Rodolfa & Park, 1993), reflecting consistently increased rates of mental health service utilization by US college students as reported by Lipson et al. (2019). The increase trends reflected the results and concerns of many studies and literature on college students' mental health challenges. Having an assessment inventory developed particularly for the student population that addresses the diverse segment, will be an additional tool in the toolkits of universities and colleges' mental health and counseling center practitioners.

From reviewed literature, universities and colleges are dealing with substantial challenges posed by mental health needs of today's college students. According to Kitzrow (2003), students' mental health problems have also affected institutions in terms of legal challenges

related to risk management issues and mental health services provided by the institution. Universities and colleges can respond effectively to the challenges posed by the increased demand for counseling services and the increase in serious psychological problems among the college student population at the institutional level; however, the active support of top-level administrators who are willing to consider mental health needs a priority and provide adequate funding is critical. Philosophically, institutions need to adopt the attitude that student mental health is an important and legitimate concern and responsibility of everyone involved in higher education (including administrators, faculty, and staff), rather than being the sole responsibility of the counseling center.

Counseling centers can also implement a variety of innovative strategies to meet the mental health needs of students and the demand for services. In terms of direct clinical services, these strategies may include offering more immediate and accessible appointments, especially for students in crisis, by providing phone consultations and evening and drop-in appointments. Peer counselors and graduate interns can also be an important resource that allows counseling centers to serve more students. Additionally, an assessment tool in the form of a phone and desktop app that can be deployed to be completed remote to assess the condition of students in need without physically visiting the counselling center or mental health clinic, could help facilitate these efforts like the assessment inventory specifically for college students that this research seek to develop.

It is important for administrators, faculty, and staff to understand the profound impact that mental health problems can have on all aspects of campus life, and to treat mental health issues as an institutional responsibility and priority. Counseling centers can respond effectively to the current challenges if they have the support and commitment of the administration; and if

they take steps to balance the demand for services with existing resources by reviewing priorities, establishing appropriate limits, employing innovative strategies, and encouraging students to practice good self-care to minimize stress and burnout. Obviously, the need for counseling centers has never been greater and they will continue to play an important role in supporting the mission of higher education institutions by providing counseling for students who are experiencing problems and assisting them in achieving their educational and personal goals (Kitzrow, 2003).

Stigmatization of Mental Health Among College Students

Another challenge college mental health has faced is the issue of stigmatization with those seeking help among college students. Beliefs and attitudes about mental illness and treatment are likely to influence an individual's propensity to perceive a need for help as well as an individual's assessment of the costs and benefits of receiving treatment (Eisenberg et al., 2009). Stigma associated with mental illness has been identified as a key attitudinal factor that may impede mental health service use, and stigma reduction is a central objective of national mental health policies (Hogan, 2003). The term mental illness stigma is often used in a broad sense and takes several distinct forms (Eisenberg et al., 2009). Public stigma is defined as negative stereotypes and prejudice about mental illness (such as "people with mental illness are dangerous and unreliable") held collectively by people in a society or community (Corrigan, 2004).

Corrigan et al. (2006) proposed that for an individual, the concepts of stigma often develop sequentially once public stigma is present. An individual becomes aware of public stigma (i.e., perceived public stigma), then forms personal attitudes (i.e., personal stigma) that may or may not concur with perceived stigma; and then the individual determines whether or not

to apply these stigmatizing attitudes to the self (self-stigma). Perceived public stigma may hinder people from using mental health services to avoid possible criticism or discrimination from others. Personal stigma and self-stigma may deter individuals from seeking help if service use implies acknowledgement of one's own mental health problems and if the individual's negative attitudes about people with mental health problems would harm his/her own self-esteem (Corrigan, 2004). Because college students often experience first onset and are unaware that they have mental disorders that would benefit from treatment, it is important to consider how stigma affects individuals who do not necessarily identify themselves as having a mental health problem (Eisenberg et al., 2009).

Several empirical studies have explored how mental illness stigma relates to help-seeking attitudes and behavior. Studies examining people's own stigmatizing attitudes have generally found that higher personal stigma is associated with lower help-seeking among both adults (Cooper et al., 2003) and adolescents (Penn et al., 2005). Mojtabai et al. (2002) found that participants who reported embarrassment associated with mental health treatment were less likely to perceive a need for help or use mental health services, although the study did not distinguish between personal stigma or perceived public stigma. A study by Golberstein et al. (2008) of college students on perceived stigma and seeking mental health care found that perceived public stigma was not associated with past-year service use. Disentangling the relative contributions of these aspects of stigma can improve the understanding of how stigma may affect discrete steps in the help-seeking process. This can inform the development of stigma reduction efforts that are more effectively tailored to increase help-seeking behavior among diverse segments of the college student population.

Eisenberg et al. (2009), stated the discordance between perceived and personal stigma suggests that students have an exaggerated view of public stigma. If this is the case, campus education initiatives could focus on reducing perceived public stigma. For example, a social norms campaign could advertise the fact that 90% of students report that they would not think less of someone who has received mental health treatment. Social norms–based interventions, which aim to alter individual health-related attitudes and behaviors by correcting misperceptions about peers' behaviors and attitudes, have been widely used in campus health promotion campaigns (Wechsler et al., 2003).

The inclusion of major mental health domains in this research is intended to provide mental health and counselling center practitioners some holistic information about their patients in managing the challenges of incidences and facilitating better care for students with mental health needs on college and university campuses.

Existing Measures of Mental Health

Measures of psychopathological symptoms leading to a diagnosis have been especially criticized for their universal application, without attention to their limitations across cultures. Yet, measures are crucial to assess recovery and the performance of services, and to take account of caregivers' and users' views (Bhui et al., 2003). Lack of appropriate treatment of mental health can result in significant negative effects on both short and long term social, economic, and interpersonal outcomes as well as increasing risk for all causes of early age mortality, including suicide (Wei et al., 2016).

A search for existing measures of mental health was conducted on PsycINFO, ERIC, and PubMed. Several mental health measures were found. Common features found among the measures reviewed is that they are all based on a single domain or construct measured such as

anxiety, depression, schizophrenia, or attention deficit hyperactivity disorder (ADHD) among others. Very few were multi-dimensional containing two or three constructs and the population of study for the measure are the general public or a segment of the general public, such as patients or mental health practitioners or psychiatrists. Some examples of the measures reviewed are discussed below.

Gulliver et al. (2012) developed the Depression Literacy (D-Lit) and Anxiety Literacy (A-Lit), for elite athletes with 22 true/false items on depression and anxiety. The age of the participants for an initial study using the instrument was reported as $M = 25.5$, median = 24.5, and range of 18–48. Sample sizes for Gulliver et al.'s study was $n = 52$. The psychometric properties of the scores associated with this measure reported is the internal consistency reliability with the overall results. Internal consistency for the D-Lit study was reported be adequate with a Cronbach alpha coefficient of .70 ($n = 40$). Test–retest reliability for preintervention and 4 weeks postintervention for the control condition was also reported to be adequate ($r = .71$; $n = 12$, $p = .02$). For the A-Lit, internal consistency was reported to be acceptable with a Cronbach alpha coefficient of .76 ($n = 40$), and test–retest reliability for the control condition was reported to be very good ($r = .83$; $n = 12$, $p = .003$). This intervention was also associated with increased depression literacy ($p = .003$, $p = .005$) and anxiety literacy ($p = .002$, $p = .001$) relative to control at postintervention and 3-month follow-up, respectively, and a reduction in depression stigma relative to control at postintervention ($p = .01$, $p = .12$) and anxiety stigma at 3-month follow-up ($p = .18$, $p = .02$). The study concluded by stating this is the first randomized controlled trial (RCT) of an internet-based mental health help-seeking intervention for young elite athletes; the results suggested that brief mental health literacy and

destigmatization improves knowledge and may decrease stigma but does not increase help-seeking. However, since the trial was underpowered, a larger trial is warranted.

A review of Depression Multiple Choice Question (MCQ; Gabriel & Violato, 2009), shows the measure was designed for the general population with 27 multiple-choice items on knowledge of depression. The population in one study of the measure was based on patients and psychiatrists. The ages of the participants in Gabriel and Violato's (2009) study was reported *M* = 43 (*SD* = 11.3), with a range age from 18 to 65. The sample size comprised *n* = 63 patients. For the psychiatrists, the mean age was 52 (*SD* = 11.6) based on only 12 participants. The psychometric properties assessed for scores on the MCQ included internal consistency reliability, content appropriateness, convergent validity-related evidence, structural validity, and factor analysis. The study conducted expert ratings on the relevance of each item for meeting the objective of measuring and testing patient knowledge of depression. The items were rated as follows: 1 as irrelevant, 2 as slightly relevant, 3 as moderately relevant, 4 as significantly relevant, and 5 as highly relevant. The study reported there were no significant differences in ratings among the experts based on their length of experience and there was an overall agreement of 88% among the experts about the relevance of the MCQs to test patient knowledge on depression and its treatments. The majority of the items were rated as highly or significantly relevant (mean = 4.4, *SD* = 0.67, range = 1-4). The results stated there was a significant positive relationship ($r = 0.35$, $p < 0.01$; $r = 0.33$, $p < 0.05$) between having the necessary knowledge about the risks of relapse (subscale #2), being aware of the symptoms of depression (subscale #4) and having knowledge of different biological and psychological treatments (subscale #5) respectively. There was also positive correlation ($r = 0.30$, $p < 0.05$; $r = 0.27$, $p < 0.05$) between

subscale 5 (understanding biological and psychological treatments), subscale 3 (knowledge of etiology and triggers of depression), and subscale 4, (knowledge of symptoms) respectively.

For the reliability assessment for the study, the total test had an internal consistency of 0.68 and although internal consistency for subscales #3, #4 and # 5 were reported to be 0.70, 0.44, and 0.61, subscale #1 (items = 5) and subscale #2 (items = 2) have a much lower internal consistency of 0.11 and 0.32. Some of the items in the two subscales (items = 7) were reported to have good discriminating values that ranged from 0.40 to 0.80 in three out of the seven items. The study reported the low reliability is due to the poor variability among the individual scores on the items within the subscales. For the factor analysis, the study conducted principal component analysis on the 27 MCQs item collected from the psychiatric out-patient participants. The result revealed seven principal components that explain 57.6% of the variance related to patient's responses on knowledge about depression and its treatments.

The Knowledge About Schizophrenia Test (KAST; Compton et al., 2007), was intended for populations of community members, families of people with schizophrenia, police officers, and mental health professionals. The measure has 21 multiple choice questions on knowledge of schizophrenia. The age of the participants for the Compton et al. (2007) study as reported range from M = 37.8 to 44.2 (SD 7.8 to 12.8) for the different groups: community members, families, police officers, and mental health professional that participated in the study. From the information, the ages did not include traditional college students, which is the focus of this study. The sample size comprised n = 144 for community members, n = 77 for family members, n = 170 for police officers and n = 50 for mental health professionals. The psychometric properties of scores from the measure were assessed by internal consistency reliability estimates, evaluation of content appropriateness, criterion/concurrent related validity. For the item analysis conducted,

the study stated items with $p<0.3$ (less than 30% of participants answered the item correctly) were deemed difficult within that sample, and items with $p>0.9$ (more than 90% of the participants answered the item correctly) were considered very easy. This procedure allowed for determining the level of difficulty for each item within each sample. Thus, the final version of the KAST included 18 items after dropping three items.

Internal consistency reliability was assessed with the Kuder–Richardson formula 20 (KR-20). For the overall sample, including all four types of participants, the 18-item version of the KAST, the study reported a KR-20 reliability coefficient of 0.82. The KR-20 coefficients were reported: 0.78, 0.63, 0.45, and 0.73, in the subgroups of community members, family members, police officers, and mental health professionals, respectively. The study reported that validity for the community members scores on the KAST were significantly associated with educational attainment ($p<0.001$) and having known someone with schizophrenia ($p<0.001$). For family members, scores were significantly associated with educational attainment ($p=0.05$), but the difference in scores between family members of patients diagnosed with schizophrenia for <5 years and those of patients diagnosed for ≥5 years was not significant ($p=0.29$), though scores differed slightly in the expected direction. For police officers, scores on the KAST were significantly associated with educational attainment ($p=0.01$).

Additionally, among 152 officers completing the instrument at the beginning and at the end of the week of CIT training, scores significantly improved from pre-test to post-test ($P<0.001$), suggesting that the instrument is sensitive to change resulting from planned interventions. Scores increased in a stepwise fashion across the four subgroups ($F=115.73$; $df=3$, 395; $P<0.001$). Mean scores for community members, relatives, police officers, and mental health professionals were: 9.3±3.8, 10.9±2.9, 14.3±2.0, and 16.4±2.0, respectively. Each post-

hoc Tukey comparison test was statistically significant ($p<0.01$), indicating that the mean score of each group was significantly different from the mean scores of the other groups.

Results are in the expected direction based on educational levels of the four samples. Specifically, 38.5%, 59.7%, 85.9%, and 97.9% completed greater than 12 years of education in the samples of lay community members, family members, police officers, and mental health professionals, respectively. Among 39 family members, KAST scores were directly correlated with scores on the concurrent criterion measure, the KOS ($r=0.48$; $p<0.01$). Thus, the coefficient of determination was 0.23, indicating that, in this sample of family members, 23% of the variance in the KAST was shared by the KOS. The findings demonstrate that knowledge about schizophrenia – a construct with potentially broad applicability in psychosocially oriented schizophrenia research – can be assessed with brief, self-administered, multiple-choice knowledge tests.

The 7-item Generalized Anxiety Disorders Scale (GAD-7; Spitzer et al., 2006) was developed as a screener for generalized anxiety disorder (GAD) in primary care settings. The GAD-7 is a brief self-report scale to identify probable cases of GAD. The study stated that a criterion-standard study was performed in 15 primary care clinics in the United States from November 2004 through June 2005. In all, 2982 subjects were approached and 2739 (91.9%) completed the study questionnaire with no or minimal missing data, 965 patients had a telephone interview with a mental health professional (MHP) within 1 week. The scale development study evaluated its reliability and validity. Also, the divergent validity of each item was assessed by calculating the difference between the item correlations with the 13-item anxiety score and the PHQ-8 depression score.

The study reported the mean (SD) age of the patients as 47.4 (15.5) years (range, 18-95 years). Most participants were female (65%); 80% were white non-Hispanic, 8% were African American, and 9% were Hispanic; 64% were married, 13% were divorced, and 15% were never married; and 31% had a high school degree or equivalent, whereas 62% had attended some college. The study reported that the GAD-7 consists of the 7 items with the highest correlation with the total 13-item scale score (r=0.75-0.85). The receiver operating characteristic analysis with the set of items showed an area under the curve (0.906) as good as scales with as much as the full 13-item set. The 7 items also had the highest rank correlations in the developmental sample (n=1184) and the 2 replication samples (n=965 and n=591). The study reported the internal consistency of the GAD-7 reliability and procedural validity was excellent (Cronbach =.92). Test-retest reliability was also good (intraclass correlation=0.83). The mean (SD) GAD-7 score was 14.4 (4.7) in the 73 patients with GAD diagnosed according to the MHP and 4.9 (4.8) in the 892 patients without GAD. The prevalence of GAD according to the MHP interview was 9% in women and 4% in men. In the entire sample of 2739 patients, the mean GAD-7 score was 6.1 in women and 4.6 in men. The construct validity was reported to have a strong association between increasing GAD-7 severity scores and worsening function on all 6 SF-20 scales. For the factorial validity, the study reported principal component analysis of a set of 15 items that includes the 8 depression items of the PHQ-8 and the 7 anxiety items of the GAD-7 which indicated that the first 2 emergent factors had an eigenvalue greater than 1. 63% of the total variance was explained by the first 2 factors. The varimax-rotated component-matrix clearly confirmed the original allocation of the items to the PHQ scales, with all depression items having the highest factor loadings on 1 factor (0.58-0.75) and all anxiety items having the highest factor

loadings on the second factor (0.69-0.81). The 7-item anxiety scale (GAD-7) was reported to have had good reliability, as well as criterion, construct, factorial, and procedural validity.

The Patient Health Questionnaire 9 (PHQ-9; Kroenke et al., 2001) is the depression module from the full Patient Health Questionnaire (PHQ), a self-administered version of the PRIME-MD diagnostic instrument for common mental disorders. For the study of the PHQ-9, the study reported 6,000 patients to have completed the questionnaire in 8 primary care clinics and 7 obstetrics-gynecology clinics. The study reported that as with the original PRIME-MD, before making a final diagnosis, the clinician is expected to rule out physical causes of depression, normal bereavement, and history of a manic episode. For most analyses, the PHQ-9 score was divided into the following categories of increasing severity: 0±4, 5±9, 10±14, 15±19, and 20 or greater. The study reported the categories were chosen for several reasons. The first was pragmatic, in that the cut points of 5, 10, 15, and 20 are simple for clinicians to remember and apply. The second reason was empiric, in that using different cut points did not noticeably change the associations between increasing PHQ-9 severity and measures of construct validity.

The study reported the internal reliability of the PHQ-9 to be excellent, with a Cronbach's of 0.89 in the PHQ Primary Care Study and 0.86 in the PHQ Ob-Gyn Study. Test-retest reliability of the PHQ-9 was also reported to be excellent. Correlation between the PHQ-9 completed by the patient in the clinic and that administered telephonically by the MHP within 48 hours was 0.84, and the mean scores were reported to be nearly identical (5.08 vs 5.03). For the criterion validity of PHQ-9 assessed by MHP interview, the study reported receiver operating characteristic (ROC) analysis was conducted and showed that the area under the curve for the PHQ-9 in diagnosing major depression was 0.95, suggesting a test that discriminates well between persons with and without major depression. The area under the curve for the 5-item

mental health scale of the SF-20 was reported in the study to be 0.93. The study discussed that data from the two studies totaling 6,000 patients provided strong evidence for the validity of the PHQ-9 as a brief measure of depression severity. Criterion validity was demonstrated in the sample of 580 primary care patients who underwent an independent reinterview by a mental health professional. Construct validity was established by the strong association between PHQ-9 scores and functional status, disability days, and symptom-related difficulty. External validity was achieved by replicating the findings from the 3,000 primary care patients in a second sample of 3,000 obstetrics-gynecology patients and reported similar results was seen in rather different patient populations that suggested the PHQ-9 findings may be generalizable to outpatients seen in a variety of clinic settings.

Theoretical Framework

As can be seen from the preceding review of different measures of mental health, there are different indicators that can be measured individually or as a combination in assessing mental health incidence in an individual. This leads to the understanding that there are different approaches to conceptualizing mental health or well-being, further leading to the widespread agreement that mental health or well-being is best understood as a multidimensional construct, so measures need to reflect this (Marsh et al., 2020). Obviously, it would be convenient if mental health assessment could be conducted using a single construct or better still, a single question but this would not be very informative if mental health is really a multidimensional latent construct. A single construct may not provide useful holistic information about the profile of different components that may indicate the presence of mental illness, and as a result, it could not provide practical management or identification about which components of mental health need to be improved or specific interventions to improve the incidences of mental health, enhancing the

need for a multidimensional approach to measuring mental health among the college student population.

Since mental health determinants include individual, social and societal factors, and their interaction with each other, it is these known risk factors that are addressed in effective mental health promotion programs (Sturgeon, 2007), as reflected in the emerged hypothesized study model from the qualitative research phase of this study for the college student population. Mental health needs to be understood from biological, psychological as well as sociocultural perspectives (Kendler, 2008); thus, to prevent mental illness and promote mental health, there is a need to simultaneously target several multilayered factors (World Health Organization, 2012). As suggested by Kendler (2008), rather than adopting a single explanatory perspective to mental illness, as is often advocated in traditional theories of science, etiological models for psychiatric disorders need to be pluralistic or multilevel. A range of compelling evidence indicates that these disorders involve causal processes that act both at micro levels and macro levels, that act within and outside of the individual, and that involve processes best understood from these biological, psychological, and sociocultural perspectives. However, in order to clearly understand and act upon these multilayered and interacting factors that determine mental health, theory is crucial. Theory offers understandings of the causal pathways between various factors and health and disease and can thus guide the planning and design of mental health interventions. Clearly the importance of theories guiding the complex and multifaceted pathways in mental health cannot be over emphasized.

In addition, an ecological approach to public mental health offers a way to simultaneously emphasize both individual and contextual systems and the interdependent relations between these two systems, and thus offers a variety of conceptual and methodological

tools for organizing and evaluating health-promotion interventions (Stokols, 1996). Ecological theories emanate from many disciplines, but health research has mainly been influenced by psychology, including community and developmental psychology (Richard et al., 2011). The developmental psychologist, Urie Bronfenbrenner, stands out as one of the most influential contributors to ecological thinking in health research. Influenced by his mentor, Kurt Lewin, Bronfenbrenner (1977) started to develop his ecological theory as a new theoretical perspective for understanding human development. His theory underwent significant changes since its first inception during the late 1970s, as he constantly revised the theory until his death in 2005. Even though Bronfenbrenner developed his theory to understand human development, it has been extensively applied in many other fields including health research (Richard et al., 2011). The evolution of Bronfenbrenner's theory has been described in different phases (Rosa & Tudge, 2013): from an ecological approach to human development during the initial phase (1973–1979), followed by a stronger emphasis on the role of the individual and developmental processes during 1980–1993. Finally, in the last phase (1993–2006), the Process–Person–Context–Time model (PPCT) was developed and described as the most appropriate research design for the theory.

Eriksson et al. (2018) stated Bronfenbrenner's theory is clearly appealing as a conceptual tool for guiding interventions within the field of public mental health. However, the implications that can be drawn for public mental health policy and practice might differ depending on what concepts (i.e., early, or later) of the theory are utilized, and how these concepts are applied. Table 2.1 described the three different phases of analytical focuses for the Bronfenbrenner's theory with regards to mental health research. Phase three key concepts, core of analysis and basic assumption in relation to mental health aligns with the theoretical framework of this study.

Table 2. 1

Analytical Phases of Bronfenbrenner's Theory with Regards to Mental Health Research

Bronfenbrenner's theory			
	Phase 1	Phase 2	Phase 3
Key concepts	Ecological systems – *Micro, Meso, Exo, Macro* Ecological transitions	Chronosystems	Proximal processes PPCT model–Process–Person–Context–Time Model
Core of analysis	How different ecological systems and interactions within and between these systems affect the individual and the outcome in focus	How biological and psychological personal characteristics interplay with context, in particular the immediate face-to-face environment, over time	How proximal processes influence the individual and the outcome in focus and how these processes are influenced by personal characteristics and the context in which they occur
Basic assumption in relation to mental health	Understanding an individual's mental health requires a pluralistic and multilevel perspective	Genes interacts with environmental experiences in determining mental health outcomes	Proximal processes are the most powerful predictors of mental health outcomes

Note. This table shows compares the three different phases analytical focuses (In public domain).

Bronfenbrenner's theory has been used within the public mental health field and to analyze mutual interactions between the individual and the context (Tudge et al., 2009) by considering interactions within and between different ecological systems, which can come up with valuable results for guiding public mental health interventions. The use of the theory offers a way to simultaneously focus on intrapersonal and environmental factors and the dynamic interplay between these factors in determining mental health (Eriksson et al., 2018). This way of using the concepts of the theory therefore corresponds very well to the ecological ''needs'' within public mental health for understanding the complexity of mental health problems, including social inequality in health and the effects of place on health (McLaren & Hawe, 2005). In addition, using concepts of Bronfenbrenner's theory in this way is well in line with a life course and social determinants of mental health perspective that emphasizes how mental health is shaped not only by individual factors but to a great extent by the social, economic and physical environments in which people live throughout their lives (WHO & Calouste Gulbenkian Foundation, 2014).

From the literature review above, it can be appreciated that the majority of the mental health assessment tools in use were developed for the general public and mostly with one mental health indicator. Also, from the theoretical framework review, the importance of a holistic assessment inventory for a complex and challenging issue like the increasing mental health needs among the college student population is apparent.

Current Research Model Emerged from the Qualitative Research Strand

For this research, the review of literature and theoretical framework on mental health assessment inventories and the themes/constructs that emerged from the exploratory semi-structured interviews provided the basis for the developed CMHAI hypothesized model that is tested and assessed for psychometric properties in this study. The components of the emerged model tested are discussed next.

Addiction

The use of alcohol and illicit drugs peaks during young adulthood and slowly declines with age (Substance Abuse and Mental Health Services Administration, 2013). Therefore, it is not surprising that the most prevalent problem among college students is the presence of substance use disorders. According to Slutske (2005), approximately one in five college students meet the criteria for alcohol use disorder (AUD) representing 12.5% alcohol dependence and 7.8% alcohol abuse. Another hazardous behavior common among college students is binge drinking, defined as a pattern of drinking alcohol that brings blood alcohol concentration (BAC) to 0.08-gram percent or above (≥5/4 for men/women in 2 hour) on more than one occasion within the past 6 months (Courtney & Polich, 2009). Nearly half (44%) of college students binge drink, and one in five engages in this behavior frequently (Wechsler et al., 2002). Binge drinking

is considered the number one public health hazard and the primary source of preventable morbidity and mortality for college students in the USA.

Among college students, alcohol consumption is associated with motor vehicle accidents (another leading cause of death in this age group), accidental injuries, unsafe sex, sexual assaults, and poor classroom performance, as well as impairments in prefrontal cortex functions such as memory and attention (Hingson et al., 2005; Marlatt et al., 1998). Furthermore, many college students who are heavy drinkers continue to exhibit substance use-related problems after college (Johnston et al., 2007) and later develop an alcohol use disorder (Jennison, 2004). In addition to substance use and hazardous alcohol use, college students often engage in non-medical use (or misuse) of prescription medications, for example, taking prescription medications without a prescription or taking more than prescribed. According to the National Survey on Drug Use and Health (Substance Abuse and Mental Health Services Administration, 2013), approximately one in ten young adults reported non-medical use of pain relievers. Data suggest that the most commonly misused medications among college students include opioids, benzodiazepines (sedative/hypnotics), and amphetamine/methylphenidates (stimulants), with 5–35 % of college students having misused stimulants (Wilens et al., 2008).

Suicidal Ideation

Suicidal ideation refers to the act of thinking about, considering, or planning suicide. Suicidal ideation has risen in prevalence amongst college-age students (Garlow et al., 2008). Garlow et al. (2008) stated that 11.1% of students reported having suicidal ideation within the past four weeks of the study and 16.5% of students attempted suicide or had a self-injurious event at least once in their lifetime. Suicidal ideation is associated with symptoms of depression, and students who reported current suicidal ideation had more of the severe depression symptoms.

Suicidal behavior is an area of psychological disturbance associated with potentially severe mental and/or physical health outcomes. Suicidal behavior may be categorized to include suicide completion, suicide attempts, and suicidal ideation (Reynolds, 1991).

Campus Loneliness

Loneliness is defined as a distressing feeling that accompanies the perception that one's social needs are not being met by the quantity or especially the quality of one's social relationships (Hawkley et al., 2008). Hawkley and Cacioppo, (2010) stated that as a social species, humans rely on a safe, secure social surround to survive and thrive. Perceptions of social isolation, or loneliness, increase vigilance for threat and heighten feelings of vulnerability while also raising the desire to reconnect. They went on to state that implicit hypervigilance for social threat alters psychological processes that influence physiological functioning, diminish sleep quality, and increase morbidity and mortality. Loneliness has been associated with objective social isolation, depression, introversion, or poor social skills. However, studies have shown these characterizations are incorrect, and that loneliness is a unique condition in which an individual perceives himself or herself to be socially isolated even when among other people (Cacioppo & Cacioppo, 2018) which is the case of some college students' experience as campuses are seen to be full of activities and students, yet some students feel lonely and isolated. Furthermore, human longitudinal studies and animal models indicate that the adverse effects of loneliness are not attributable to some peculiarity of individuals who are lonely; instead, they are due to the effects of loneliness on ordinary people (Cole et al., 2015).

Loneliness is a common problem among college students, especially those who are beginning their freshman year. In fact, many would say that it is to be expected. But that does not make it any easier to cope with. Not only is it a difficult experience to weather, but many college

students do not feel comfortable talking about or even admitting to their feelings. Loneliness in college students often presents itself as feelings of sadness, isolation, and disconnect. Students feel alone at various points throughout college often triggered by the unfamiliarity of a new routine, uncertainty about their education or major, isolation from family and friends, and lack of friendships and connections if they are new to college.

Depression

Another common mental health problem among college students as emerged from the qualitative phase of this research is clinical depression, with prevalence rates in college students of 7 to 9% (Eisenberg et al., 2013). Zisook et al. (2007) found that over half of all cases of depression had a first onset during childhood, adolescence, or young adulthood. Depression causes feelings of sadness and/or a loss of interest in activities an individual once enjoyed. It can lead to a variety of emotional and physical problems and can decrease one's ability to function at school, work or at home. Depression is now recognized as occurring in children and adolescents, although it sometimes presents more prominently with irritability than low mood.

Time at college can be stressful, and a person may be dealing with other lifestyles, cultures, and experiences for the first time. Some students have difficulty coping with these changes, and they may develop depression, anxiety, or both as a result. Symptoms of depression in college students may include difficulty concentrating on schoolwork, insomnia, sleeping too much, a decrease or increase in appetite avoiding social situations and activities that they used to enjoy. Similarly, others have shown an elevated risk for mood disorders beginning in the early teens increasing with age in a linear fashion. In the National Comorbidity Survey-Replication study, Kessler et al. (2005) reported that one out of every five individuals with depression had their first episode by the age of 25 years. The onset of bipolar affective disorder (BAD) appears

to follow a similar trend. Approximately 3.2% of college students meet the criteria for BAD (Blanco et al., 2008). An emerging literature has shown that the majority of adults with BAD have the onset of their disorder in child and adolescent years, with at least a third of adults with BAD having their onset before the age of 12 years (Perlis et al., 2009).

Given the uniqueness of college students, there is a need to outline critical issues to consider when working with this population (Pedrelli et al., 2015). In particular, counseling centers are in need of psychiatrists with expertise in treating traditional as well as non-traditional college students, two groups with specific age-related characteristics and challenges (Pedrelli et al., 2015). Most mental health disorders have their peak onset during young adulthood. Kessler et al. (2007) observed that by the age of 25 years, 75% of those who will have a mental health disorder have had their first onset. Among traditional students, the significant disruptions associated with attending college may exacerbate current psychopathology that first manifested in childhood and/or trigger its first onset.

Stress

Stress can be defined as any type of change that causes physical, emotional, or psychological strain. Stress is a body's response to anything that requires attention or action (Scott, 2020). Attending college can be a stressful time for many students. In addition to coping with academic pressure, some students have to deal with the stressful tasks of separation and individuation from their family of origin while some may have to attend to numerous work and family responsibilities. In this context, many college students experience the first onset of mental health and substance use problems or an exacerbation of their symptoms. When improperly managed, the stress response may lead to a variety of medical, psychological, and behavioral

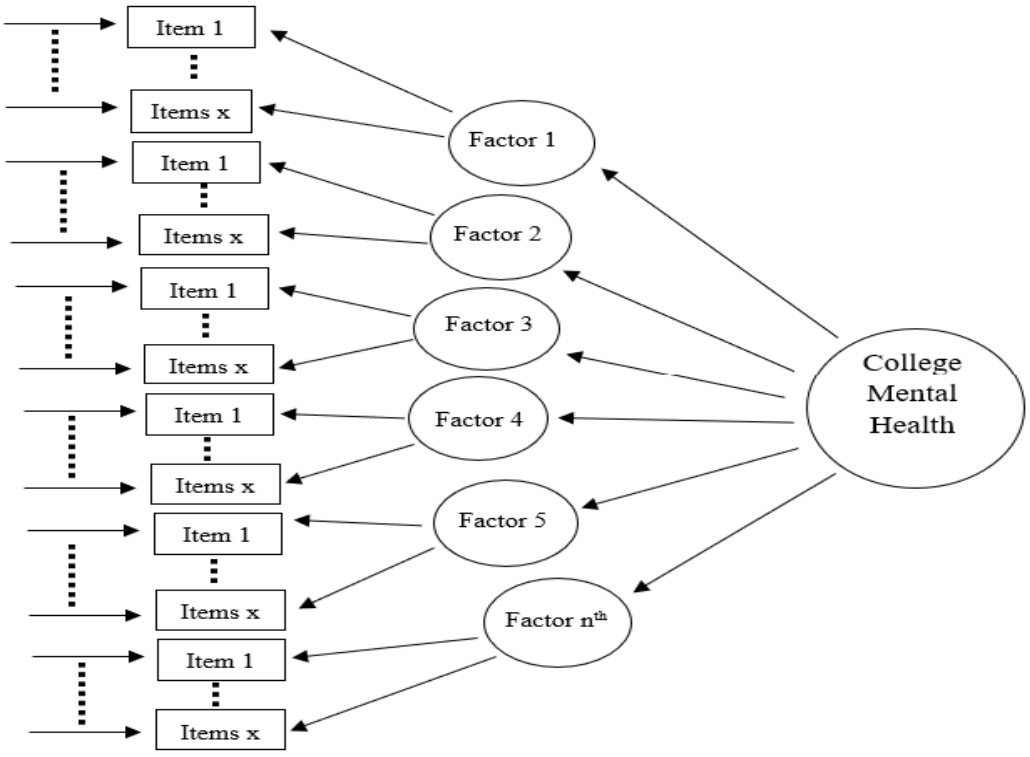
health problems. These problems range from cigarette smoking, alcohol and drug abuse, violence, and family conflict to insomnia, heart diseases, cancer, and ulcers (Quick et al., 1987).

Hypothesized College Mental Health Assessment Inventory Model

From the exploratory semi-structured interviews emerged themes/constructs and substantiated by literature, Figure 2.3 below shows the proposed model of the inventory development and psychometric testing. This exact model has not been tested previously, is a proposed model based on the exploratory interview and the literature discussed above that provides support for its development in this study.

Figure 2. 1

Conceptual CMHAI Latent Variable Model



Note. This figure shows conceptual college mental health assessment inventory (CMHAI) model.

Summary

This dissertation research study seeks to develop a self-administered multi-dimensional CMHAI with the mental health indicators or domains as emerged from the qualitative research component specifically for the college student population. The goal is to provide a more comprehensive mental health measure for the college student population bearing in mind that a tool whose use has been supported by multiple psychometric evaluations will help to accurately measure the incidence of current mental health needs among college students. Additionally, such a tool can be made available to college counseling center professionals and mental health practitioners to assist in addressing the ever-increasing need for mental health support on college campuses.

CHAPTER III

METHODOLOGY

This chapter focuses on the various methods that is used in the different steps involved in instrument development. In the following sections I discuss the study epistemology, methodological framework and methodology, involving qualitative and quantitative phases, participants, instruments, procedures and finally, the coding of the data and the analyses conducted.

Epistemology

Epistemology refers to beliefs about knowledge and how knowledge is constructed. It is one part of the philosophical assumptions that influences the methodologies and methods researchers consider appropriate (Crotty, 2020). The mixing of research methods requires an epistemological framework that embraces the reality uncovered by different research methods (Mackenzie & Knipe, 2006). The transformative paradigm provides a philosophical framework that focuses on ethics in terms of cultural responsiveness, recognizing those dimensions of diversity that are associated with power differences, building trusting relationships, and developing mixed methods that are conducive to social change (Mertens, 2012). The transformative epistemological assumption addresses the nature of knowledge and the relationship between the knower and that which would be known in terms of conducting research. It also raises questions about the nature of knowledge in terms of power and privilege.

Researchers cannot escape epistemology, because every decision they make – their choice of methodology, the method they choose to conduct their research, the form in which

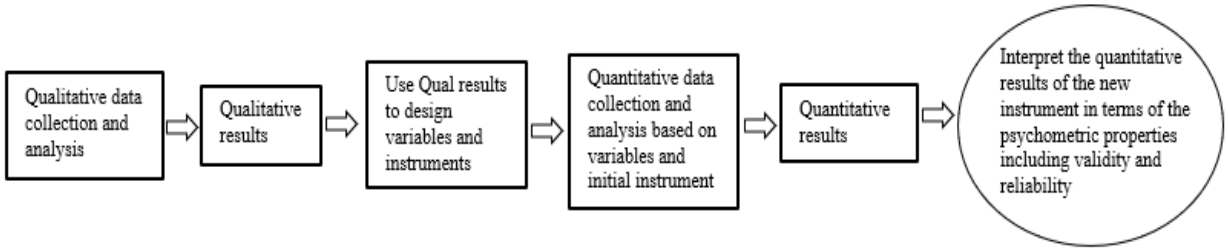
their data is represented, and even their value judgment of their data – is based on their understanding of what constitutes knowledge (Carter & Little, 2007). Furthermore, adopting the transformative epistemological lenses gives a voice to the population of interest on how they see and are affected by the complex issue of mental health and in particular the college student population in the United States.

Methodology: The Mixed Methods Exploratory Sequential Design

In this inventory development research, I used the exploratory sequential design approach (Creswell & Clark, 2017) as shown on Figure 3.1. Mixed methods research (MMR) encourages the use of multiple world views and a combination of methodologies to provide a practical research approach for investigating complex problems and systems. MMR is important because of the complex processes that need to be addressed in instrument development study like in this research of CMHAI development. The rise of interest in qualitative research and the practical need to gather multiple forms of data for diverse audiences for which a combination of both qualitative and quantitative data can provide the most complete analysis of the research problem (Sadan, 2014).

Figure 3. 1

Mixed Methods Exploratory Sequential Design

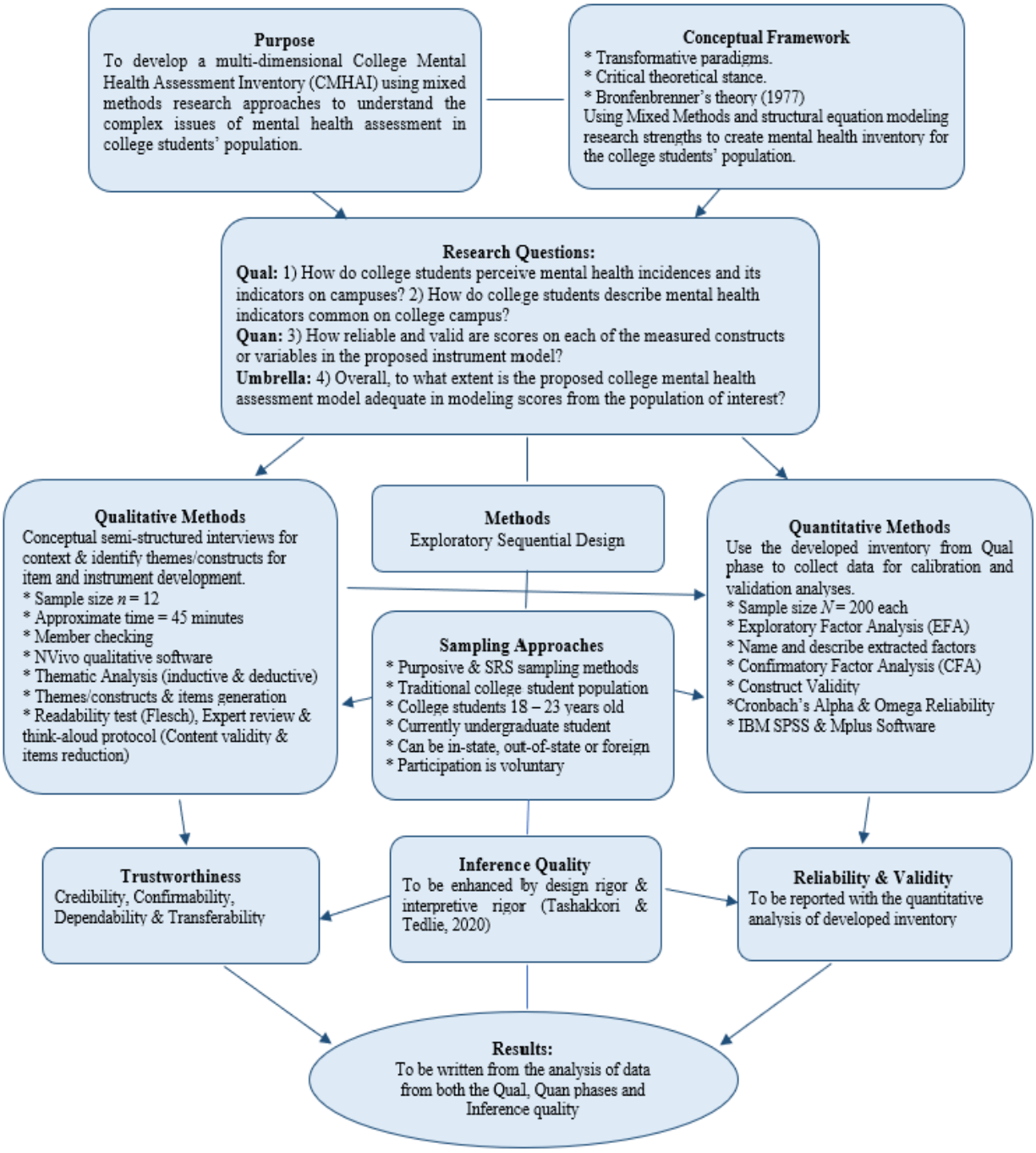


Note. This figure shows the research design implementation steps.

In research, the selected research methodology outlines and guides the research design, which contains established methods to reach the desired research outcome (Clark & Ivankova, 2016; Crotty, 2020). The MMR exploratory sequential design aligns with the purpose of this research, which is to develop the College Mental Health Assessment Inventory (CMHAI). As shown on Figure 3.1, the exploratory sequential design begins with and typically prioritizes the collection and analysis of qualitative data in the first component leading to emerged themes/constructs. Building from the exploratory results, the researcher designs the quantitative feature based on the qualitative results (in this case, themes/constructs identification, items, and instrument development) and in the second phase the investigator quantitatively tests the features of the new measure. The researcher then interprets how the quantitative results build on the initial qualitative results or how the quantitative results provide a clear understanding because they are grounded in the initial qualitative perspectives of participants (Creswell & Clark, 2017). Figure 3.2 shows the Methodological Concept Map reflecting the overall research methodology and methods in the different strands of the MMR exploratory sequential design.

Figure 3. 2

Methodological Concept Map



Note. This figure shows various methods used. Qual is qualitative and Quan is quantitative.

The research started with the collection of qualitative data through semi-structured interview of selected participants from the population of interest on the research problem in the first component of the study for contextual perspectives, emerged themes/constructs, item development and exploration of content validity. Informed by the qualitative research, the second component of quantitative research strand was conducted which involved two steps – scale development (calibration) and scale evaluation (validation) using exploratory factor analysis (EFA) and a structural equation modeling (SEM) approach utilizing confirmatory factor analysis (CFA). The instrument calibration involved extraction of factors based on Kaiser's criteria (eigenvalue > 1: Kaiser, 1960). Next, the retained extracted model from the calibration was used to collect a different set of data from the population of study and tested for construct validation of the inventory model.

Methods

This research started with the collection of qualitative data through interviews. In instrument development, it is standard practice to either conduct interviews and/or focus groups with members of the target population to help refine the definition and contextual understanding of the emerged constructs in order to supplement what is known about the research problem(s) based on the review of literature. In addition, items of the CMHAI are developed based on the emerged constructs from the qualitative interviews, followed by the content validity processes of a readability test, expert reviews and think-aloud protocols. The Flesch Readability Ease (FRE; Flesch, 1948) was first conducted on the developed instrument items to assess the grade level education required to be able to read the developed inventory text easily. Next was the expert review of the inventory items conducted by five mental health professionals. This was followed by a think-aloud protocol (Fonteyn et al., 1993) by three participants selected from the

population of study. There was no compensation for participation in either the expert review or the think-aloud protocol. The only cost was the time spent on the review and providing feedback. The developed inventory items were revised based on the expert reviews and the think-aloud protocol exercises. Then the revised inventory was quantitatively tested using EFA and structural equation modeling CFA (Widhiarso & Kozeny, 2013). The various methods and procedures are described in greater detail below.

Participants

The Institutional Review Board approval (Appendix B) was received before this research started. This research was conducted in the United States. The population of interest was the college student population. The inclusion criteria were: 1) participants must be between ages of 18 and 23 years of age; 2) currently be an undergraduate student at a college or university in the United States; 3) may be an in-state, out-of-state, or a foreign student; and 4) participation was voluntary. The sampling approaches were purposive, including the use of snowball sampling methods for the qualitative component of the study and simple random sampling for the quantitative strand of the research. With the sampling frame defined, participants were contacted through email and in person, inviting them to participate in the research. The reason for using the random sampling approach for the quantitative research phase was to ensure participants from the population of study sampled were a fair representation of the population to ensure the results of the analysis were reliable. Participants came from a population that is not vulnerable.

Qualitative Strand Participants

The qualitative strand comprised phases one and two. The participants for the qualitative part were recruited through email and in-person from the population of study. They were also given the opportunity to select a pseudonym for the purpose of this research and they were required to sign a consent form (Appendix C) before the interview began. The sample size for

the qualitative semi-structured interview was $n = 12$ to attain data saturation appropriate for this study (data saturation is the stage where no new data, no new themes, no new coding, and the ability to replicate the study is reached; Guest et al., 2006). I approached saturation by way of assessing the richness (quality) and thickness (quantity) of the data obtained from the interviews (Fusch & Ness, 2015). Table 3.1 shows the demographic information of the participants in the exploratory semi-structured interview.

Table 3. 1

Participants' Demographic Information for Semi-Structured Interview

Pseudonym	Age	Gender	Race/Ethnicity	SES	Residency
Bambi	22	Female	African American	Medium	In-state
Drew	18	Male	White/Caucasian	Medium	In-state
Evel	19	Female	American Indian	Low	Out-of-state
Hann	19	Female	White/Caucasian	Medium	In-state
Jack	20	Male	African American	High	Out-of-state
Jackie	18	Female	Hispanic	Medium	Out-of-state
Katie	19	Female	Asian	Medium	In-state
Maniac	22	Female	African American	Low	Out-of-state
Olive	18	Female	White/Caucasian	Medium	Out-of-state
Pink	19	Female	Hispanic	Medium	In-state
Rain	18	Female	White/Caucasian	High	In-state
Sims	18	Non-binary	White/Caucasian	Medium	In-state

The recruitment for the expert reviewers was through purposive and snowball sampling ($n = 5$). They were currently registered and board licensed practicing mental health professionals. Their role was to review each of the inventory items that was developed from the qualitative data analysis for content relevance and meaning, technical quality and representativeness of the emerged constructs.

For the think-aloud protocol, participants ($n = 3$) from the population of study were recruited through email. The roles of the think-aloud protocol participants were to think aloud while performing the task of completing the survey and spontaneously report everything that is going through their minds while performing the task, thus creating a record of their cognitive

processing that was analyzed. Table 3.2 shows the demographic of the participants in the think-aloud protocol selected from the population of study.

Table 3. 2

Participants' Demographic Information for the Think-Aloud Protocol

Pseudonym	Age	Gender	Race/Ethnicity	Residency
TAP 1	21	Female	African American	In-state
TAP 2	18	Male	White/Caucasian	In-state
TAP 3	22	Female	African American	Out-of-state

Quantitative Strand Participants

For the quantitative strand, participants were sought out through email. Prior to taking the survey, participants were asked to electronically acknowledge a consent form (Appendix D). Once the participant acknowledged the consent form, the survey questions along with demographic questions were displayed for completion. Two sets of quantitative data were collected for this research: the first was for the scale development of the revised inventory items from the qualitative research phase. The EFA was conducted on the data for factor extraction of the generated items using Kaiser's criteria (Eigenvalue > 1 rule) with sample size of $n = 220$. The retained factors were identified as relevant to the purpose of the research, with a factor coefficient > .40. The second set of data was collected using the revised inventory from the EFA. The CFA (Muthén & Muthén, 2002) was conducted on the different set of data collected from the population of study for scale evaluation (construct validity) of the revised inventory. The sample size for the construct validation data set was $n = 230$. Both survey data sets were collected using Centiment, a survey company for quantitative data collection. All data collected were anonymous.

Instruments

Semi-Structured Interview

For the qualitative phase of the research, to collect data for the contextual understanding and the initial development of inventory items, semi-structured interviews were conducted with the selected participants from the population of study. The interview had seven questions focused on the research questions in addition to six demographic questions (Appendix E). The purpose of the interview was to help improve the definition of the construct of interest (mental health among college students) to supplement what is known about the constructs of interest based on the review of literature. Also, I investigated how participants perceived and described mental health issues among college students and the depth and breadth they think mental health assessment inventory should cover when students present themselves or seek help at college mental health clinics or counseling centers. The data collected during the interview was analyzed into themes/constructs and items, and an inventory was developed from the emerged constructs for the CMHAI. The content and face validity processes of a readability test, expert reviews and think-aloud protocols were then conducted on the initial developed inventory items before it was further tested quantitively.

College Mental Health Assessment Inventory (CMHAI) length and breadth

This developed inventory (Appendix H) is a self-administered and multi-dimensional measure that covers five key domains of mental health as identified by participants and analyses in this research. The inventory is designed specifically for the diverse traditional college student population to assess the incidence of mental health among college student population. All items have 7 Likert scale response options. The emerged subscales in this inventory are addiction,

suicidal ideation, campus loneliness, depression, and stress. Upon completion of the inventory development, the score range for the inventory will be designed based on the final inventory.

Procedures

Qualitative Data Collection Procedures

All data was collected between June and August of 2022. Participants were recruited through in-person and email as indicated above. All interviews were conducted one-on-one via Zoom. First, participants were asked to sign the consent form before the interview began. The interviews were digitally (audio/video) recorded, and transcribed verbatim. The interviews lasted between 30 – 45 minutes for each interview session. Member checking was used to provide feedback and verification of researcher interpretations of data (Savin-Baden & Howell-Major, 2013).

Quantitative Data Collection Procedures

The revised inventory after the qualitative strand was used to collect the data for the EFA. Participants were recruited through email to take the revised created instrument using a Centiment survey platform. After the data was collected, it was cleaned and explored by producing descriptive statistics. The distributional properties of the data were assessed even though the assumptions of EFA tend to be conceptual rather than statistical, as the name of the analysis implies, it is exploratory. The EFA was conducted extracting factors using the Kaiser criteria of Eigenvalue > 1 rule (Kaiser, 1960). The EFA output was reviewed, factors relevant to the purpose of the research were identified, described, and retained. Poorly performed items with factor loading < .04 and factors with items three and below were removed.

The inventory resulting from the EFA calibration was used to collect new set of data from different sample of the population of study. Participants were recruited again through email

to take the revised inventory on the Centiment survey platform. After the data was collected, it was cleaned and explored by producing descriptive statistics. The CFA was conducted on the data to validate the CMHAI model.

Data Analysis

NVivo© qualitative data analysis software (QSR International Pty Ltd, 2020) was used for qualitative data coding and analysis. The qualitative data was analyzed inductively (Patton, 2015) and deductively (Boyatzis, 1998) using a standard thematic analysis approach. A thematic analysis method was used to identify, analyze, and report patterns (themes) within data (Braun & Clarke, 2006) for the development of the initial instrument items. The Flesch Readability Ease (FRE) online was used for the readability test. The average congruency percentage (ACP) analysis was conducted on the expert review reports. Items assessed as lacking relevance to the purpose of the research and badly written were removed. Trustworthiness, including credibility, confirmability, dependability, and transferability was enhanced by design rigor and interpretive rigor as part of the MMR inference quality approach as defined by Tashakkori et al. (2020).

For the quantitative phases, all statistical analyses were conducted using IBM SPSS Statistics for Windows©, Version 27.0, (IBM Corp. Released, 2020) and Mplus© Version 8.7 (Muthén, 2021) statistical software. The statistical procedures that were conducted to answer the research questions were: i) the Exploratory Factor Analysis (EFA; Bentler & Yuan, 1996; Yuan et al., 2002) and 2) the Confirmatory Factor Analysis (CFA; Jöreskog, 1969). The EFA enabled me to determine the optimal number of factors or domains that fit a set of items, and the CFA addressed the latent structure of the scale items and their underlying relationships, as well as creating the scores for substantive analysis including construct validity (Model Fit Information), McDonald Omega reliability (ω) and internal consistency reliability (α).

Assessment of Distributional Properties of Research Data

The EFA and CFA assumptions of multivariate normality, sufficient sample size $n > 200$ (Izquierdo et al., 2014), the correct a priori model specification, and random data sample (Bollen, 1989) checks were conducted on the two samples. The distributional properties of the datasets are reported on the descriptive statistics tables and the bar charts in chapter four.

It is important to check the variability of the data before performing the analyses because if a sample is more restrictive than the population, then the variance of its variables will also be restricted, leading to attenuated *r* coefficients (Fabrigar et al., 1999). Cain et al. (2017) noted that violations of normality appear to be common with real data sets. Skewness and kurtosis are especially influential on *r* and subsequent EFA results. Skewness refers to the symmetry of the score distribution, whereas kurtosis is a measure of the height of the score distribution in relation to its width. The data was checked and shown to have very minimal missing data of less than 1.5% in both sets of data. The missing data in the EFA was coded as "9" and for the CFA as "99". The EFA was conducted in SPSS. In SPSS, Listwise deletion of cases with missing data are the default methods. The CFA was conducted in Mplus statistical software, and the default estimation method for missing data is maximum likelihood (ML). Studies of imputation methods with simulated and real data demonstrate that any method is probably effective when < 5% of the data are missing, mean imputation is acceptable when < 10% of the data are missing, and regression imputation is acceptable when < 15% of the data are missing (Schumacker, 2014). Additionally, the data was explored and reviewed for outliers and was found not to show outliers that should be a concern.

All statistical significance was set at a p-value of less than .05 and the alpha for post hoc individual significance tests where necessary were adjusted accordingly. The weighted least

squares mean and variance (WLSMV) estimation (Muthén, 1993; Muthén & Muthén, 2002) was used for CFA. The choice of WLSMV estimation is based on its robustness designed for use primarily with ordinal data in conjunction with polychoric correlations (i.e., calculate the correlation between ordinal categorical variables) which are the kinds of data collected in this research as the developed inventory is in a Likert scale form. Also, WLSMV is also designed to address the large *n* requirements needed for other SEM estimators. Research suggests it works well in terms of estimates and model fit even with at least moderate $n = 200$ (Muthén, 1997). Additionally, WLSMV is available in Mplus statistical software used in this research. For evaluation of model fit information and diagnostic procedures, the modification indices were reviewed and respecify two items sequentially by suspending them from two factors. The model fit indices examined include chi-square (x^2), root mean squared error of approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and standardized root mean squared residual (SRMR) based Hu and Bentler (1999) cutoff criteria, Kline (2005) and Brown (2006) recommendations.

Findings Presentation

The findings in this dissertation research are presented in the form of a traditional dissertation presentation in chapter four. The findings of the analyses are presented to answer each research question, followed by the sequence of the exploratory sequential design in tables, graphs, and narratives. This study involved the presentation of the QUAL results followed by the QUAN results, how the QUAL results informed the QUAN inventory development. Finally, the chapter describes the results of the CHMAI validation testing of model fit information.

Summary

The mixed methods exploratory sequential design as discussed as discussed at the beginning of this chapter, provides the opportunity to combine both qualitative and quantitative data to conduct the most complete analysis to answer the research questions. The participants were recruited for different phases of the research following the inclusion criteria. The instrument for the qualitative data collection aspect of the research was a semi-structured interview followed by a readability test, expect reviews and think-aloud protocols, leading to the initial CMHAI items development, content/face validity assessment and revision of the items. The quantitative instrument was the revised CMHAI items from the qualitative strand, which was then used for the scale development (calibration) by conducting a factor analysis (EFA). For scale evaluation (construct validity), a structural equation modeling (SEM) approach of confirmatory factor analysis (CFA) was used as well as assessing the reliability of the modelled inventory. The hypothesized model items that failed to perform based on the item analysis were dropped. The following chapter 4 describes the findings and analysis. Finally, Chapter 5 will be the discussion, conclusion, recommendations, limitations, and implications for the dissertation research.

CHAPTER IV

RESULTS

The purpose of this study was to develop a multidimensional College Mental Health Assessment Inventory (CMHAI) specifically for the college student population. Participants for this research were drawn from the college student population across the United States. Within the context of this research, the traditional college student population is defined as college students between the ages of 18 and 23 years who pursued their college education immediately after graduating from high school (Johnson, 2020). This research was guided by four questions designed to address the statement of the problem, which asserted that college students' mental health is a significant and growing concern on college campuses across the United States (Batra et al., 2021; Lipson et al., 2019). The first step to addressing the alarming mental health problems among college students is prevention through screening for mental health using a mental health assessment inventory specifically designed for the college student population.

To understand responses to the research questions cited below, the results of the analysis for each question is presented in this chapter.

Q1 How do college students perceive mental health incidences and its indicators on campuses?

Q2 How do college students describe mental health indicators common on college campus?

Q3 How reliable and valid are scores on each of the measured constructs or variables in the proposed instrument model?

Q4 Overall, to what extent is the proposed college mental health assessment model adequate in modeling scores from the population of interest?

Research Questions 1 and 2 explored how college student perceive and describe mental health incidences and its indicators on campuses. The qualitative research strand of the study addressed these questions. College students' narratives of their lived experiences gave contextual understanding and generated themes (constructs or variables) through their lenses, which was used to generate items for the developed assessment inventory. Research Questions 3 and 4 addressed the scale development and evaluation and examined the reliability and validity of the scores on each of the measured constructs in the resulting mental health assessment instrument model from the qualitative component of this research.

To facilitate the presentation of the qualitative and quantitative data, the findings are presented based on each of the research questions with a diagram of the implementation steps involved. The themes/constructs derived from the qualitative questions led to the development of the college mental health assessment (CMHA) inventory items, followed by quantitative statistical analyses of factor extraction, reliability and validity of the model using scores obtained from the population of interest.

Research Question One

Q1 How do college students perceive mental health incidences and its indicators on college campuses?

Research question one generated the following themes: (a) admission to college with pre-existing mental health conditions; (b) students' expectation about college versus the actual experience; (c) college as a new environment brings about feelings of loneliness; and (d) ethical issues relating to college students seeking mental health support. These themes have been highlighted by participants in this research. The themes are discussed in more detail below reflecting the participants' own voices.

College students' views on the incidence of mental health on college campuses is fundamental to the development of a multidimensional assessment inventory to be used by college counseling and mental health centers to support students seeking help. All the participants indicated that mental health of students is vital to accomplish their academic success. Furthermore, in providing a comprehensive view of college students' description and understanding of mental health, Rain shared, "Personally, I find that my mental health gets a lot better when I'm surrounded by other people, like friends that care about me and I have like a support system of people around me, I think that's really important." Sims also expressed having personal mental health challenges, that

> … I've sort of gone through it even in High School, like a whole mental health journey, where I ended up being medicated and all those things. Personally, my mental health sort of developed in like anxiety, and a lot of that, and I think I see that in a lot of my friends as well on campus. A lot of the time, in more like extreme circumstances, there will be like severe depression.

Bambi, one of the participants emphasized, "I feel like the focus should be more on mental health, because I feel like they don't really talk much about it on campus." This speaks to college administrators creating more awareness of available mental health supports on campus to students. Collectively, these responses provided realistic perspectives and descriptions of mental health among the college students population in the United States.

College students' views about mental health reflected an increasing challenge among students, which requires more attention and deliberate efforts by college administrators to provide adequate support to students needing help because it directly affects their academic progression and successful completion of their study.

Students Coming to College with Pre-Existing Mental Health Conditions

Most of the participants expressed that students' mental health conditions on campus might not only be triggered by experiences on campus but may be made worse as some students come to college with some vulnerabilities of pre-existing mental health challenges. The unique academic pressure for those students accelerates incidences while in college. Maniac, a research participant, shared during the interview that

> … I feel like mental health is more of someone's personal experience than what actually happens to them when they go out into the real world, because most people think college students are depressed, stressed because of college experience, but that actually begins before they get to college.

Most of the expression shared by students in this regard point to the fact that their experiences on campus relates to issues that may have been going on for a while in their lives.

Hann shared during the interview that her personal challenge started before getting to college, stating

> … I've had mental health incidences in the past before getting to college. My support system has been very helpful in navigating through the challenges. I see a therapist periodically and the college pressure has not helped my situation either, but I have friends on campus that help me get through when things are not going well during crisis.

Evel remarked

> …all these mental health on campus can manifest itself in the form of like anxiety, stress, depression, in college but the underlying cause of these issues may have started before college and got worse because they are not taken care of, and they continue to occur, and you just, like, snowball into, like, more depression and anxiety and other serious mental issues. I'm saying this out of experience…

These extracts will help remind college administrators and stakeholders that while as a society we treat 18-year-olds as adults, their brain does not fully mature until about mid-twenties, and during these periods the brain is largely driven by emotion (Arain et al., 2013). So, college students need support, as their college years are still within their development period and tend to

be ruled by feeling, impulse, and pleasure seeking, which really complicates decision making and behavior in highly charged situations; situations that are very common in college.

Students' Expectation about College Versus Their Actual Experience

As in many life situations, transition or managing change can be very daunting. The transition from high school to college presents challenges as well as opportunities. Most of the students attending residential colleges are typically living on their own for the first time. They are faced with simultaneous challenge of adapting to college academic rigor and new social responsibilities (Holmstrom et al., 2002). Maniac remarked, "…we always go to college with all these expectations, then when you reach college, you're disappointed, so you get anxious." As observed during the interviews, for some, it may be the first time that they have the responsibility of waking themselves up for classes, getting along with roommates, making new friends, or confronting choices about drinking and dating. These are only a few of the potentially new social and emotional stressors that a freshmen college student face (Karp et al., 1998). During the interview for this study, Sims shared,

> … I think finding your own path to work through your schoolwork is difficult for some people. Also, I do think of substance use and fraternities and things like that, throwing massive parties, and things like that with drinking and drugs and things like that.

Obviously, these are activities that can have severe consequences that may affect their academic progression and/or create mental health challenges for a college student. Drew, a participant, remarked

> … I think one of the biggest triggers is probably depression caused by change. Because college students have some of the highest rates of depression and suicide because when they get to college, their experience is not what they thought it is and expecting something different. These types of things can be a problem that adjusting to real college stress will cause student to make bad decisions which can be worse because of mental health of the student.

As noted by Venezia et al. (2003), many college students are ill-prepared for these changes, partly because college and high school have different standards and expectations.

College as a New Environment Brings about Feelings of Loneliness

This was one issue that was expressed in many ways by participants during the interviews. College students are still developing biologically as described by Qualter et al. (2015). For adolescents transitioning into emerging adulthood, this period of development is known to be one of heightened susceptibility to experiences of loneliness. Navigating new academic expectations and social contexts requires adept use of social skills that vary dramatically among college students. Jackie, a participant in this study, remarked

> … I would say, college is overwhelming because there's a lot of new people and like for me, I came here knowing no one. So, it was difficult finding people to hang out with and to like eat with. And going into classrooms, I had no idea who was going to be in there.

Katie remarked,

> … general understandings of mental health coming into college, I mean, you're in a new environment, no friends, start all over, which can either be very good for a student or can actually be very hard for a student, because they don't have that social interaction that most people do.

Also, Pink (another participant) shared that

> I live in my hometown in Texas. So, I'm super far away. So sometimes it gets really stressful not having like my parents, my support system, kind of right here with me. That's definitely caused us some more stress being over here.

Similar expressions were shared by other participants.

Ethical Issues Relating College Students Seeking Mental Health Supports

Students were asked about ethical issues that they think should be considered when students seek help relating to mental health on campus. All the participants expressed the issues

of confidentiality, trust, privacy during consultation, and stigmatization among others. Bambi commented during the interview, "… confidentiality and privacy should be very important. Also, like not pushing anyone to say anything that they don't want to say, and councilors or therapist should seek permission before collecting certain information." Olive shared

> … I know there's like a lot of stigmas around mental health and people don't really believe it is an issue. So, I think like making people aware, and like trying to reduce the stigma, it will be beneficial to students seeking help...

Another participant, Drew remarked,

> … I feel like they don't try to understand people before diagnosing them and not actually getting to know their problems as much. So, I feel like we need to have more of a personal interaction with them before trying to get to the bottom of the mental health situation. It's important to have a personal relationship with the student to build trust for privacy.

This information provided a rich contextual perspective to how students perceive and describe mental health among college students during the qualitative research phase of developing the CMHAI.

Research Question Two

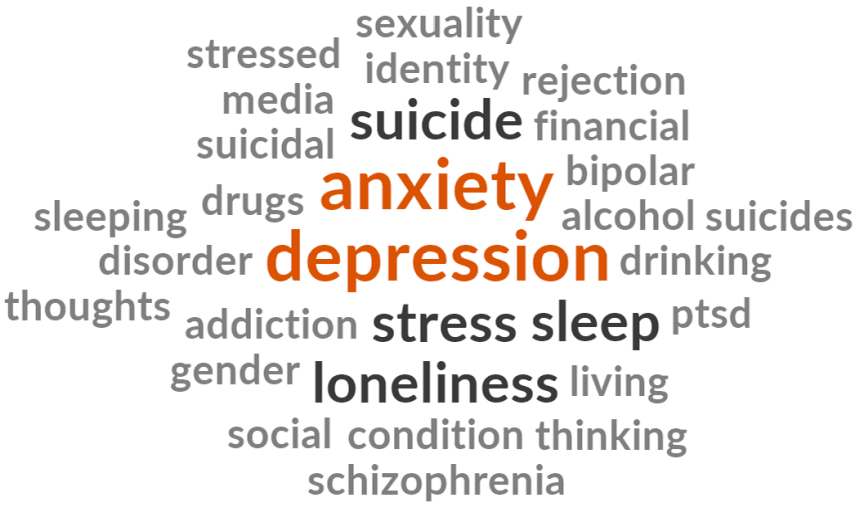
Q2 How do college students describe mental health indicators common on college campus?

In the previous section, college students described and expressed their views about mental health on college campuses and some key situations that serve as triggers. In this section, participants identified the various mental health indicators or constructs based on their personal and general experiences on campuses. These factors were expressed by participants during the qualitative interview sessions to give contextual understanding and description of mental health incidences among college student population. Therefore, their views offered here provided valuable insights into identifying the mental health indicators/constructs used to develop the proposed model for CMHAI.

NVivo qualitative research software was used to code and analyze the interview data which produced constructs (themes) as shown in the word cloud below. Fifty-two inventory items (Appendix F) were developed based on these constructs – addiction, anxiety, depression, campus loneliness, PTSD, stress, suicide and suicidal ideation, schizophrenia, sleep disorder, social media, financial stress, sexual identity, and rejection. The word cloud below in Figure 4.1 shows the emerged themes/constructs from the qualitative exploratory interviews data analysis. A word cloud is a visual representation of a data set. The word cloud shows the popularity of words or phrases by making the most frequently used words appear larger or bolder compared with the other words around them. Figure 4.1 is reflecting that anxiety and depression as the words with the highest frequency in the interview data.

Figure 4. 1

Word Cloud of Emerged Themes from Qualitative Data Analysis



Note. This figure shows the word cloud from the qualitative interviews data analysis.

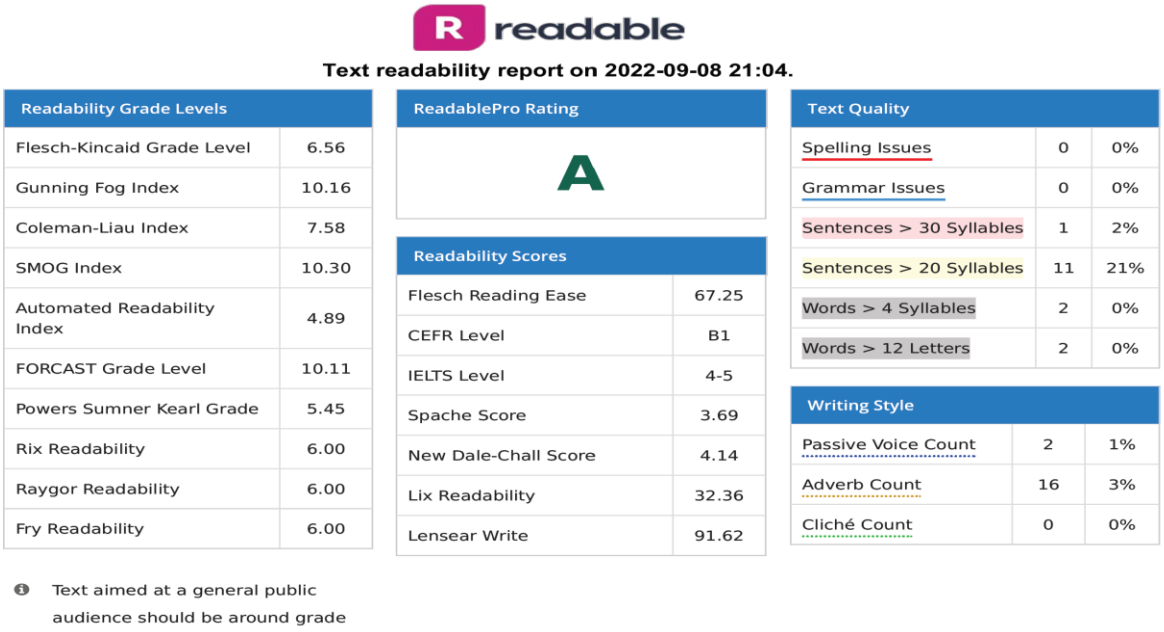
Further evaluations of readability test, expert reviews and think-aloud protocols were conducted on the created items as part of the content and face validity before progressing to testing the created inventory quantitatively.

Readability Test

One of the most important steps in evaluating a developed inventory is the readability test. Readability of a given text is the objective measurement of the reading skills one should possess to understand the written material (Badarudeen & Sabharwal, 2010). The Flesch Reading Ease (FRE; Flesch, 1948) score was conducted through an online calculator on the initial CMHAI 52 items text and measured 67.25 with Flesch-Kincaid grade level of 6.56 as shown on Figure 4.2 below. The result indicates that a reader needs a grade 6 level of reading or above to understand the CMHAI text. It also implies the content of CMHAI should be fairly easy for the average adult to read even if they are a basic reader and the content is less time-consuming to read. The readability report in Figure 4.2 indicated that texts aimed at a general public audience should be around grade level 8 to 10 to ensure the content can be read by 80% of Americans.

Figure 4. 2

The Readability Test Output



Note. This figure shows readability test results of Flesch-Kincaid grade level 6.56 reading score.

The Flesch Reading Ease gives a text a score between 1 and 100, with 100 being the highest readability score. The Flesch reading test is one of the most popular tests applied to evaluate inventory or survey modules. Higher scores indicate that the material is easier to read; lower score numbers indicate that statements or paragraphs are more difficult to read (Lenz, 2010).

Expert Review

Next, the developed inventory was subjected to expert review by mental health practitioners. Experts are considered knowledgeable of a particular subject and are identified by virtue of their specific knowledge, their community position, or their status (Kaiser, 2014). Expert reviews are widely used as a qualitative research method, often aiming at gaining information about or exploring a specific field of action (Döringer, 2021). Expert reviews as qualitative methodology is frequently used as a method of evaluating draft questionnaires that can either be conducted alone or in combination with other methods. Professionals who have theoretical questionnaire knowledge or practical experience in the subject areas are asked to review draft questionnaires with an eye to identifying questionnaire problems. This can be done either by having individuals review the questionnaire alone or convening a group, also known as an "expert panel" (DeMaio & Landreth, 2004).

For this research, five experts in mental health and psychiatry practicing with the following profiles were contacted through email using a snowball sampling method: RN – Psychiatric (n = 2); RN, BSN Psych Mental Health (n = 1); RN, PMHNP (n = 1) and RN, MSN – Mental Health (n = 1). They volunteered to participate and provided their expert opinion on the generated items. They were requested to review the items on the bases of *content relevance, representativeness, and technical quality* of the items generated in addressing the emerged

constructs by rating each item using one of the scores: 1 as Very poor, 2 as Poor, 3 as Moderate, 4 as Good and 5 as Excellent. The completed review reports by the experts were then analyzed with accompanying notes.

Average congruency percentage (ACP) analysis (Popham, 1978) was conducted on the expert review reports. It is one of the content validity approaches conducted using the ratings of the inventory items by the expert reviewers. The ACP analysis value for the inventory was 81.85% (Appendix G). The validity of a survey-based inventory is the degree to which the assessment measures what it is supposed to measure. Valid inventories facilitate better quality data collection which reduces the effort and increases the creditability of data (Elwakil, 2017). The ACP test is a well-known tool for assessing the content validity of a questionnaire. Waltz et al. (2005) advises that an ACP of 90 percent or higher would be considered acceptable, but different authors have suggested various values while advising that it should be used in combination with other validity assessment approaches. In this research, it was used together with a readability test, a think-aloud protocol, and EFA and CFA as assessments for the instrument development.

The Think-Aloud Protocol

The next step of content validity in the process of developing the CMHAI items was the think-aloud protocol by selected participants from the population of study. A think-aloud protocol is a process in which participants verbalize their thoughts when performing tasks and it is used in testing to elicit insights into a participant's thought processes that are hard to obtain from mere observation (Fan et al., 2020). A think-aloud protocol is a transcript of ongoing mental activity, as reported by a participant engaged in a task. In this case, three participants from the population of study were recruited to speak their thoughts aloud while performing the

task of completing the inventory, thus creating a record of their cognitive processing, which was later analyzed as part of the content and face validity.

Upon completion of the think-aloud protocol, the subsequent refinement became a part of the holistic review of the qualitative content and face validity processes, which altogether involved the readability test, expert reviews, and the think- aloud protocol. These valuable processes led to restructuring of some of the items and completely removing some of the items as recommended and identified by the entire qualitative content and face validity exercise. At the end of this qualitative research process, the initial 52 inventory items were reduced to 45 items, which were then used for data collection in the next phase of the quantitative research testing. The quantitative component involved two steps: 1) an Exploratory Factor Analysis (EFA), and 2) a Confirmatory Factor Analysis (CFA), addressing research questions 3 and 4 respectively and producing a CMHAI model of the inventory items from the qualitative research strand.

Research Question Three

Q3 How reliable and valid are scores on each of the measured constructs or variables in the proposed instrument model?

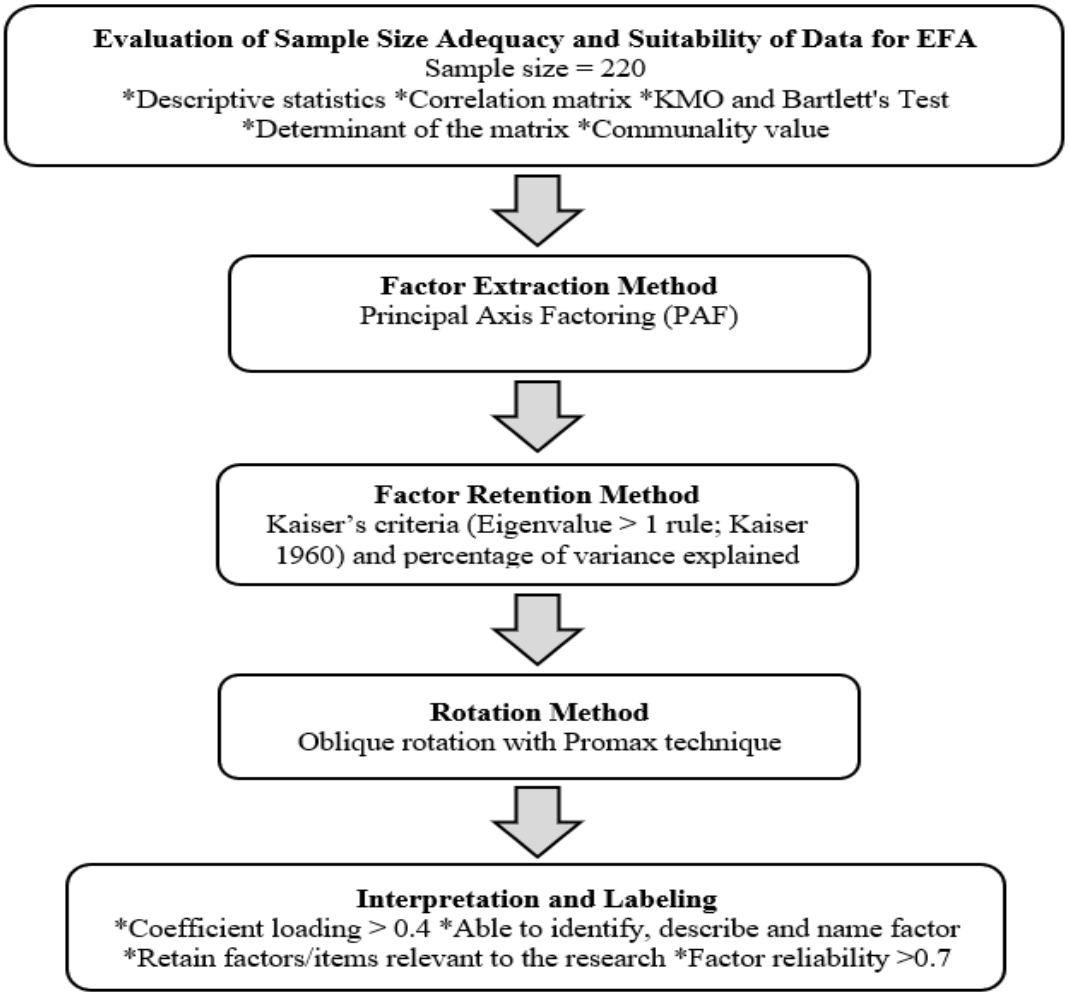
Factor extraction and reliability assessment of the CMHAI model using exploratory factor analysis (EFA) was conducted in this section to answer the research question. The EFA started with assessing the data collected for adequacy and suitability for the analysis. The data was cleaned and checked to ensure all participants met the inclusion criteria and are currently undergraduate traditional student in the United States. The inclusion criteria set forth in the methods were: 1) participants must be between18 and 23 years of age, 2) currently an undergraduate student, 3) may be in-state, out-of-state, or a foreign student and 4) participation is voluntary. The data was explored, and the descriptive statistics produced as shown below. Because I had no expectations of the number or nature of the factors, EFA was used. As the title

suggests, it allows investigators to explore the main variables to create a theory or model from a relatively large set of latent dimensions often represented by a set of items (Henson & Roberts, 2006; Pett et al., 2003).

Despite EFA being an evidently complex statistical method, the approach taken in the analysis is sequential and linear, involving many options (Thompson, 2004). In this research, Figure 4.3 shows the EFA decisions reflecting the analysis implementation processes.

Figure 4. 3

Exploratory Factor Analysis Implementation Steps



Note. This figure shows exploratory factor analysis (EFA) steps. KMO is Kaiser-Meyer-Olkin.

Evaluation of Sample Size Adequacy and Suitability of Data

220 college students in the United States responded to the college mental health assessment inventory, comprised of a total of 45 statements items constructed to cover the themes/constructs that emerged from the qualitative research phases of this study. Table 4.1 shows the descriptive statistics of the data for the 45-items in the inventory. The bar charts in Figures 4.4 and 4.5 shows the variability of the EFA data based on age (figure 4.4) and race/ethnicity (figure 4.5) of the participants.

Table 4. 1

Exploratory Factor Analysis Data Descriptive Statistics for the 220 Participants

	Descriptive Statistics			
Item	Mean	SD	Skewness	Kurtosis
Item 1	2.99	2.10	0.53	-1.22
Item 2	2.39	1.83	1.00	-0.39
Item 3	2.58	1.92	0.88	-0.63
Item 4	2.37	1.83	1.04	-0.30
Item 5	2.44	1.95	1.08	-0.23
Item 6	2.60	2.04	0.84	-0.82
Item 7	2.92	1.96	0.51	-1.14
Item 8	3.03	1.93	0.50	-1.04
Item 9	4.48	1.93	-0.51	-0.81
Item 10	3.46	2.03	0.21	-1.28
Item 11	4.07	1.95	-0.11	-1.15
Item 12	4.71	1.79	-0.67	-0.48
Item 13	4.50	1.85	-0.37	-0.87
Item 14	4.22	1.85	-0.29	-0.98
Item 15	3.84	2.01	-0.03	-1.25
Item 16	3.63	1.95	0.13	-1.11
Item 17	4.21	1.94	-0.36	-1.04
Item 18	4.16	1.85	-0.26	-0.94
Item 19	4.09	1.97	-0.18	-1.17
Item 20	4.03	1.98	-0.18	-1.18
Item 21	3.55	1.95	0.19	-1.21
Item 22	3.60	1.90	0.15	-1.15
Item 23	3.78	1.79	0.07	-0.88
Item 24	4.05	1.97	-0.14	-1.21
Item 25	4.00	1.85	-0.07	-1.03
Item 26	4.05	1.85	-0.15	-1.03
Item 27	3.95	1.88	-0.12	-1.03
Item 28	3.95	1.89	-0.06	-1.08
Item 29	3.83	1.86	-0.09	-1.13
Item 30	3.51	2.03	0.17	-1.24
Item 31	2.93	2.14	0.61	-1.17
Item 32	3.70	2.29	0.05	-1.55
Item 33	3.39	2.13	0.33	-1.22
Item 34	3.89	2.10	-0.12	-1.40
Item 35	3.76	2.01	-0.04	-1.27
Item 36	4.00	1.81	-0.13	-0.90
Item 37	4.03	1.94	-0.19	-1.07
Item 38	3.86	1.91	-0.03	-1.11
Item 39	3.66	2.13	0.09	-1.42
Item 40	4.16	1.92	-0.30	-1.07
Item 41	3.20	1.80	0.37	-0.94
Item 42	3.24	1.83	0.45	-0.80
Item 43	3.28	1.93	0.30	-1.14
Item 44	3.90	1.94	-0.04	-1.08
Item 45	3.97	2.01	-0.09	-1.14

The distribution of the EFA data between the traditional college students' age (18 – 23 years) are shown on Figure 4.4, indicating a fair representation of all the ages in the population of study.

Figure 4. 4

Descriptive Bar Chart for EFA Data by Participants' Ages

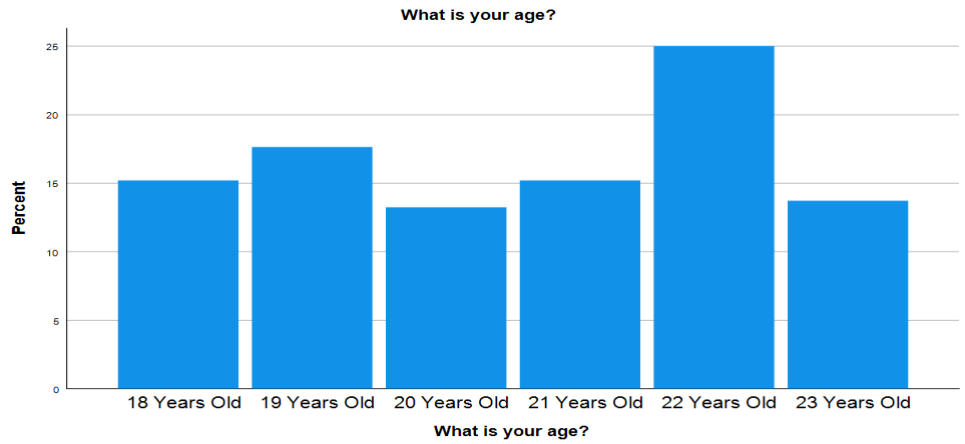
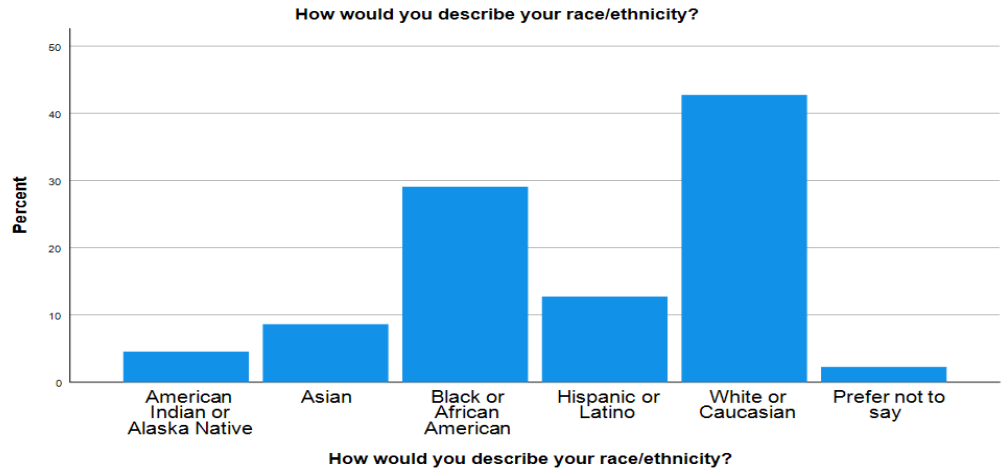


Figure 4.5 shows the representation of the EFA data by race/ethnicity. The bar chart reflects white/Caucasian as the highest race represented, which fairly represents the population of study.

Figure 4. 5

Descriptive Bar Chart for EFA Data by Participants' Race/Ethnicity



Before carrying out the EFA, the correlation matrix, Kaiser-Meyer-Olkin (KMO) and Bartlett's test, determinant of the matrix and the communality values were performed on the data using SPSS to confirm suitability for the analysis (Burton & Mazerolle, 2011).

The values of the bivariate correlation matrix of the items were analyzed. High values of the bivariate correlation are an indication of multicollinearity although they are not a necessary condition to be met and there is no statistical means for deciding which item of a pair to remove, this decision should be based on a qualitative interpretation of the highly correlated items by the researcher (Samuels, 2017). Field (2013) suggests removing one of a pair of items with bivariate correlation scores greater than .80. The correlation matrix table of the data showed a unique pair of correlation (items 10 and 11) with an absolute value greater than .80. Following the suggestions of Field (2013), one of this pair was marked for removal as the bivariate correlation coefficient was higher than the threshold. For this research, additional analyses were considered in combination with correlation matrix before an item was removed.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity with approximate Chi-square value were conducted on the EFA data. The minimum acceptable score for the KMO test is 0.5 or greater (Kaiser, 1974) and the Bartlett's test of sphericity should be statistically significant. Table 4.2 shows the results of KMO and Bartlett's test indicating adequacy of the sample size and suitability of the data for EFA are met.

Table 4. 2

Kaiser-Meyer-Olkin Measure and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.944
Bartlett's Test of Sphericity	Approx. Chi-Square	7401.939
	df	990
	Sig.	.000

The determinant of the matrix value was assessed, and the score obtained from the data shows that this test was not met. As a rule of thumb, the score for the determinant of the matrix should be greater than 0.00001. A lower score might indicate that groups of three or more

question items in the instrument have high intercorrelations, so the threshold for item removal should be reduced until this condition is satisfied (Samuels, 2017). Upon running and reviewing the intercorrelation, the items appeared moderately correlated as expected except for a pair of items that have a correlation value over .80.

The communality of the retained items in the instrument was also examined. The average communality value computed for the retained items is 0.652. The communalities of the initial and extraction solution were observed; all the 45 items had communality values ranging from .406 to .789. According to MacCallum et al. (1999), an average value above 0.6 is acceptable for samples less than 100, and an average value between 0.5 and 0.6 is acceptable for sample sizes between 100 and 200. Osborne et al. (2008) suggested that while performing EFA using Principal Axis Factoring with Promax rotation, the communalities value above 0.4 is acceptable.

With the data from 220 sample size meeting the tests of bivariate correlation, determinant of the matrix, Kaiser-Meyer-Olkin (KMO) and Bartlett's tests, and the average communality test, the EFA was then performed using the data obtained with the developed CMHA inventory.

Factor Extraction, Rotation and Retention

The EFA extraction, rotation and retention methods used for this research was the Principal Axis Factoring (PAF), Oblique rotation with Promax technique and Kaiser's criteria (Eigenvalue > 1 rule; Kaiser, 1960). In deciding the extraction, rotation, and retention methods to use, the purpose of this research, which is to develop a multidimensional assessment inventory for the college students' population, was considered.

Netemeyer et al. (2003) suggested that if researchers have initially developed an instrument with several items and are interested in reducing the number of items, then the Principal Components Analysis (PCA) is useful. Burton and Mazerolle (2011) suggested that

PAF is useful if researchers want to determine the underlying factors related to a set of items. Considering that the factors in this research are measuring the same underlying latent variable (mental health), there should be expectation that the items and factors will share some correlations between them. As a result, the suggestion by Burton and Mazerolle (2011), the PAF extraction method was used. An additional decision made was how many constructs were needed to analyze the data, particularly if a variable might relate to more than one factor (Williams et al., 2010). To produce a more interpretable and simplified solution, the chosen rotation should help by maximizing high item loadings and minimizing low item loadings. For its relevance to the study, an Oblique rotation with Promax technique was used for the analysis (Taherdoost et al., 2022).

An EFA was then conducted on the data administered with the retained 45-items inventory after the qualitative content and face validity processes. For this analysis, PAF with Promax rotation technique was used, requesting the KMO, Bartlett's test of sphericity, determinant of the correlation matrix, retaining all factors with eigenvalues > 1, sorting the factor coefficients by size and suppressing items with loading factor less than .40, keeping items with factor loadings greater than .40. Table 4.3 shows the pattern matrix produced by the EFA analysis with the extracted seven factors and the retained items with loading factors > .40.

Table 4. 3

Exploratory Factor Analysis Pattern Matrix. Principal Axis Factoring with Promax

	Factor						
Item	1	2	3	4	5	6	7
Q5. I have neglected people close to me due to my alcohol or substance use	.904						
Q4. I have experienced withdrawal symptoms like agitation when I stopped alcohol/substance use	.889						
Q6. Someone has expressed concern about my alcohol drinking or substance use	.864						
Q3. I have been concerned about my drinking of alcohol or substance use	.830						
Q2. I have at least a cup of alcoholic drinks or drugs first thing in the morning to steady my nerves	.802						
Q7. I experience breathlessness in the absence of physical activity	.611						
Q1. I have used drugs other than those required for medical reasons	.562						
Q8. I often have feelings of faintness	.439						
Q33. I have experienced a terrible incidence as a victim or witness that has impacted me significantly		.867					
Q32. I have thought of killing myself at least once		.838					
Q35. I often feel dark or unhopeful of the future		.794					
Q31. I have told someone I was going to commit suicide or might commit suicide		.708					
Q38. I have experienced more than a week lower-than-usual interest in activities that I usually enjoy		.597					
Q40. I feel it is very difficult for me to express myself in words that others can understand		.506					
Q34. I frequently worried about something that I am unable to sleep at night		.504					
Q37. I have often had trouble focusing on school		.496					
Q45. I try hard not to think about event(s) or situations that reminded me of event(s) that happened		.459					
Q36. I feel positive about my interpersonal connections with others on campus							
Q44. I feel guilty and unable to stop blaming myself on problem(s) or event(s) I may have not caused							
Q24. It is difficult for me to make friends on and off campus			.968				
Q22. I am unhappy doing so many things on campus alone			.715				
Q23. I feel my interests are not shared by those around me on campus			.674				
Q20. I feel as if nobody really understands me on campus			.614				
Q19. I feel isolated from others on campus			.547				
Q21. I find it difficult to communicate with professors or advisors			.537				
Q41. I feel I share absolutely nothing in common with other people around me			.459				
Q15. I feel life is meaningless				.843			
Q16. I feel that there is nothing to get excited about				.759			
Q13. I feel sad or depressed				.736			
Q17. I often experience negative feelings				.732			
Q14. I feel that I had lost interest in just about everything				.732			
Q18. It feels difficult to get going with issues on and off campus				.538			
Q29. I feel like I cannot deal with everything anymore							
Q30. I feel everyone would be better off without me							
Q27. I feel that I find myself getting agitated consistently					.778		
Q28. I find myself getting angry at even the smallest of situations					.667		
Q26. I tend to over-react to situations					.661		
Q25. I found it difficult to calm down after something upset me					.584		
Q9. I often feel overwhelmed with my course/class work						.673	
Q12. I feel panic in part due to my schoolwork						.644	
Q10. I feel scared with trembling without any good reason						.431	
Q11. I easily sweat in the absence of high temperature							
Q43. I talk to other people inside my head that nobody else can hear							.729
Q42. I believe in more than one thing about reality around me that nobody else seems to believe							.632
Q39. I talk to other people inside my head that nobody else can hear							.627

The seven extracted factors with the eigenvalues, percentage of variance explained by each factor and the cumulative percentage of the variance explained are presented in Table 4.4. The seven extracted factors explained a total of 67.82% of the variance in the data.

Table 4. 4

The Seven Extracted Factors Based on Kaiser's Criteria (Eigenvalue > 1)

Factor	Eigenvalues	Initial Eigenvalues % of Variance Explained	Cumulative %
1	18.859	41.909	41.909
2	3.719	8.265	50.173
3	2.261	5.024	55.197
4	1.657	3.682	58.879
5	1.497	3.327	62.206
6	1.321	2.936	65.142
7	1.203	2.674	67.816

The internal consistency reliability (Cronbach's alpha) score for each of the seven extracted factors are presented in Table 4.5. All the reliability assessed shows acceptable scores.

Table 4. 5

The Reliability Coefficients for the Seven Extracted Factors

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Cronbach's Alpha (α)	0.917	0.923	0.894	0.929	0.860	0.734	0.841

The seven extracted factors were then examined for 1) their relevance to the purpose of the research, 2) for items having coefficient loading > 0.4, and 3) being able to describe and name the factors. The first five factors were retained for their relevance to the purpose of this research and being able to describe and name them. The last two factors as shown on Table 4.3 have three extracted items each. Fabrigar et al. (1999) recommended four and above indicators per factor for statistical identification, that Statistical software will operate with fewer variables, but the location of such factors will be imprecise. Considering this recommendation, the two

factors with three items were removed from the model. Five factors with four and above items were retained for the model. The 45-item inventory that was used for the EFA data collection was then further reduced to 34 items for the retained five factors. The remaining factors in the revised CMHAI-34 items are described as Addiction, Suicidal Ideations, Campus Loneliness, Depression and Stress. The first factor was extracted with eight items, the second factor was extracted with nine items, the third factor was extracted with seven items, the fourth factor was extracted with six items and the fifth factor was extracted with 4 items, totaling 34 items altogether. Table 4.6 shows the retained five factors, items, and the loading factors. This revised instrument was then used to collect a different set of data from the population of study used in the next step to answer Research Question 4 by conducting Confirmatory Factor Analysis (CFA) to validate the five factors (subscales) retained.

Table 4. 6

The 34-Items and Five Factors Retained from the Exploratory Factor Analysis

	Retained Factors and Items	Factor loading	Cronbach Alpha (α)
	Addiction		**0.917**
1	I have at least a cup of alcoholic drinks or drugs first thing in the morning to steady my nerves	.904	
2	I have been concerned about my drinking of alcohol or substance use	.889	
3	I have experienced withdrawal symptoms like agitation when I stopped alcohol/substance use	.864	
4	I have neglected people close to me due to my alcohol or substance use	.830	
5	Someone has expressed concern about my alcohol drinking or substance use	.802	
6	I experience breathlessness in the absence of physical activity	.611	
7	I often have feelings of faintness	.562	
8	I have used drugs other than those required for medical reasons	.439	
	Suicidal Ideation		**0.915**
9	I have told someone I was going to commit suicide or might commit suicide	.867	
10	I have thought of killing myself at least once	.838	
11	I have experienced a terrible incidence as a victim or witness that has impacted me significantly	.794	
12	I often feel dark or unhopeful of the future	.708	
13	I have experienced more than a week lower-than-usual interest in activities that I usually enjoy	.597	
14	I frequently worried about something that I am unable to sleep at night	.506	
15	I have often had trouble focusing on school	.504	
16	I feel it is very difficult for me to express myself in words that others can understand	.496	
17	I try hard not to think about event(s) or situations that reminded me of event(s) that happened	.459	
	Campus Loneliness		**0.894**
18	I feel isolated from others on campus	.968	
19	I feel as if nobody really understands me on campus	.715	
20	I find it difficult to communicate with professors or advisors	.674	
21	I am unhappy doing so many things on campus alone	.614	
22	I feel my interests are not shared by those around me on campus	.547	
23	It is difficult for me to make friends on and off campus	.537	
24	I feel I share absolutely nothing in common with other people around me	.459	
	Depression		**0.929**
25	I feel sad or depressed	.843	
26	I feel that I had lost interest in just about everything	.759	
27	I feel life is meaningless	.736	
28	I feel that there is nothing to get excited about	.732	
29	I often experience negative feelings	.732	
30	It feels difficult to get going with issues on and off campus	.538	
	Stress		**0.860**
31	I found it difficult to calm down after something upset me	.778	
32	I tend to over-react to situations	.667	
33	I feel that I find myself getting agitated consistently	.661	
34	I find myself getting angry at even the smallest of situations	.584	

Research Question Four

Q4 Overall, to what extent is the proposed college mental health assessment model adequate in modeling scores from the population of interest?

Confirmatory factor analysis (CFA) is a structural equation modeling (SEM) statistical technique used to verify the factor structure of a set of observed variables. It allows a researcher to test the premise that a relationship exists between observed variables and their underlying latent constructs. CFA is used primarily in 1) psychometric evaluation of measures; 2) construct validation; 3) testing method effects; and 4) testing measurement invariance (Brown, 2006). In this research, CFA was used for psychometric evaluation and construct validation of the CMHAI retained five extracted factors (subscale) with 34-items from the EFA.

After reviewing the EFA results and retaining five factors relevant to the purpose of the research, the reduced CMHAI with a total of 34 statements items was used collect a different set of data from the population of study. 230 participants who are currently pursuing their undergraduate degree within the United States responded to the CMHAI survey, which now comprised the five identified subscales (Addiction, Suicidal Ideations, Campus Loneliness, Depression and Stress). The CFA was then conducted with the second data on Mplus statistical software, producing the results reported below in “Model Fit Information” and “Standardized Factor Loading” estimates. First, the data was explored. Table 4.7 show the descriptive statistics of the CFA data containing the mean, standard deviation (SD) skewness and the kurtosis.

Table 4. 7

Confirmatory Factor Analysis Data Descriptive Statistics

	Descriptive Statistics			
Item	Mean	SD	Skewness	Kurtosis
AQ1	2.31	1.76	1.15	-0.04
AQ2	2.52	1.86	0.90	-0.59
AQ3	2.55	1.91	0.88	-0.66
AQ4	2.45	1.87	0.99	-0.46
AQ5	2.61	1.96	0.83	-0.80
AQ6	2.97	1.88	0.48	-1.09
AQ7	3.36	1.93	0.21	-1.32
AQ8	3.13	2.07	0.30	-1.46
SIQ1	2.79	1.89	0.67	-0.87
SIQ2	3.73	2.17	-0.01	-1.53
SIQ3	3.39	2.07	0.32	-1.26
SIQ4	3.74	1.96	0.05	-1.15
SIQ5	3.90	1.98	-0.10	-1.23
SIQ6	4.04	2.03	-0.11	-1.30
SIQ7	4.44	1.79	-0.48	-0.76
SIQ8	4.53	1.89	-0.50	-0.86
SIQ9	4.16	1.95	-0.27	-1.11
CLQ1	3.97	1.84	-0.13	-1.11
CLQ2	3.93	1.87	-0.06	-1.17
CLQ3	3.95	1.74	-0.06	-1.02
CLQ4	4.06	1.94	-0.05	-1.20
CLQ5	3.85	1.80	0.10	-1.04
CLQ6	4.33	1.82	-0.32	-0.94
CLQ7	3.59	1.80	0.21	-0.99
DPQ1	3.92	1.95	-0.05	-1.24
DPQ2	3.51	1.91	0.27	-1.06
DPQ3	3.29	1.96	0.41	-1.12
DPQ4	3.33	1.91	0.38	-1.06
DPQ5	3.99	1.95	-0.06	-1.22
DPQ6	3.71	1.90	0.18	-1.07
STQ1	4.38	1.75	-0.34	-0.89
STQ2	4.25	1.81	-0.22	-1.04
STQ3	4.18	1.76	-0.24	-0.94
STQ4	4.08	1.86	-0.15	-1.17

Figure 4.6 shows the distribution of the CFA data by ages of the participants in the study which are fairly distributed among the various age. Figure 4.7 shows the variability of the CFA data by race/ethnicity which fairly represent the composition of race/ethnicity in the population of study.

Figure 4. 6

Descriptive Bar Chart for CFA Data by Participants' Ages

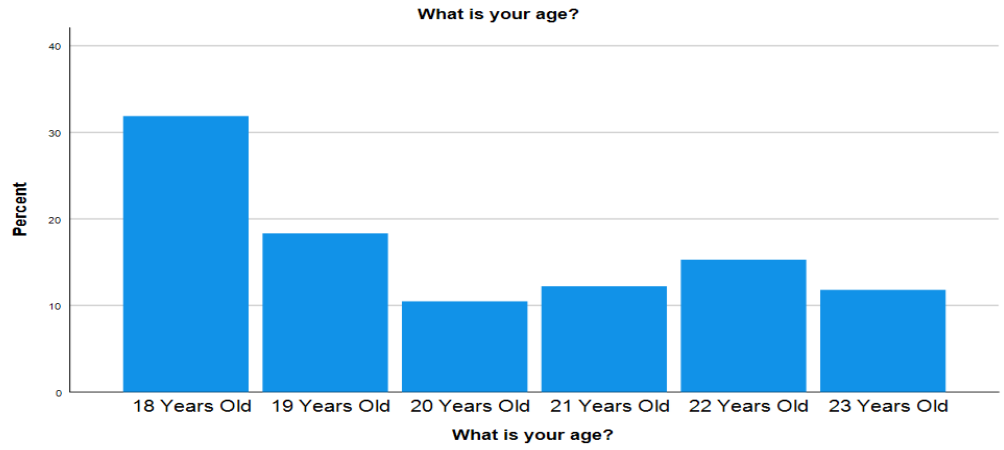
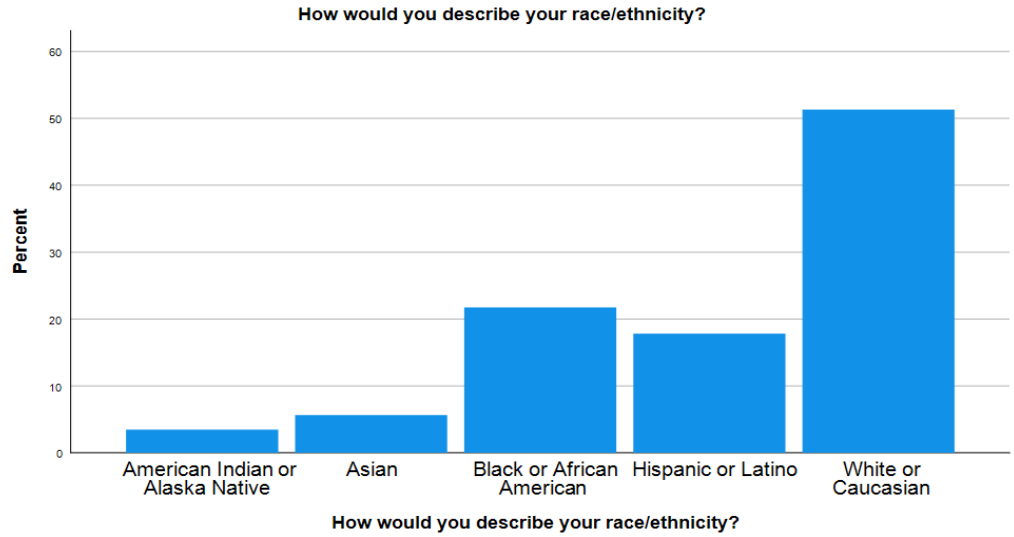


Figure 4. 7

Descriptive Bar Chart for CFA Data by Participants' Race/Ethnicity



Confirmatory Factor Analysis Model Fit Information

Model fit information is one of the key assessments made in structural equation modeling (SEM). Using SEM confirmatory factor analysis (CFA) in testing the CMHAI five factor model, the model fit information was analyzed to know how the data collected with the developed inventory fit the extracted five-factor model.

There are several guidelines and suggestions by different authors for “acceptable” model fit. Acceptable, good, or excellent model fit refers to a situation where the data being used in testing the hypothesized, or theorized model produces estimate values that meet a consensus by different researchers. In this research, I referred to the Hu and Bentler (1999) cutoff criteria in addition to Kline (2005) and Brown (2006) recommendations. It is important to note that these authors recommend reporting several of the same fit indices, but their criteria for acceptable fit are slightly different, with Brown (2006) being a little more conservative as referred to below.

Hu and Bentler (1999) suggested that it is difficult to designate a specific cutoff value for each fit index because it does not work equally well with various conditions. They recommended that practitioners use a cutoff value close to .95 for TLI and CFI in combination with a cutoff value close to .09 for SRMR to evaluate a model fit. In their study, a combinational rule with RMSEA >.06 and SRMR >.09 resulted in the least sum of Type I and Type II error rates.

According to Kline (2005), RMSEA ≤ .05 indicates close approximate fit, values between .05 and .08 suggest reasonable error of approximation, and RMSEA ≥ .10 suggests poor fit. CFI and TLI greater than roughly .90 may indicate reasonably good fit of the researcher’s model, and SRMR values less than .10 are generally considered favorable.

Brown (2006) recommends a RMSEA close to 0.06 or less; SRMR close to 0.08. or less; CFI close to 0.95 or greater; and TLI close to 0.95 or greater. Brown went on to state that his use of “close to” is purposeful as it is important to note that these are not rigid guidelines.

The full meaning of the initials in table 4.8 and table 4.9 are Comparative Fit Index (CFI); Tucker-Lewis index (TLI); Root mean square error of approximation (RMSEA); and Standardized Root Mean Square Residual (SRMR). Table 4.8 presents the initial result of the CFA. A review of the output analysis showed that RMSEA value of 0.071 is a little higher than recommended; as a

result, the modification indices were reviewed. Items AQ7 (factor1) and SIQ1 (factor 2) are sequentially suspended from the hypothesized model and the CFA reconducted. Table 4.9 present the modified CFA model fit information which meets the acceptable recommendations of Brown (2006), which is a little more conservative.

Table 4. 8

Initial Confirmatory Factor Analysis Model Fit Information

	X^2	*df*	CFI	TLI	RMSEA	SRMR
CMHAI Model	1123.464	517	0.956	0.952	0.071	0.065

Table 4. 9

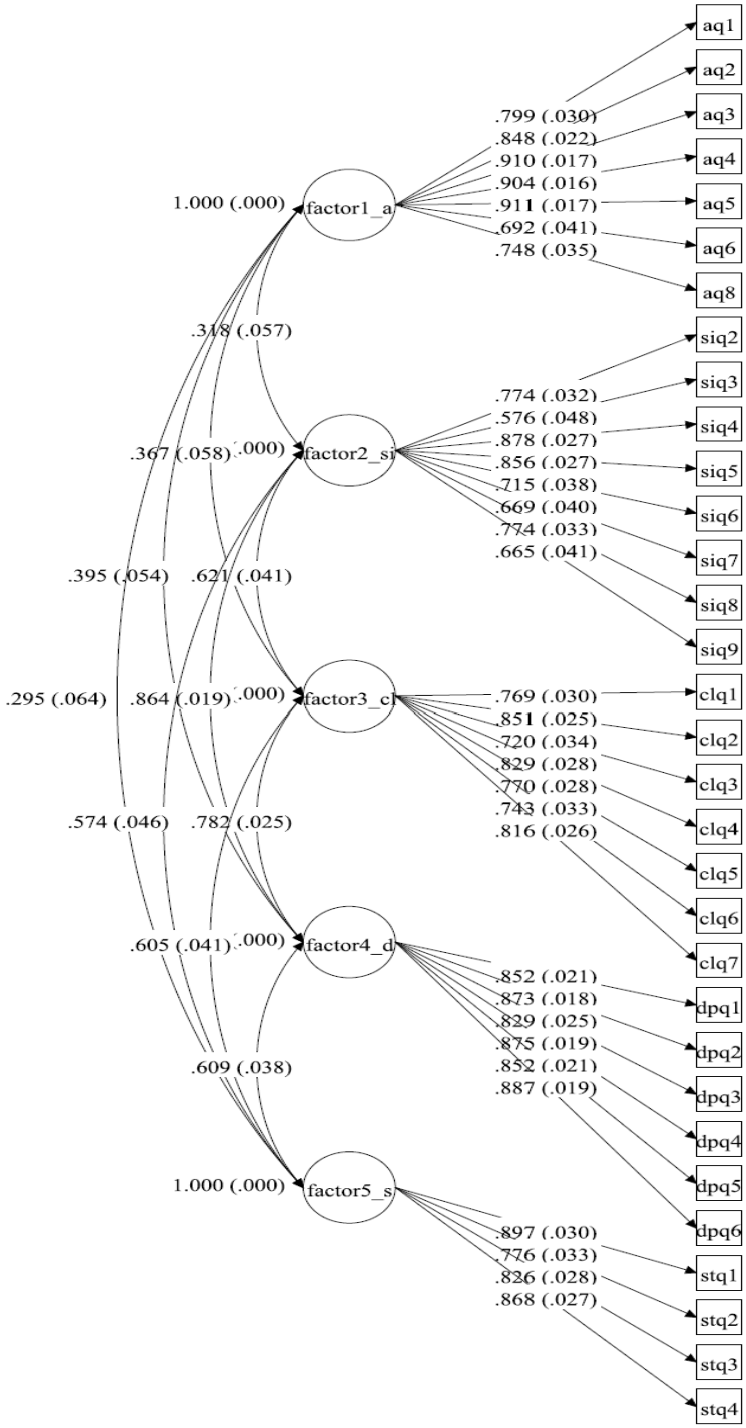
Modified and Reported Confirmatory Factor Analysis Model Fit Information

	X^2	*df*	CFI	TLI	RMSEA	SRMR
CMHAI Model	830.862	454	0.972	0.969	0.060	0.053

Model diagram of the five factors hypothesized CMHAI model from EFA tested using a different set of data collected from the population of study to conduct CFA (construct validity) is presented in Figure 4.8 with the standardized estimates of factor loading and error variance.

Figure 4. 8

College Mental Health Assessment Inventory Model Diagram



Note. This figure shows the final tested model with 32-items and five subscales.

All factor loadings for the 34 items were reviewed and are all above the minimum of .32 as advised by Tabachnick and Fidell (2001). Table 4.10 present the factor loadings estimates for the items as well as the reliability estimates for each of the subscales.

Table 4. 10

Confirmatory Factor Analysis Items Factor Loading and Reliability Estimates

Factor/Items	STDYX Factor Loading	Cronbach Alpha (α)	McDonald Omega (ω)
Factor 1(F1_A) Addiction		.914	.917
I have at least a cup of alcoholic drinks or drugs first thing in the morning to steady my nerves	0.799		
I have been concerned about my drinking of alcohol or substance use	0.848		
I have experienced withdrawal symptoms like agitation when I stopped alcohol/substance use	0.910		
I have neglected people close to me due to my alcohol or substance use	0.904		
Someone has expressed concern about my alcohol drinking or substance use	0.911		
I experience breathlessness in the absence of physical activity	0.692		
I have used drugs other than those required for medical reasons	0.748		
Factor 2(F2_SI) Suicidal Ideation		.886	.885
I have thought of killing myself at least once	0.774		
I have experienced a terrible incidence as a victim or witness that has impacted me significantly	0.576		
I often feel dark or unhopeful of the future	0.878		
I have experienced more than a week lower-than-usual interest in activities that I usually enjoy	0.856		
I frequently worried about something that I am unable to sleep at night	0.715		
I have often had trouble focusing on school	0.669		
I feel it is very difficult for me to express myself in words that others can understand	0.774		
I try hard not to think about event(s) or situations that reminded me of event(s) that happened	0.665		
Factor 3 (F3_CL) Campus Loneliness		.903	.902
I feel isolated from others on campus	0.769		
I feel as if nobody really understands me on campus	0.851		
I find it difficult to communicate with professors or advisors	0.720		
I am unhappy doing so many things on campus alone	0.829		
I feel my interests are not shared by those around me on campus	0.770		
It is difficult for me to make friends on and off campus	0.743		
I feel I share absolutely nothing in common with other people around me	0.816		
Factor 4 (F4_D) Depression		.927	.926
I feel sad or depressed	0.852		
I feel that I had lost interest in just about everything	0.873		
I feel life is meaningless	0.829		
I feel that there is nothing to get excited about	0.875		
I often experience negative feelings	0.852		
It feels difficult to get going with issues on and off campus	0.887		
Factor 5 (F4_S) Stress		.886	.887
I found it difficult to calm down after something upset me	0.897		
I tend to over-react to situations	0.776		
I feel that I find myself getting agitated consistently	0.826		
I find myself getting angry at even the smallest of situations	0.868		

The reliability for each of the subscale was assessed and presented on Table 4.11 for the internal consistency reliability coefficients (Cronbach alphas) and Table 4.12 for the McDonald Omega coefficients. All the internal consistency reliability coefficients (Cronbach alphas; Cronbach, 1951) for the subscales were above .80, which is considered acceptable for basic research. The McDonald's Omega (ω) reliability was conducted with the CFA model to compare to the Cronbach's alpha values. The reliability values for McDonald Omega coefficients for the five factors (subscales) are above .88. The reliability estimates for all the subscales (factors) in the CMHAI were above .83.

Table 4. 11

The Internal Consistency Reliability Coefficients

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Cronbach's Alpha (α)	0.914	0.886	0.903	0.927	0.886

Table 4. 12

The McDonald Omega Reliability Coefficients

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
McDonald Omega (ω)	0.917	0.885	0.902	0.926	0.887

Considering the suggestions and recommendations above and reviewing the values of estimates from the analysis of data collected with the proposed CMHAI model as presented on the "Model Fit Information and Factor Loading" tables, it can be concluded that the findings of the research confirmed that the developed inventory model fit well with the data collected from the population of study that this assessment inventory is designed for.

Summary

This chapter reported the findings that emerged from the data analysis. Several themes/constructs emerged from the qualitative strand of this research, leading to a proposed CMHAI model around which the inventory items for CMHAI were developed and tested with quantitative research statistical techniques of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The constructs that emerged from the data generated from each of the qualitative research questions were as follows: addiction, anxiety, depression, campus loneliness, PTSD, stress, suicidal ideation, schizophrenia, sexual identity, and rejection. Further qualitative discussion gave contextual insight that led to the following themes: (a) students coming to college with pre-existing mental health conditions; (b) students' expectation about college versus actual experience; (c) college as a new environment brings about feelings of loneliness; and (d) ethical issues relating college students seeking mental health support.

The results from the EFA conducted on the initial eight constructs emerging from the qualitative part of the research extracted seven factors. Further review of the EFA output led to dropping of two factors with less than four items producing a hypothesized CMHAI model from the EFA with five-factor and 34 items. The CFA conducted on the different set of data collected from the population of study using the reduced five factors model produced excellent model fit information, factor loading and reliability (internal consistence) estimates or coefficients.

Chapter 5 provides further discussion on the findings, conclusion, recommendations, limitations, and implications of the study.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Mental health is fundamental to our collective and individual ability as humans to interact and engage with our immediate environment, to learn, grow, and enjoy life. As noted by the World Health Organization (WHO), multiple social, psychological, and biological factors determine the level of mental health of a person at any point in time (WHO, 2014). Students' wellbeing is foundational to their academic success. The National Academies of Sciences, Engineering, and Medicine (NASEM), reviewing studies on this topic, have found the dropout rates for students with a diagnosed mental health problem range from 43 percent to as high as 86 percent (NASEM, 2021). NASEM went on to state that, while dealing with stress is a normal part of life, for some students, stress can adversely affect their physical, emotional, and psychological health, particularly given that adolescence and early adulthood are when most mental illnesses are first manifested. Many undergraduate students experience the onset of mental health and substance abuse problems or an exacerbation of their symptoms during this critical developmental stage (Pedrelli et al., 2015).

The rise in mental health, emotional, and behavioral issues that are reflected in a remarkable increase in psychological distress being reported at colleges and universities throughout the U.S. makes this research relevant and timely. Postsecondary students, from those attending community colleges to professional private institutions including graduate students, are reporting rising rates of anxiety, depression, suicidal thoughts, trauma, and substance abuse (Xiao et al., 2017). Students' mental health requires urgent deliberate commitments and efforts

from college administrators and policy makers to address the increasing challenges. Research should be an integral part of that efforts. These increases call for substantial improvements in how the nation's institutions of higher learning engage with students, and for institutions to recognize how their policies, practices, and cultures can affect and support student mental health and wellbeing more broadly (Posselt, 2018). Treating mental illness at a critical stage in an individual's development such as the college student age is key to lessening dropout rates for students with mental health challenges. In addition, absence of this treatment increases the potential for prolonging mental health conditions. An effective assessment inventory particularly designed for the college students' population can provide an opportunity for care that is urgently needed.

This research sought to address the problem that, to the best of my knowledge, there is no multi-dimensional mental health assessment instrument designed particularly for college students. This population is unique because of their stage in human development and the academic rigor expected of college students. Using an assessment tool designed particularly for this population will provide an additional opportunity for institutions of higher education to tackle the increasing mental health challenges among college students. The purpose of this study was to develop a multidimensional College Mental Health Assessment Inventory (CMHAI) specifically for the college student population. The developed inventory will serve as an additional tool in the toolkits of college mental health counselors and practitioners.

The methodology used in this research was an exploratory sequential mixed methods design, in which qualitive research data is first collected and analyzed. These findings are then used to inform the quantitative research data collection and analysis phase (Fetters et al., 2013) to provide an in-depth understanding of the nature of college students' mental health challenges.

The research questions used in this research explored how college students perceive and describe mental health incidences on college campus as well as their description of common mental health indicators on campus. The findings and implications for college student mental health and future research discussed in this chapter were guided by the primary purpose of this research – to develop a multi-dimensional college mental health assessment inventory (CMHAI) that could be used as an additional tool by college mental health practitioners and counselors to assist them in addressing the alarming increase in mental health needs on college campuses. It is my belief that such an inventory is both necessary and timely.

Discussion of Findings

There are four main findings that emerged from this research that can be helpful in addressing the increasing mental health needs on college campuses. The findings present a picture of college students' level of awareness and familiarity with mental health on college campuses. These findings include:

- A description of the current understanding of the issues of mental health by college students;
- A description of ethical issues surrounding students who are seeking mental health support on campus and institutions publicizing to students the available support they can use;
- A list of themes (indicators/constructs) of mental health experienced among college students from which inventory items were developed; and
- The exploration of the dimensionality, extraction and validation of a newly developed college mental health assessment inventory (CMHAI) model using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to

develop and evaluate the psychometric properties of the inventory items that emerged from the qualitative strand of this research.

Current Understanding of the Issues of Mental Health by College Students

This finding was well supported by literature regarding the concerns of college students about their mental well-being due to the complications of their stage of development in addition to the academic rigor that goes with college education. It presented a comprehensive view of the significance of balancing academic stress and emotional well-being for a successful college experience. This comprehensive review by students supports the argument that advancement in medicine has made enrollment possible for students in college today who would not have been able to attend college in the past. The students interviewed for the qualitative phase of this research discussed their understanding of some college students coming to college with pre-existing mental health conditions. Participants highlighted their expectations about college versus their actual experiences when they got to college. Also, they discussed feelings of loneliness on college campus even though campuses appear to be busy with many students and activities. This feeling of loneliness was attributed by the participants to the idea of campus being a new environment.

Pre-Existing Mental Health Conditions

Regarding the idea that some college students come to college with pre-existing mental health conditions, the National Academies of Sciences, Engineering, and Medicine (NASEM, 2021) emphasized that while dealing with stress is a normal part of life, for some students, stress can adversely affect their physical, emotional, and psychological health, particularly given that adolescence and early adulthood are when most mental illnesses are first manifested. In addition

to students who may develop mental health challenges during their time in postsecondary education, many students arrive on campus with a mental health problem or having experienced significant trauma in their lives, which can also negatively affect their physical, emotional, and psychological wellbeing. This point was equally emphasized by Levine and Cureton (1998a) when they remarked in their study that students are coming to college overwhelmed and more damaged than those students of previous years. Although it is a time of emotional and intellectual growth, pursuing a postsecondary education, whether at a community college, baccalaureate institution, or in a graduate or professional degree program, can be a stressful and challenging experience for many students and negatively affect their wellbeing (Liu et al., 2019).

The Covid-19 pandemic that forced colleges and universities across the United States to lock down campuses in March 2020 and changed instructional methods to remote virtual classrooms (Sylvester, 2021) increased the already significant mental health challenges of college students across the country. Lipson et al. (2019) stated that college students' rates of mental health diagnoses and use of services on college campuses rose significantly from 2007 to 2017. This point was further substantiated by a study by Hawley et al. (2021) about the concerns of college students during the Covid-19 pandemic, reporting that several students with pre-existing anxiety or depression indicated an increase in symptoms due to the pandemic. At this time, students also developed new concerns related to mental health. A majority of these psychological symptoms arose from uncertainty about the future and fears of being infected and/or contagious; students across the United States expressed proportionally more concerns about mental health, indicating this is consistent with the USA's high rates of depression overall (Country, 2020). This view was also supported by participants in this study.

The college mental health assessment inventory being developed in the research can be pivotal in helping colleges and universities who are attempting to stem the increased incidences of mental health problems among college students. Several participants expressed that from their understanding and personal experiences on campus, many students do struggle with different mental challenges. NASEM (2021) corroborated this information by stating while student mental wellness is foundational to success in college education, there are studies that show far too many college students at different levels and in all fields of study are not achieving a level of wellbeing that will enable them to thrive in an academic setting and reach their full potential. It is essential for colleges and universities to incorporate this information in their college mental health plans by allocating resources as well as training plans for mental health providers to be able to provide the needed support and care to students seeking help.

Furthermore, as alluded to by participants in this research, one of the reasons colleges and universities should care and treat the mental health of college students with the level of attention it deserves is a report from the American Council on Education that emphasizes the point that

> the connection between mental health issues and student retention, particularly for students from historically marginalized groups, has implications for the economic wellbeing of students and institutions alike. Specifically, the negative effects of behavioral health problems on student retention suggest that institutional investments in student mental health are likely to generate both increased tuition revenues for institutions and higher earnings for students who attain a college degree (Bruce-Sanford & Soares, 2019).

College Students' Expectations About College Versus Actual Experience When in College

Expectations of students can limit their engagement in learning and negatively affect their study patterns and progression. The period of transition from high school to university and the first months of study at an institution of higher education are characterized by a high level of stress and uncertainty for students (Brinkworth et al., 2009). Students' expectations of college

and their actual experience can affect their wellbeing and mental health. In a study by van Herpen et al. (2020), students described the transition to university as a 'loss experience' – feeling a loss of their former identities, former social networks and even a sense of place, with subsequent challenges related to developing a new identity. This highlights the need for universities and colleges to play a more proactive role in facilitating transitions, including managing student expectations, and providing practical and emotional support where appropriate. These expectations as shared by participants compound the experiences of college students and lead to mental health challenges that, if identified on time, can be addressed. With this self-administered multi-dimensional inventory, remote consulting might be possible as one of the ways to achieve this.

Additionally, academic requirements may be an unexpected challenge, giving rise to transition, retention issues and mental well-being of college students. Studies have reported that academic and institutional issues influence students' expectations and experiences. Transitions start before entering university, including navigating changes between years, and throughout these transitions, students must make sense of who they are and how they fit into university life (Tett et al., 2017). Navigating transitions can be psychologically demanding, potentially playing an important role in the context of student mental health as they confront the reality of college experiences being different from their expectations of college. The challenge of students' expectations about college not being their actual experience can lead to the emergence of additional difficulties for college students, who must not only adapt to the new educational environment but also to new physical and social conditions. University life requires first-year students to demonstrate greater levels of independence, self-regulation, and initiative compared to high school (Bryde & Milburn, 1990). Moreover, this transition is a period when expectations

about ‘what a university is like’ and ‘how students should behave at a university’ are formed. The mismatch between these expectations and actual experience can lead to difficulties in adaptation to university life, dissatisfaction with study, and, finally, to withdrawal in some cases (DeWitz, et al., 2009).

Feelings of Loneliness

Most of the participants expressed that, even though college campuses appear to be busy with a lot of students and activities, a lot of them have the feelings of loneliness. This is an issue relating to student mental health that was much attributed to the Covid-19 pandemic by a participant. During the pandemic, isolation, and loneliness due to stay-at-home orders also created anxiety. Negative emotions stemmed from not seeing loved ones (parents, boyfriends/girlfriends, friends, and/or grandparents). An additional concern impacting students’ mental health centered on stressors related to contracting the corona virus and spreading it to an at-risk person and the associated responsibility or guilt.

Beyond helping students build individual skills, colleges and universities may also support student wellbeing through community and group activities. Student-led groups can take many forms and focus on a range of interests, including academic, athletic, social, religious, and spiritual affiliation, community service, and professional interests, as well as groups based around student traits or identities. Building connections with peers can alleviate loneliness and provide students with a sense of belonging on campus. These groups can also help students with opportunities to reduce stress and to learn new skills, and they can serve as venues to continue activities and hobbies they may have enjoyed prior to enrolling in their program.

Ethical Issues Surrounding Seeking Mental Health Support on Campus and Publicizing Available Support to Students

Students' ethical concerns relating seeking mental health supports on campus was expressed by participants to include confidentiality, building trust, privacy during consultation, and fear of stigmatization. It is important to remember, first and foremost, that maintaining confidentiality can save lives, as this will encourage more students to seek mental health help. Students should feel safe to share personal and sometimes uncomfortable information with mental health practitioners or councilors providing support services to students. The concern expressed by students in the research is genuine that their information can be shared with others on campus. This concern can cause students to not seek help if those students feel that doing so will impact their education or aspirations by other students knowing about their mental health challenges. If students needing mental help fail to seek treatment, their symptoms may degenerate and increase safety risks to others on college campus. Additionally, if students seek help and inappropriate breach of confidentiality occurs, the situation may add stress, increase safety risks, and can deter other students from seeking mental health help.

Building trust, as expressed by the students in this study, is one of the soft skills that mental health professionals and councilors should try to achieve with students seeking help. As one of the participants stated,

> "… I feel like they don't try to understand people before diagnosing them and not actually getting to know their problems as much. So, I feel like we need to have more of a personal interaction with them before trying to get to the bottom of the mental health situation. It's important to have a personal relationship with the student to build trust for privacy."

This expression was very resounding and should be what councilors and practitioners should strive for when providing mental health services to students.

Additionally, there are confusing issues about what legal rights students have. Colleges and universities should continuously train their mental health professionals and provide them with resources that would help them serve their students better. In addition, college officials should also be trained about the importance of and exceptions to confidentiality of students' records. On the other hand, in a situation where other means like tele-health is utilized to ensure more accessibility, colleges and universities should provide students with information or possibly training through the institution's learning management system (LMS) so students can understand their rights and the risks involved. Colleges should articulate the importance of creating a culture of wellbeing on their campus, one that recognizes the range of individual behaviors and community norms that affect wellbeing, acknowledges the magnitude of mental health and substance use issues on campus, addresses the stigma associated with mental illness and substance use disorders, and provides a range of resources to support students with different levels of needs (Guina & Kay, 2012).

Stigmatization of mental health was an issue reflected a great deal by students in this research, which should not be a burden on students seeking mental health support. This is important to note because it reveals that some people will deny themselves access to needed mental health services solely based on the belief, or perception, that the public would be stigmatized toward them (Jennings et al., 2017). The purpose of college is to allow students to learn and grow. Simultaneously, there is a public expectation that colleges will keep students safe. It can be difficult for colleges – the same way it is for parents – to balance safety and structure with autonomy and privacy. Finding this balance should be guided by ethical and legal standards. Professionals in mental health can help colleges be familiar with these standards and

ensure that colleges implement policies based on the best interests of students (Guina & Kay, 2012).

Finally, it is important as reported by Covey and Keller (2018), for mental health professionals, colleges, and universities to appreciate there has been much publicity regarding many ethical issues that have impacted providing mental health services to college students, which include five main ethical dilemmas commonly faced by university mental health professionals. These dilemmas include: (1) increased demands for services without a concomitant increase in staff; (2) increase in severity of the psychological problems in students; (3) issues related to confidentiality and record-keeping; (4) variable training levels related to serving a diverse population; and (5) technology changes and student expectations (e.g., immediate availability of practitioners via social media).

The Emerged Themes (constructs)
of Mental Health Indicators
Among College Students

From the interviews conducted with participants, the themes (constructs) that emerged are addiction, anxiety, depression, campus loneliness, PTSD, stress, suicide and suicidal ideation, schizophrenia, sexual identity, and rejection among others. The 52 items or questions of the College Mental Health Assessment Inventory (CMHAI) were developed based on these constructs.

As indicated from the interviews, addiction, alcohol, and drug use among college students represent major public health problems. They have been linked to higher rates of adverse consequences in an array of domains, for example, mental health, legal issues, educational, occupational, social, etc. The most serious outcome has been death from overdose, traffic accidents, suicide, and homicide (White & Hingson, 2014). One important factor related to alcohol and drug use is emotional dysregulation. Emotional dysregulation is a multi-faceted

construct involving maladaptive ways of responding to emotions, regardless of their intensity or reactivity, including: (a) a lack of awareness, understanding, and acceptance of emotions; (b) the inability to control behaviors when experiencing emotional distress; (c) lack of access to situationally appropriate strategies for modulating the duration and/or intensity of emotional responses in order to meet individual goals and situational demands; and (d) an unwillingness to experience emotional distress as part of pursuing meaningful activities in life (Weiss et al., 2018).

Specifically, depression, anxiety and stress are considered important indicators of mental health which, if untreated, can have a negative effect on individuals. Anxiety and depression are both emotional responses leading to a very similar set of symptoms, including difficulty sleeping, fatigue, muscle tension and irritability. Between 2009 and 2015, the proportion of students with anxiety or depression increased by 5.9% and 3.2%, respectively (Oswalt et al., 2020). Whereas stress is usually caused by an external factor and can be short-term, anxiety is persistent, even in the absence of a stressor. Depression is characterized by a set of symptoms including a lack of interest in daily activities, significant weight loss or gain, sleep pattern alterations, lack of energy, loss of concentration, feelings of worthlessness or guilt and even recurrent thoughts of death or suicide. College students are at risk of experiencing stress, anxiety, and depression, which causes psychological distress and may impact their academic performance. Causes of stress during college life include academic pressure stemming from factors such as exams and workload, lack of leisure time, peer pressure, concerns about not meeting parents' expectations, establishing new personal relationships, moving to a strange location for college and financial burdens (Ramón-Arbués et al., 2020) among other issues.

Post-Traumatic Stress Disorder, also known as PTSD, can affect students who have either witnessed or experienced a traumatic event, such as a natural disaster, sexual assault, or life-threatening event, such as a serious car accident or physical attack. Trauma exposure and posttraumatic stress (PTSD) are surprisingly common in college students (Read et al., 2014). PTSD is common among college students, and PTSD frequently co-occurs with other mental health disorders. Stressful life events, defined as exposures that the student felt were traumatic or difficult to handle, included academics, career-related issues, death of a family member or friend, family problems, intimate relationships, other social relationships, finances, health problem of family member or partner, personal appearance, personal health issues and sleep difficulties (Read et al., 2014).

The finding about suicidal ideation in this research confirms the study by Becker et al., (2018) who report that suicide is the second leading cause of death among young adults, including college students. To advance prevention and intervention efforts, substantial research attention has focused on suicidal behaviors (e.g., ideation and attempts) which are common in college students. For example, in the 2016 National College Health Assessment II, 9.8% of college students indicated that they seriously considered suicide in the past year, and 1.5% reported a suicide attempt in the past year. In a survey of over 15,000 undergraduate college students, 18% reported having seriously considered attempting suicide and 8% reported attempting suicide at least once. Rates of suicidal ideation, plans, and attempts are far higher among college students age group than older adults (Becker et al., 2018).

Sexual identity, as described by students during the interview, is how one thinks of oneself in terms of to whom one is romantically and/or sexually attracted. Sexual identity may also refer to sexual orientation identity, which is when people identify or dis-identify with a

sexual orientation or choose not to identify with a sexual orientation. Sexual orientation is a component of identity that includes sexual and emotional attraction to another person. Gender identity is one's self-identification as male, female, or an alternative gender.

These emerged constructs from the interviews confirmed previous studies on college students' mental health. Wilens et al. (2008), stated the data from their study suggest the most commonly misused medications among college students include opioids, benzodiazepines (sedative/hypnotics), and amphetamine/methylphenidates (stimulants), with 5–35 % of college students having misused stimulants. Additionally, approximately one in ten young adults reported non-medical use of pain relievers. Garlow et al. (2008) stated suicidal ideation is associated with symptoms of depression, and college students who reported current suicidal ideation had more of the severe depression symptoms. Also, stress problems can range from cigarette smoking, alcohol and drug abuse, violence, and family conflict to insomnia, cardiovascular diseases, cancer, and ulcers (Quick et al., 1987). Loneliness is not only a difficult experience to weather, but many college students do not feel comfortable talking about or even admitting to their feelings. The multi-dimensional assessment inventory developed in this research can be helpful as additional tool in addressing these mental health challenges of college students.

The Extraction and Validation of the CMHAI Model Using EFA and CFA and the results

The exploratory factor analysis (EFA) as a power method for providing evidence for construct validity was conducted on data collected using the reduced final inventory from the qualitative research phase to extract the factors of items created based on the constructs that emerged. The purpose of an EFA is to describe a multi-dimensional data set using fewer indicators (items). EFA as a statistical tool is designed to determine whether a set of items in a

developed instruments can be reduced to a smaller number of factors due to clustering or correlation among items scores. If items correlate, it is then considered that those items represent and measure the same construct; this is expected if items were designed to measure the same construct, as it was in this research.

The EFA conducted on the data extracted seven factors from the developed inventory being tested using the eigenvalues > 1 (Kaiser, 1960). Each of the items in the seven factors were examined and items with loading coefficients value less than 0.4, double or triple loaded with all values less than 0.4 were removed (Izquierdo et al., 2014). The factor having the highest items extraction with coefficient value above the threshold of 0.4 is Factor 2 identified and described as the "Suicidal Ideation" subscale with nine items, which was further reduced to eight items after the construct validity using CFA. Factors 6 and 7 had the lowest items extraction of 3 items each above the threshold of 0.4.

Guided by the purpose of this research to design a multi-dimensional mental assessment scale particularly for the college student population that would measure with high degree of accuracy the underly trigger(s) of mental health incidence in college students seeking help, the seven-factor items were further carefully examined and reviewed for their relevance to the purpose of the research and with reference to the emerged constructs from the qualitative research phase. Five factors out of the seven factors were identified, described, and named while two factors were not identifiable, easily described, or directly relevant as factors or subscales to be retained, leading these items to be dropped from the inventory. Tucker and MacCallum (1997) stated that the measured variables extracted in an EFA should adequately represent the domains the factors are thought to tap and not include variables from unrelated domains. This reasoning

by Tucker and MacCallum reenforced the decision to remove those items/factors that were not relevant to achieve an accurate and reliable scale.

The five retained factors are identified and described as:

- Factor 1 – Addiction subscale with 7 items;
- Factor 2 – Suicidal Ideation subscale with 8 items;
- Factor 3 – Campus Loneliness subscale with 7 items;
- Factor 4 – Depression subscale with 6 items; and
- Factor 5 – Stress subscale with 4 items.

In instrument development, at least three measured indicators or items are needed for statistical identification of a factor, although more indicators are preferable (Izquierdo et al., 2014); others such as Fabrigar et al. (1999) recommended four to six indicators per factor. A construct with fewer than three items is generally weak and unstable; five or more strongly loading items (0.50 or better) are desirable and indicate a solid factor (Costello & Osborne, 2005). For the loading factor, Tabachnick and Fidell (2001) recommended that instrument items should load at 0.32, which equates to approximately 10% overlapping variance with the other items in that factor. The five factors retained conform with these recommendations.

Furthermore, EFA as a statistical evidence-based analysis method found that the 34 items CMHAI with subscales – addiction, suicidal ideation, campus loneliness, depression, and stress - coalesced well in five factors in a sample of currently enrolled college students in the United States. The retained five factors inventory model hypothesized from the EFA was used to collect another set of data from the population of study for validation using confirmatory factor analysis (CFA).

CFA is widely used as one of the important validation steps in the development process of an instrument. CFA is used to test construct validity, which assesses the internal structure of a measuring instrument. The result of the construct validity was found to meet the recommended acceptable model fit values for RMSEA, CFL, TLI, and SRMR (Brown, 2006; Hu & Bentler, 1999; Kline, 2005). In addition, the factor loading value of the thirty-two items in the modified CFA ranged between 0.576 and 0.911 with all significance values < .001. This indicates that each of the thirty-two items CMHAI measures represents the latent variable that it is expected to measure. The internal consistency reliability test (Cronbach's alpha, α) for the five subscales – Addiction, Suicidal Ideation, Campus Loneliness, Depression and Stress were 0.914, 0.886, 0.903, 0.927 and 0.889 respectively. The McDonald's Omega (ω) reliability was requested with the CFA model to compare to the Cronbach's alpha values. The reliability with McDonald Omega coefficients values for the five factors – Addiction, Suicidal Ideation, Campus Loneliness, Depression and Stress were 0.925, 0.886, 0.898, 0.925 and 0.883 respectively indicating that CMHAI had a high internal consistency reliability value. Therefore, it will be a valid and reliable measuring tool for the assessment of mental health incidences among the college students' population.

The analyses results of the CMHAI were compared to selected existing instruments discussed in the literature review for better context and understanding. The PHQ-9 depression scale (Kroenke et al., 2001) with a sample size of 6,000 reported content validity with a reinterview score of 88% and internal consistency reliability (Cronbach alpha) of 0.89; the MCQ 27-item instrument for depression (Gabriel & Violato, 2009) with a sample size of 63 reported criterion validity of 87%, an EFA with PCA 7-factor extractions accounting for 57.6% of variances explained with internal consistency reliability (Cronbach alpha) of 0.79; the KAST 18

items Schizophrenia scale (Compton et al., 2007) with sample size of 441 reported internal consistency reliability (Cronbach alpha) of 0.82; and the GAD-7 general anxiety (7 items) and depression (8 items) scale (Spitzer et al., 2006) with sample size of 1,184, reported an EFA with factor loading between 0.58 – 0.75 and 0.69 – 0.81 respectively.

The CMHAI reported a readability score (Flesch Reading Ease) of 67.25. This indicate that a reader needs a grade 6 level of reading or above to understand the CMHAI text. The expert review's ACP score of 81.85%. A think-aloud protocol occurred with three participants from the population of study, followed by an EFA and CFA that met the model fit. From the results of analyses reported by existing general measures, the CHMAI shows a high promise of being a reliable and valid measure for college students' mental health assessment.

Given the goal of this research, there are several purposes of mixed methods research, Greene (2007) stated there are five purposes for mixing in mixed methods research: triangulation, complementarity, development, initiation, and expansion. Greene et al. (1989) distinguished the five purposes as follows: triangulation seeks convergence, corroboration, and correspondence of results from different methods; complementarity seeks elaboration, enhancement, illustration, and clarification of the results from one method with the results from the other method; development seeks to use the results from one method to help develop or inform the other method, where development is broadly construed to include sampling and implementation, as well as measurement decisions; initiation seeks the discovery of paradox and contradiction, new perspectives of frameworks, and the recasting of questions or results from one method with questions or results from the other method; and expansion seeks to extend the breadth and range of inquiry by using different methods for different inquiry components.

For this study, the purpose was to develop a CMHAI for the college student population, and the qualitative research component informed the quantitative research component. However, the noticeable difference between qualitative and quantitative components results worthy of note in this study is that not all the themes/constructs that emerged from the qualitative data analysis were part of the retained factors in the final CMHAI model. For example, schizophrenia, PTSD, sleep disorder, social media, financial stress, sexual identity, and rejection were not included. Further CMHAI research could be conducted separately or collectively on these themes to develop assessment inventory items focusing on them.

Recommendations

The research that has been undertaken for this dissertation has highlighted some topics on which further research would be beneficial and areas where information is lacking that can be improved to advance this research. There are a number of additional areas for further research that have been highlighted by this dissertation. These include further investigation on vetting the validity scores in this study using other methods of validating the multi-dimensional mental assessment inventory. A study to confirm how realistic the reliability and validation assessments that were obtained in this initial research could be conducted via a Rasch analysis and a differential item functioning analysis on the 34 items five subscales of the College Mental Health Assessment Inventor (CMHAI-34). This would help to confirm and/or possibly quantify the magnitude of deviation in the reliability and validity that this research has established, which could result in a more reliable instrument in the toolkits of college mental health practitioners and councilors to address the significant challenge of mental health needs on college campuses.

There are also other areas for further research work to be undertaken in this dissertation such as Multigroup invariance analysis; analysis of differential item functioning to assess the

equivalence of translation of questionnaire or the translation fidelity of the CMHAI-34, which could be a comparative study of selected cultures across different or selected continents; and research specifically focusing on developing assessment measures on those themes/constructs that emerged from the qualitative research component of this study that are not part of the CMHAI-34 model subscales. This study has developed the initial inventory for the mental health assessment incidences for the college students' population and demonstrated the importance of such a study for an increasingly diverse segment of the United States population.

Information is lacking regarding existing measures related to the population of this research. This was particularly challenging as, after identifying the gap for this research and the reported increase of incidence of mental health among college students' population worldwide, embarking on a deductive approach trying to find existing inventories for the college student population's mental health assessment resulted in no known existing multi-factor instruments.

Limitations

Areas of limitations for research like this are the required time and resources needed to conduct a mixed methods research, often requiring a team of researchers to conduct the research and having access to a large sample size. Although the sample size used for this research is considered adequate and reasonable, repeating this study with an even larger sample size is encouraged. Using a large sample size in instrument development has many advantages, including but not limited to reducing or eliminating measurement errors, biases, and statistical power worries, and increasing the generalizability of the research findings, among other relevant considerations.

Finally, using a team of researchers to work in parallel, sequentially, or jointly from a disciplinary-specific basis would be of great benefit for research like this. The research team can

leverage their time and abilities using a shared conceptual framework that draws together disciplinary-specific theories, concepts, and approaches, as well as a diversity of thoughts and skills to address the common research purpose. This type of group effort would certainly improve the quality of the research more than the research conducted by a single researcher.

Implications

Over the past two decades, the increasing mental health needs on college campuses has continued in a steady rise with no possibility or signs of slowing down. Finding a solution that will be efficient and effective in assessing and providing the needed timely help and support to college students is essential. Upon completion of this research, the next step would be to develop the CMHAI-34 into an app (desktop and mobile) that can be deployed remotely, as it could be a self-administered, multidimensional assessment inventory that could be used by college and university mental health practitioners. Students would be served better, as an early intervention can stop the worsening of a mantal health illness and increase the chances of academic success by affected students with mental health needs. The ability of the tool to be deployed remotely and self-administered would increase the urgent action needed to address the challenges of today's college students' mental health needs.

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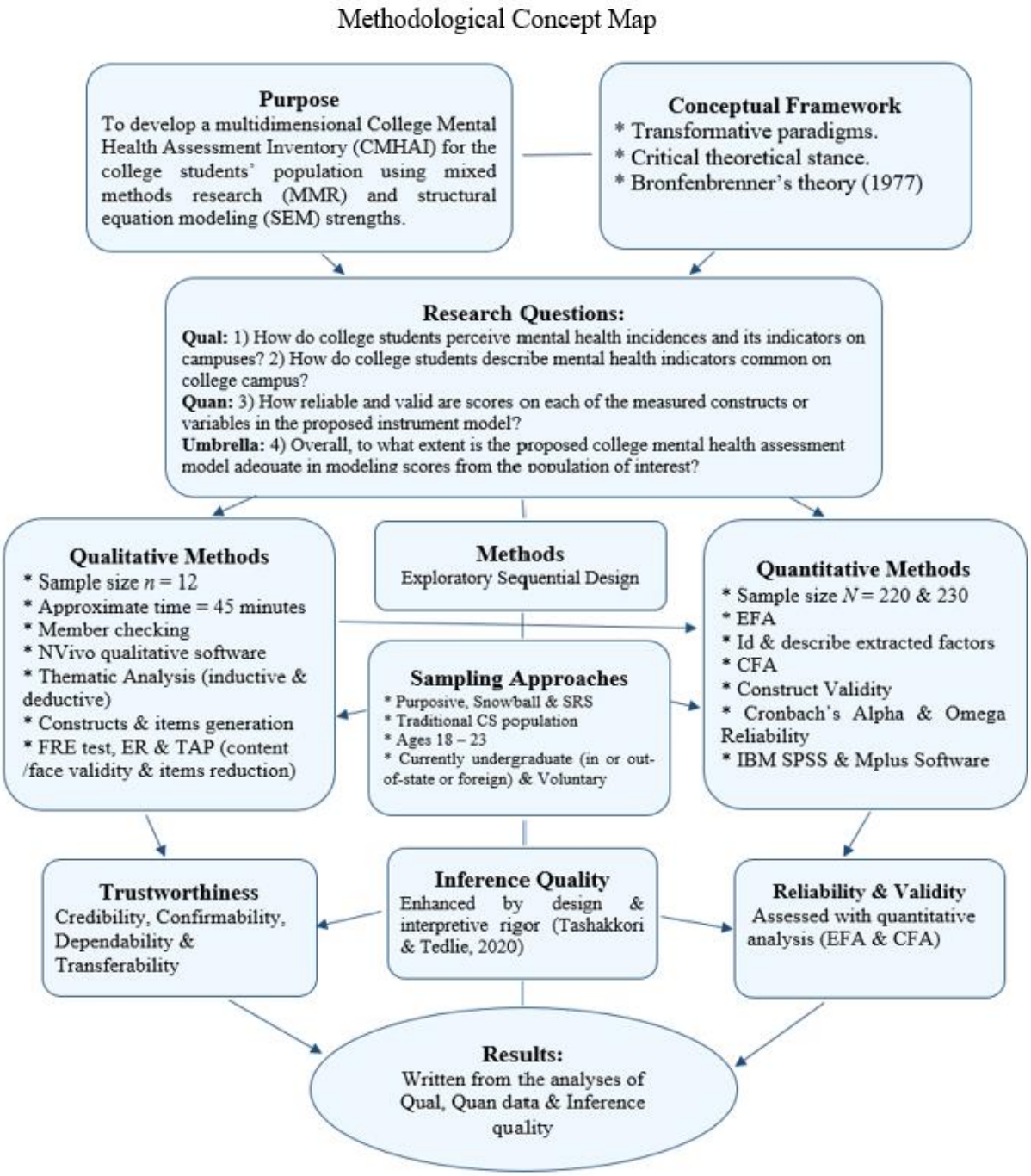
APPENDIX A

VISUAL SUMMARY OF DISSERTATION RESEARCH

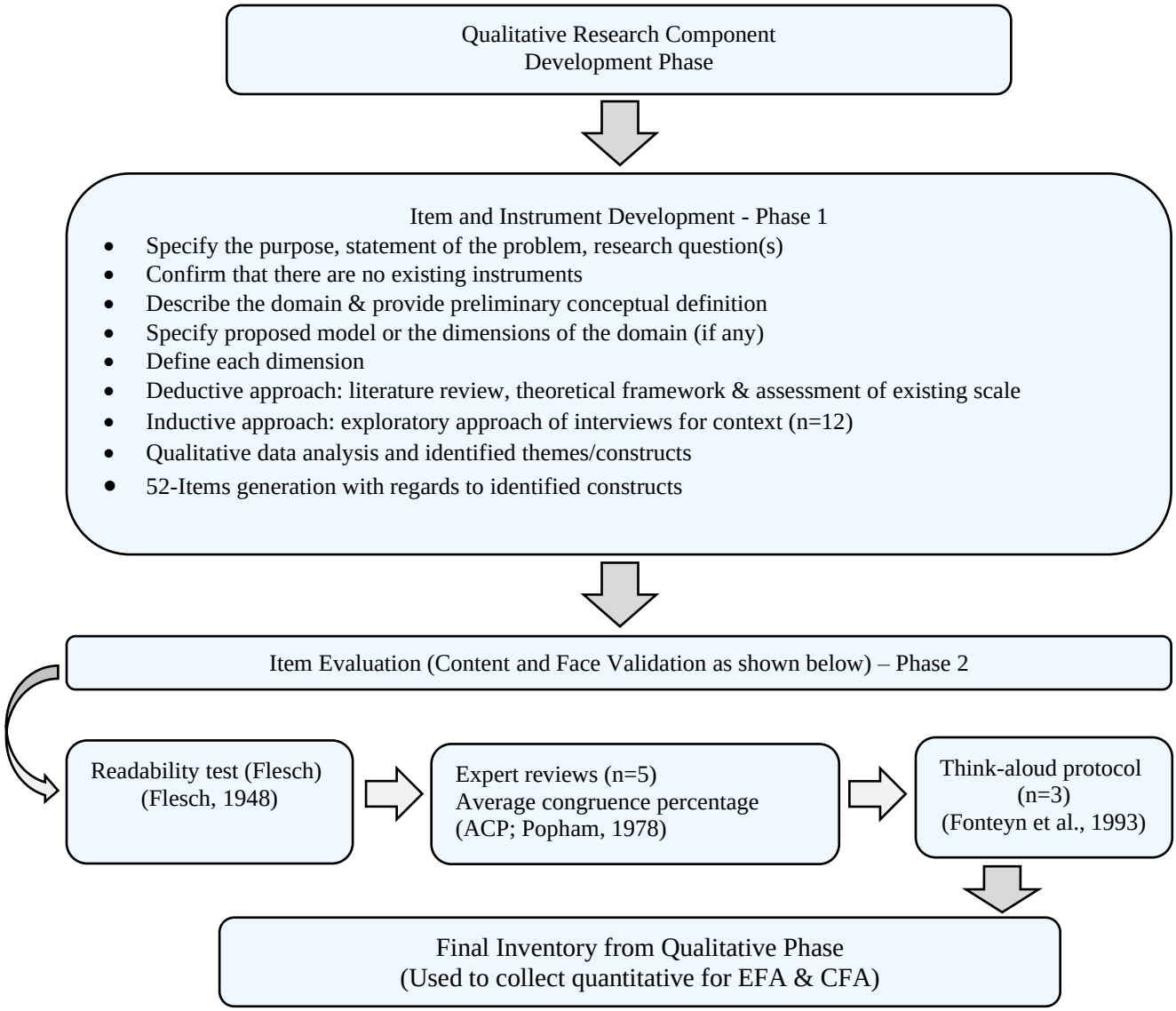
Visual Summary of Dissertation Research



The figure above shows the various research methods used in this dissertation research.

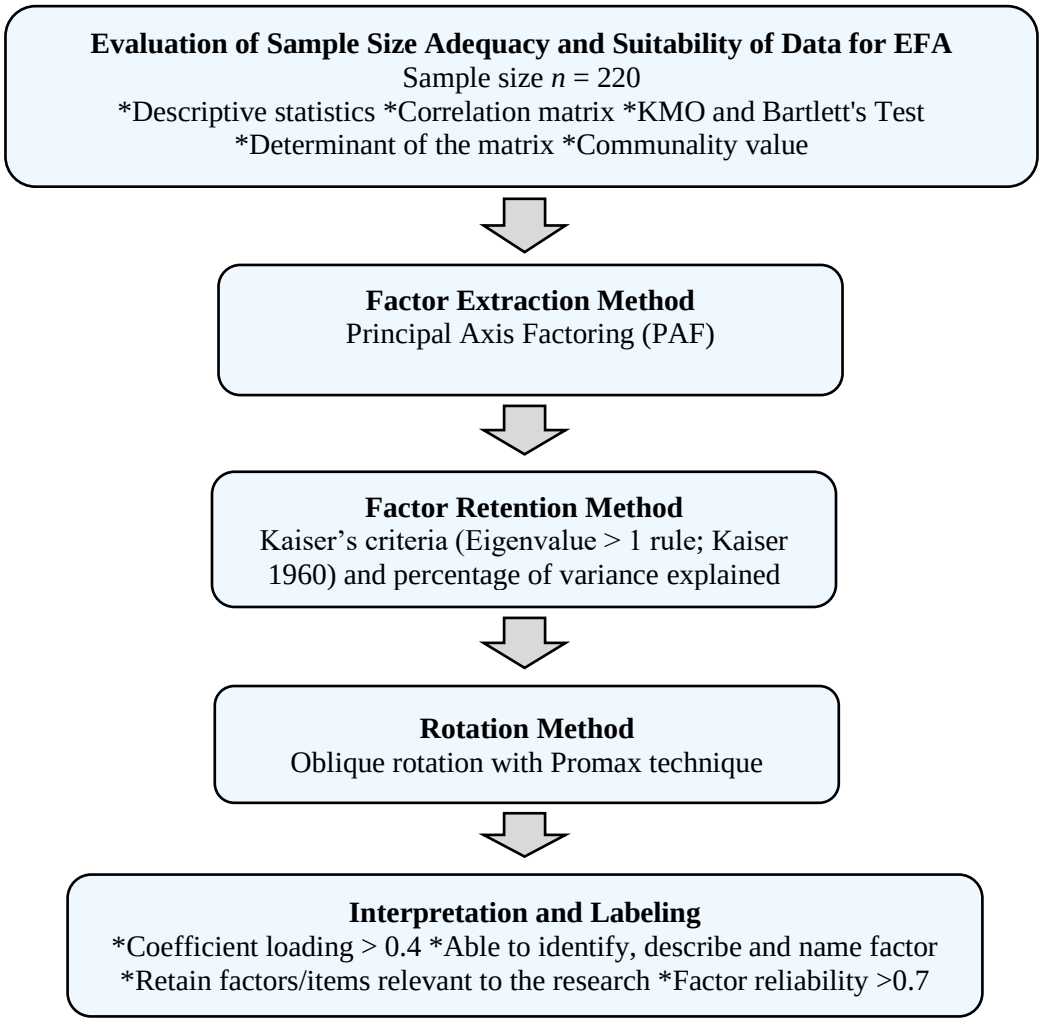
Qualitative Research Component (Phases 1 & 2)

The qualitative research component covers the initial contextual research process leading inventory items development and evaluation. The process involves initial review of literature to identify and specify the boundaries of the domain, identify appropriate research questions that fits the identified research gap leading to conducting exploratory interview to identify themes/constructs relevant to the purpose of the research. The inventory items are created based on the emerged constructs (domains). The developed items were then evaluated by conducting readability test, expert reviews, and think-aloud protocol (content validity). The activities carried out in this dissertation research are shown below:



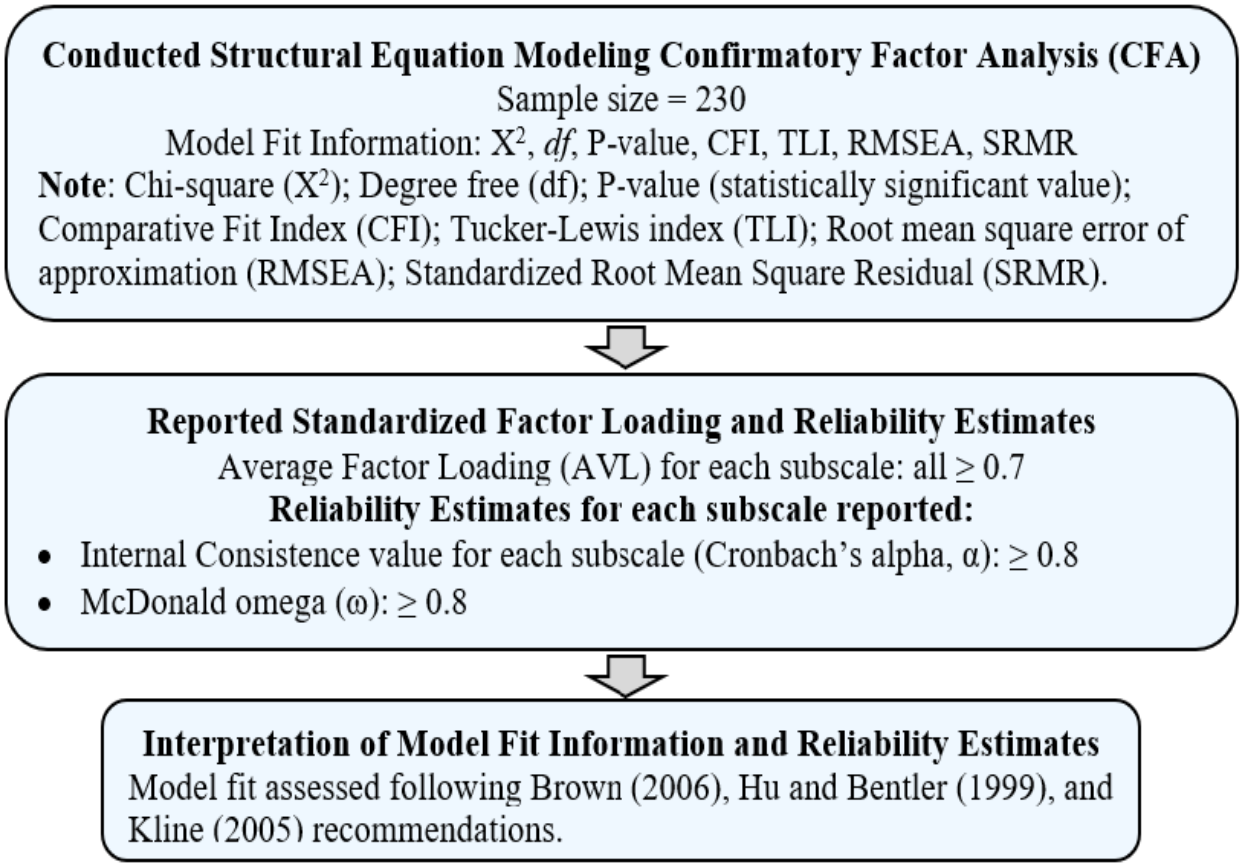
Quantitative Research Phases (3 & 4) – Implementation Steps

Phase 3: The Exploratory Factor Analysis (EFA; factor extraction, retention & reliability) – This is to ensure that generated and evaluated items or questions from the Qualitative research phases are meaningful. This phase also assesses the extent to which these items reflect the constructs (domains) identified. The data collected with the developed instrument was used to further analyze the CMHAI based on the purpose of the research.



Note: Five factors out of the seven extracted factors were retained resulting in 34-items inventory with five subscales described as Addiction, suicidal ideation, campus loneliness, depression, and stress. This was used to collect different sample from the population of study for further validation using CFA.

Phases 4: Confirmatory Factor Analysis (CFA; validation of extracted model from EFA and reliability assessment) is the final phase in this dissertation research. The assessed and reduced inventory from EFA that met the purpose of the research was used to collect new set of data (different sample) from the population of study with minimum measurement errors for the scale validation.

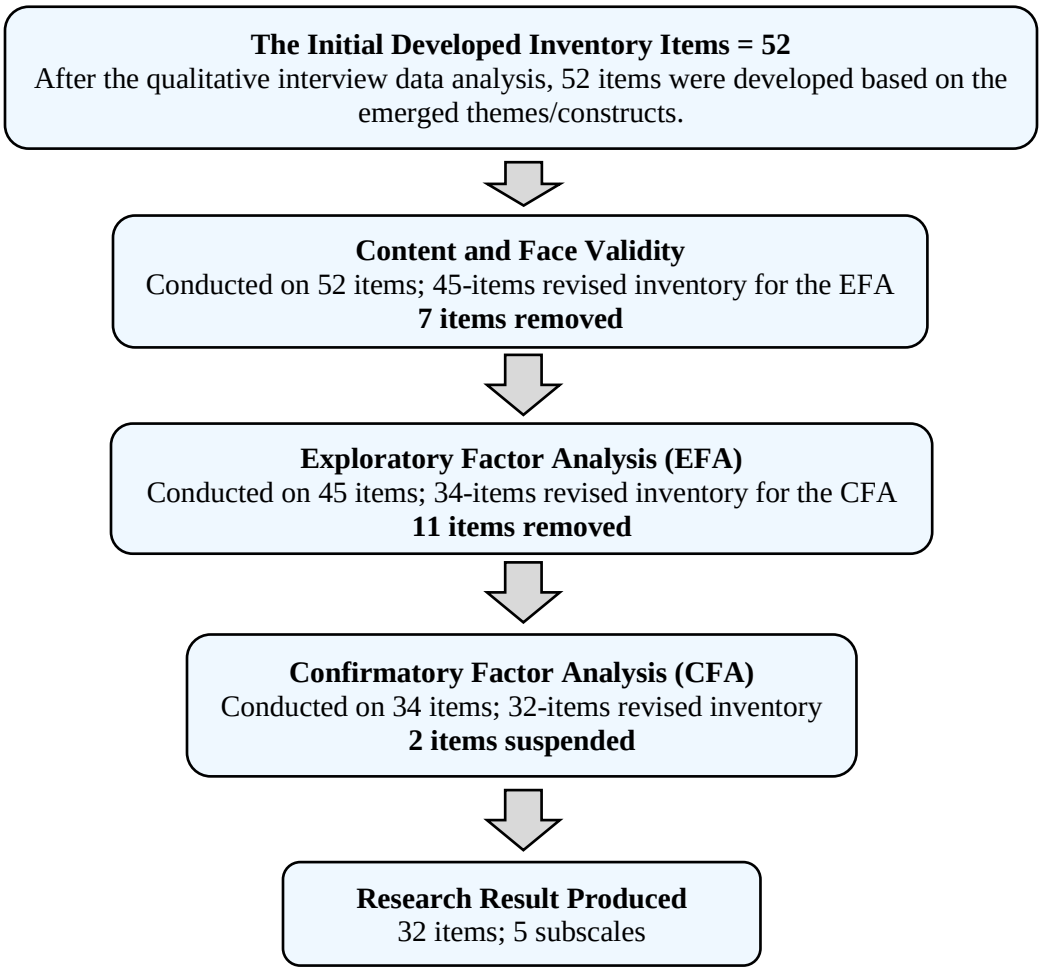


Exploratory factor analysis (EFA) was conducted to answer this research question and the results are shown below. To evaluate the sample size adequacy and suitability of the data, the following were computed to explore the distributional properties of the data:

- Descriptive Statistics (Mean, standard deviation, skewness, kurtosis, and bar-chart)
- Kaiser-Meyer-Olkin (KMO; >0.5)
- Bartlett's Test of Sphericity (Approx. X2 value, df & statistically sig.)
- Determinant of the matrix
- Communality value – met (ranges from 0.406 – 0.789) Osborne et al. (2008) suggested 0.4 is acceptable for PAF extraction)

CMHAI Development Summary Chart

The summary chart for the inventory development started with the initial generated items.



Note: The emerged and retained factors at the end of the dissertation research are - Addiction subscale – 7 items, Suicidal Ideation subscale – 8 items, Campus Loneliness subscale – 7 items, Depression subscale – 6 items and Stress subscale – 4 items.

APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

Date:	06/17/2022
Principal Investigator:	John Sylvester
Committee Action:	**IRB EXEMPT DETERMINATION – New Protocol**
Action Date:	06/17/2022
Protocol Number:	2206039643
Protocol Title:	Developing a Mental Health Assessment Inventory for the College Student Population
Expiration Date:	

The University of Northern Colorado Institutional Review Board has reviewed your protocol and determined your project to be exempt under 45 CFR 46.104(d)(702) for research involving

Category 2 (2018): EDUCATIONAL TESTS, SURVEYS, INTERVIEWS, OR OBSERVATIONS OF PUBLIC BEHAVIOR. Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met: (i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects; (ii) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or (iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 45 CFR 46.111(a)(7).

You may begin conducting your research as outlined in your protocol. Your study does not require further review from the IRB, unless changes need to be made to your approved protocol.

As the Principal Investigator (PI), you are still responsible for contacting the UNC IRB office if and when:

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

- You wish to deviate from the described protocol and would like to formally submit a modification request. Prior IRB approval must be obtained before any changes can be implemented (except to eliminate an immediate hazard to research participants).
- You make changes to the research personnel working on this study (add or drop research staff on this protocol).
- At the end of the study or before you leave The University of Northern Colorado and are no longer a student or employee, to request your protocol be closed. *You cannot continue to reference UNC on any documents (including the informed consent form) or conduct the study under the auspices of UNC if you are no longer a student/employee of this university.
- You have received or have been made aware of any complaints, problems, or adverse events that are related or possibly related to participation in the research.

If you have any questions, please contact the Research Compliance Manager, Nicole Morse, at 970-351-1910 or via e-mail at nicole.morse@unco.edu. Additional information concerning the requirements for the protection of human subjects may be found at the Office of Human Research Protection website - http://hhs.gov/ohrp/ and https://www.unco.edu/research/research-integrity-and-compliance/institutional-review-board/.

Sincerely,

Nicole Morse
Research Compliance Manager

University of Northern Colorado: FWA00000784

APPENDIX C

QUALITATIVE CONSENT FORM

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
UNIVERSITY OF NORTHERN COLORADO

Project Title: Developing and Assessing the Psychometric Properties of a Multidimensional College Mental Health Assessment Inventory: A Mixed-Methods Study

Researcher: John Sylvester, Ph.D. Student in Applied Statistics and Research Methods
Email: sylv8245@bears.unco.edu

Doctoral Advisor: Randy Larkins, Ph.D. **Phone**: (970) 351-1676, **Email**: randy.larkins@unco.edu

By signing this consent form and emailing it back to me, you are indicating the following:

You are choosing to volunteer to participate in methodological mixed methods research conducted by John Sylvester at the University of Northern Colorado.

Purpose and Description: This research seeks to develop a multi-dimensional College Mental Health Assessment Inventory (CMHAI). This information and the final mental health assessment instrument developed can be used by colleges and universities mental health and counseling centers to assess the incidence of mental health among college students. Although you are helping to create the CMHAI with your interview answers, you will personally not be asked mental health issues pertaining to you or about you; the questions and answers are about mental health issues of college students in general.

You understand that most interviewees will find the discussion interesting and thought-provoking. If, however, you feel uncomfortable in any way during the interview session, you have the right to decline to answer any question or to end the interview.

Through participating in this one-on-one interview, you will be invited to share your experiences and perceptions about college students' mental health. The interview will last approximately 45 minutes. Notes may be written during the interview. A zoom video recording of the interview

_____
(Participant's initials)

and subsequent dialogue will be made. You understand that the researcher and his advisor will have sole access to the recorded file, the recording will be kept in a password protected file and will be destroyed after the transcription process is completed. If you don't want to be recorded, you will not be able to participate in the study.

The cost for participating in this study is the time invested in participating in the interview. There will be an incentive of $15 gift card for each participant that participate in the interview. Foreseeable risks are not greater than those that might be encountered in a classroom environment or a conversation with a colleague about one's career goals.

Participation is voluntary. You may decide not to participate in this study and if you begin participation, you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Nicole Morse, Research Compliance Manager, Office of Research, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910; nicole.morse@unco.edu.

Participant's Signature _____Date_____

Researcher's Signature _____Date_____

APPENDIX D

DIGITAL QUANTITATIVE CONSENT FORM

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
UNIVERSITY OF NORTHERN COLORADO

Project Title: Developing and Assessing the Psychometric Properties of a Multidimensional College Mental Health Assessment Inventory: A Mixed-Methods Study

Researcher: John Sylvester, Ph.D. Student in Applied Statistics and Research Methods
Email: sylv8245@bears.unco.edu

Doctoral Advisor: Randy Larkins, Ph.D. (Advisor), **Phone**: (970) 351-1676, **Email:** randy.larkins@unco.edu

By signing this consent form and emailing it back to me, you are indicating the following:

You are choosing to volunteer to participate in this methodological mixed methods research conducted by John Sylvester at the University of Northern Colorado.

Purpose and Description: This research seeks to develop a multi-dimensional College Mental Health Assessment Inventory (CMHAI). This information and the final mental health assessment instrument developed can be used by colleges and universities mental health and counselling centers to assess the incident of mental health among college students.

Through participating in this survey, you will be invited to share your experiences and perceptions. The survey questionnaire consists of 49 questions in total including four demographic questions, designed to collect data about how college students describe college mental health among college students. The estimated time it will take is approximately 15 minutes or less. Data collected and analyzed for this study will be kept in a password-protected file in the researcher's office. To maintain confidentiality, no personally identifiable information will be captured. Additionally, your responses will be combined with those of many others and summarized in a report to further protect your anonymity.

The cost for participating in this study is the time invested in participating in completing this survey questionnaire. No compensation will be provided to participants in this study. Foreseeable risks are not greater than those that might be encountered in a classroom environment or a conversation with a colleague about one's career goals. The potential benefits of this study include the final developed instrument is expected to be used by colleges and universities mental health and counseling centers.

Participation is voluntary. You may decide not to participate in this study and if you begin participation, you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please complete the questionnaire if you would like to participate in this research. By completing the questionnaire, you give your permission to be included in this study as a participant. You may keep a copy of this form to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Nicole Morse, Research Compliance Manager, Office of Research, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910; Nicole.morse@unco.edu

APPENDIX E

QUALITATIVE INTERVIEW PROTOCOL

Title: Developing and Assessing the Psychometric Properties of a Multidimensional College Mental Health Assessment Inventory: A Mixed-Methods Study

Investigator: John Sylvester, Doctoral Student, Department of Applied Statistics and Research Method

Introduction:

Thank you for volunteering to participate in this research. I am seeking to develop a multi-dimensional mental health assessment inventory (CMHAI). The final developed questionnaire is expected to be used by colleges and universities mental health and counselling centers to assess the incidence of mental on student seeking help.

1. Preliminary Question: Pseudonym- Is there a specific name you would prefer to use other than your name for this interview?

Interview questions:

1. When you think of mental health of college students what do you think of?
    a. Personal experiences
    b. General understandings
2. What do you think of when you are asked about mental health in college students?
3. If you were designing an instrument to assess mental health among college students, what types of mental health or illness do you think should be considered as part of the assessment?
4. Looking at the list you described above, do you think each indicator of mental health should be individually assessed or put together in one comprehensive measure? Why do you think that?
5. Do you have an idea of the level of detailed information I should gather about each indicator?
6. What ethical issues do you think should be considered when developing a mental health assessment instrument for the college student population?
7. What else did you want to say about this topic that I did not think to ask?

Demographics:

1. What is your gender/sexual orientation?
2. What is your race/ethnicity?
3. What is your student residency status?
4. How would you describe your socio-economic background: low, medium, or high?
5. If you have one or more disabilities, could you share the nature of your disability(ies) with me?

APPENDIX F

EXPERT REVIEW ASSESSMENT

Expert Review Assessment

Title: Developing and Assessing the Psychometric Properties of a Multidimensional College Mental Health Assessment Inventory: A Mixed-Methods Study

Investigator: John Sylvester, Doctoral Student, Department of Applied Statistics and Research Method

Introduction:

This research project is on designing and assessing the psychometric properties of a mental health assessment inventory focusing on college student population. Selected participants using purposive sampling approach were interviewed to share their experiences, perceptions, and description of mental health among college students for contextual understanding through participants' lenses. The data was analyzed using NVivo qualitative software from which the following themes (factors) emerged.

Expert Activity:

Your voluntary participation as an expert in the subject area is to read through the questionnaire statements below and offer your expert opinion in terms of **content relevance**, **representativeness**, and **technical quality** of the statements addressing the **factors** by rating each item using one of the scores stated below:

1 – Very poor
2 – Poor
3 – Moderate
4 – Good
5 – Excellent

Thank you so much for your participation.

Expert Reviewer Designation (name is optional):

Date:

Comments/Suggestions (your feedback is highly appreciated):

Note: The inventory items below are generated based on the emerged factors from the interviews - addiction, anxiety, depression, campus loneliness, PTSD, stress, suicide and suicidal ideation, schizophrenia, sexual identity, and rejection.

S/No.	Inventory	1	2	3	4	5
1	I have used drugs other than those required for medical reasons					
2	I have had a drink or used drugs first thing in the morning to steady my nerves					
3	I have been concerned about my drinking or substance use					
4	I have experienced withdrawal symptoms when I stopped alcohol or substance use					
5	I have neglected my family or friends because of alcohol or substance use					
6	Someone has expressed concern or criticize my drinking or substance use					
7	I experience breathlessness in the absence of physical exertion					
8	I often have feelings of faintness and terrified					
9	I feel overwhelmed with my course/class work					
10	I feel scared and experienced trembling without any good reason					
11	I easily perspired or sweat in the absence of high temperature					
12	I feel panic in part due to my schoolwork					
13	I feel sad or depressed					
14	I feel that I had lost interest in just about everything					
15	I feel life was meaningless					
16	I feel that there is nothing to get excited about					
17	I often experience negative feelings					
18	It feels difficult to get going with issues					
19	I feel isolated from others on campus					
20	I feel as if nobody really understands me on campus					
21	I find it difficult to communicate with professors or advisors					
22	I am unhappy doing so many things on campus alone					
23	I feel my interests are not shared by those around me on campus					
24	It is difficult for me to make friends on campus					
25	I found it difficult to calm down after something upset me					
26	I tend to over-react to situations					
27	I feel that I use a lot of nervous energy					
28	I feel that I find myself getting agitated consistently					
29	I do not tolerate interruptions to what I am doing					
30	I find myself getting angry at even the smallest of situations					
31	I feel as if nobody really understands me, or nobody feels the way I do					
32	I feel like I cannot deal with everything anymore					
33	I feel everyone would be better off without me					
34	I feel like I have a hard time controlling my anger					
35	I have told someone I was going to commit suicide or might commit suicide					
36	I have thought of killing myself at least once					
37	I have experienced a terrible incidence as a victim or witness that has impacted me significantly					
38	I frequently worried about something that I am unable to sleep at night					
39	I often feel bleak of the future					
40	I feel positive about my interpersonal connections with others on campus					
41	I have had trouble focusing on school					
42	I have experienced more than a week lower-than-usual interest in activities that I usually enjoy					
43	I hear things that others do not hear					
44	I feel it is very difficult for me to express myself in words that others can understand					
45	I feel I share absolutely nothing in common with other students including my friends and family					
46	I believe in more than one thing about reality around me that nobody else seems to believe					
47	I talk to other people inside my head that nobody else can hear					
48	I feel guilty and unable to stop blaming myself on problem(s) event(s) may have caused					
49	I try hard not to think about event(s) or situations that reminded me of event(s) that happened					
50	I am easily frightened					
51	I have had nightmares about event(s) when I did not want to					
52	I feel detached from people or my surroundings					

APPENDIX G

EXPERT REVIEWS AVERAGE CONGRUENCE PERCENTAGE ANALYSIS

Expert Reviews Average Congruence Percentage Analysis

S/No.	Inventory	Expert Review 1	Expert Review 2	Expert Review 3	Expert Review 4	Expert Review 5	Average	Points Rating
1	I have used drugs other than those required for medical reasons	4	5	3	4	5	4.2	0.84
2	I have had a drink or used drugs first thing in the morning to steady my nerves	3	5	5	3	2	3.6	0.72
3	I have been concerned about my drinking or substance use	3	5	5	5	3	4.2	0.84
4	I have experienced withdrawal symptoms when I stopped alcohol or substance use	5	5	5	5	4	4.8	0.96
5	I have neglected my family or friends because of alcohol or substance use	4	5	4	3	4	4	0.80
6	Someone has expressed concern or criticize my drinking or substance use	4	5	4	5	5	4.6	0.92
7	I experience breathlessness in the absence of physical exertion	3	5	3	2	3	3.2	0.64
8	I often have feelings of faintness and terrified	4	5	4	3	3	3.8	0.76
9	I feel overwhelmed with my course/class work	3	4	3	4	5	3.8	0.76
10	I feel scared and experienced trembling without any good reason	2	5	4	4	4	3.8	0.76
11	I easily perspired or sweat in the absence of high temperature	3	5	3	2	4	3.4	0.68
12	I feel panic in part due to my schoolwork	3	4	3	5	5	4	0.80
13	I feel sad or depressed	4	5	5	4	5	4.6	0.92
14	I feel that I had lost interest in just about everything	5	5	5	5	5	5	1.00
15	I feel life was meaningless	5	5	5	5	5	5	1.00
16	I feel that there is nothing to get excited about	3	5	5	5	3	4.2	0.84
17	I often experience negative feelings	4	5	4	5	4	4.4	0.88
18	It feels difficult to get going with issues	4	4	3	2	4	3.4	0.68
19	I feel isolated from others on campus	2	5	4	4	2	3.4	0.68
20	I feel as if nobody really understands me on campus	4	5	4	3	2	3.6	0.72
21	I find it difficult to communicate with professors or advisors	4	3	3	4	4	3.6	0.72
22	I am unhappy doing so many things on campus alone	3	4	4	3	4	3.6	0.72
23	I feel my interests are not shared by those around me on campus	3	5	4	4	5	4.2	0.84
24	It is difficult for me to make friends on and off campus	3	5	5	5	3	4.2	0.84
25	I found it difficult to calm down after something upset me	4	4	4	5	5	4.4	0.88
26	I tend to over-react to situations	4	4	4	5	5	4.4	0.88
27	I feel that I use a lot of nervous energy	4	5	2	1	5	3.4	0.68
28	I feel that I find myself getting agitated consistently	4	5	5	4	5	4.6	0.92
29	I do not tolerate interruptions to what I am doing	5	5	2	1	3	3.2	0.64
30	I find myself getting angry at even the smallest of situations	4	5	4	4	4	4.2	0.84
31	I feel as if nobody really understands me, or nobody feels the way I do	4	4	4	3	4	3.8	0.76
32	I feel like I cannot deal with everything anymore	4	5	4	5	5	4.6	0.92
33	I feel everyone would be better off without me	4	5	5	5	5	4.8	0.96
34	I feel like I have a hard time controlling my anger	5	5	5	5	4	4.8	0.96
35	I have told someone I was going to commit suicide or might commit suicide	4	5	5	5	5	4.8	0.96
36	I have thought of killing myself at least once	4	5	5	5	5	4.8	0.96
37	I have experienced a terrible incidence as a victim or witness that has impacted me significantly	3	5	5	5	4	4.4	0.88
38	I frequently worried about something that I am unable to sleep at night	4	5	5	5	4	4.6	0.92
39	I often feel bleak of the future	4	5	5	5	2	4.2	0.84
40	I feel positive about my interpersonal connections with others on campus	2	0	4	3	5	2.8	0.56
41	I have had trouble focusing on school	5	4	5	4	5	4.6	0.92
42	I have experienced more than a week lower-than-usual interest in activities that I usually enjoy	4	5	5	4	4	4.4	0.88
43	I hear things that others do not hear	3	5	5	4	4	4.2	0.84
44	I feel it is very difficult for me to express myself in words that others can understand	4	5	4	4	3	4	0.80
45	I feel I share absolutely nothing in common with other students including my friends and family	3	5	3	2	5	3.6	0.72
46	I believe in more than one thing about reality around me that nobody else seems to believe	3	5	4	3	3	3.6	0.72
47	I talk to other people inside my head that nobody else can hear	3	5	4	5	4	4.2	0.84
48	I feel guilty and unable to stop blaming myself on problem(s) event(s) may have caused	3	5	4	5	5	4.4	0.88
49	I try hard not to think about event(s) or situations that reminded me of event(s) that happened	2	5	4	4	5	4	0.80
50	I am easily frightened	3	5	2	3	5	3.6	0.72
51	I have had nightmares about event(s) when I did not want to	4	5	2	1	5	3.4	0.68
52	I feel detached from people or my surroundings	4	5	4	5	4	4.4	0.88
		189	**245**	**211**	**204**	**215**		
		260	**260**	**260**	**260**	**260**		
		72.69%	**94.23%**	**81.15%**	**78.46%**	**82.69%**		
	Expert Reviews Average Congruency Percentage (ACP) Analysis			**81.85%**				

APPENDIX H

REVISED CMHA INVENTORY FOR CFA VALIDATION

Revised CMHA Inventory for CFA Validation

Title: Developing and Assessing the Psychometric Properties of a Multidimensional College Mental Health Assessment Inventory: A Mixed-Methods Study

Investigator: John Sylvester, Doctoral Student, Department of Applied Statistics and Research Method

The questionnaire statements below are about how you feel and how things have been with you during the past 12 months and the statements may be personal.

For each of the statement, please indicate a number for the one answer that comes closest to the way you have been feeling: 1 – Strongly Disagree, 2 – Disagree, 3 Somewhat Disagree, 4 – Neither Agree nor Disagree, 5 – Somewhat Agree, 6 – Agree, and 7 – Strongly Agree.

S/No.	Inventory	1	2	3	4	5	6	7
	ADDICTION							
1	I have at least a cup of alcoholic drinks or drugs first thing in the morning to steady my nerves							
2	I have been concerned about my drinking of alcohol or substance use							
3	I have experienced withdrawal symptoms like agitation when I stopped alcohol/substance use							
4	I have neglected people close to me due to my alcohol or substance use							
5	Someone has expressed concern about my alcohol drinking or substance use							
6	I experience breathlessness in the absence of physical activity							
7	I often have feelings of faintness							
8	I have used drugs other than those required for medical reasons							
	SUICIDAL IDEATION							
9	I have told someone I was going to commit suicide or might commit suicide							
10	I have thought of killing myself at least once							
11	I have experienced a terrible incidence as a victim or witness that has impacted me significantly							
12	I often feel dark or unhopeful of the future							
13	I have experienced more than a week lower-than-usual interest in activities that I usually enjoy							
14	I frequently worried about something that I am unable to sleep at night							
15	I have often had trouble focusing on school							
16	I feel it is very difficult for me to express myself in words that others can understand							
17	I try hard not to think about event(s) or situations that reminded me of event(s) that happened							
	CAMPUS LONELINESS							
18	I feel isolated from others on campus							
19	I feel as if nobody really understands me on campus							
20	I find it difficult to communicate with professors or advisors							
21	I am unhappy doing so many things on campus alone							
22	I feel my interests are not shared by those around me on campus							
23	It is difficult for me to make friends on and off campus							
24	I feel I share absolutely nothing in common with other people around me							
	DEPRESSION							
25	I feel sad or depressed							
26	I feel that I had lost interest in just about everything							
27	I feel life is meaningless							
28	I feel that there is nothing to get excited about							
29	I often experience negative feelings							
30	It feels difficult to get going with issues on and off campus							
	STRESS							
31	I found it difficult to calm down after something upset me							
32	I tend to over-react to situations							
33	I feel that I find myself getting agitated consistently							
34	I find myself getting angry at even the smallest of situations							