

**Mental Health of Iranian College Students in a Nationally Representative Sample of Over
74,500 Individuals: Scale Development and Standardization**

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Abstract

This study sought to develop the College Mental Health Scale (CMHS) as a screening instrument among Iranian college students. In total, the nationally representative sample ($N = 74,571$) was selected to match Iranian college student population throughout the country. In the first study, a conceptual framework was developed and a pool of items based on the most prevalent mental disorders in Iranian college students was devised. In the second study, psychometric properties of CMHS was examined ($n = 600$). The third study was conducted in two phases. In the first phase ($n = 2,750$), explanatory factor analysis was used for reaching a better factor structure and in the second phase ($n = 2,750$) the invariability of factor structure and correlation of CMHS with related measure was examined. The result revealed a 56-item measurement scale consisting of seven dimensions: anxiety, depression, social anxiety, sleep disorder, obsessive-compulsive disorder, positive affect, and life satisfaction. In the fourth study ($n = 68,471$), male and female norms were developed. The CMHS has adequate reliability and validity and can be used for assessment of college students' mental health problems in Iran.

Keywords: mental health problems, college student mental health, Iranian college students, scale development, screening instrument, standardization

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Introduction

College students worldwide experience a broad range of challenges and stressors, because of their heavy workloads and tight deadlines. The mental health of this group is considered a global public health issue due to the high prevalence of mental health problems (Wang et al., 2019). In several systematic reviews of the literature (Storrie et al., 2010; Esan et al., 2019; Stalman, 2010; Pacheco et al., 2019), scholars reported the lifetime prevalence and increased rate of severe mental health problems in college students worldwide as the following: between 5.3% and 17.3% for depression (Eisenberg et al., 2013; Vazquez & Blanco, 2008), between 1.6% and 7% for generalized anxiety disorder (Eisenberg et al., 2013; Blanco et al., 2008; Vazquez et al., 2011), between 0.6% and 4.1% for panic disorder (Eisenberg et al., 2013; Blanco et al., 2008; Vazquez et al., 2011), between 9.4% and 13.1% for sleep disorders (Schlarb et al., 2012; Schlarb et al., 2017; Forquer et al., 2008), and between 3.3% and 14.3% for OCD (Ozdemir et al., 2016; Jaisooriya et al., 2017). Some studies show that mental health problems can potentially interfere with university attendance and decrease the possibility of successfully completing university (Blanco et al., 2008). Furthermore, the comorbidity between the mentioned disorders (Chiu et al. 2020; Shen et al., 2020; Hofer et al., 2018) makes the situation even worse.

Considering the advantages and disadvantages of strategies used for identifying students who experience Social, Emotional and Behavioral (SEB) problems, there are other strategies, such as observational methods, instructor referral, and university administered ratings that would be considered for timely identification of SEB risks among students (Kilpatrick, 2018). Correctly identifying individuals in need of specific instructions and services in an educational setting

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requires making use of universal screening tools that are contextually appropriate, technically sound, and usable (Marsh & Wilcoxon, 2015; Glover & Albers, 2007). Universal screening offers a remarkable solution for proactively addressing SEB concerns. First, this method ensures the proper evaluation of all students and the faint possibility of undetected risk are insured. Second, universal screening helps to intervene early by identifying target areas and presenting a baseline to compare how the intervention affects the participants. Third, the combination of early detection and intervention can result in the interruption of risk factors and negative long-term results (Conduct Problems Prevention Research Group, 2004 ; Dodge, 2007; Walker et al., 2009; Webster-Stratton et al., 2010).

The most commonly used instruments for assessing symptoms of mental disorders in European countries are Symptoms and Assets Screening Scale (SASS; Downs et al., 2014), Patient Health Questionnaire (PHQ-9; Spitzer et al., 1999), the Outcome Questionnaire-45 (OQ-45; Lambert et al., 1996), and the Comprehensive Psychopathological Rating Scale (CPRS; Åsberg et al., 1978). Although these instruments possess many strengths, most were developed for use with a general clinical population, and their appropriateness for addressing the unique features of a college student population is less clear (in both intent as well as content). There are, however, a few instruments that were designed specifically to help college students with mental health issues. These instruments include the College Adjustment Scales (CAS; Anton & Reed, 1991) and K-State Problem Identification Rating Scales (K-PIRS; Robertson et al., 2006). Despite their similarities and differences with other measures, these two instruments are more appropriate for college student assessment, even though their ability to reliably and validly assess mental health in a large and representative college student population is less well documented.

Although many studies have examined lifespan trajectories of single dimensions of mental disorder and well-being, there have been no studies to date on both mental illness and

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mental health across college students in Iran. Some of the different types of psychopathology include, but are not limited to: anxiety and depressive disorders, neurodevelopmental disorders, and disruptive, impulse-control, and conduct disorders (Westerhof & Keyes, 2010; Pedrelli et al., 2015). For a long time, it has been defined that the absence of psychopathologies is equal to mental health. This absence is, however, a minimal outcome from a psychological perspective (Westerhof & Keyes, 2010). Even though they are related to each other, there is a disparity between mental health and mental illness. Hence, the focus of this study is on both mental illness and positive mental health.

Culture and mental health are intertwined and closely related. Culture is an important determinant of the mental health of an individual or a group (Chandra et al., 2016; Kagawa Singer et al., 2016). Meanwhile, mental distress is considered the product of a complex interaction of biological, psychological, social, and cultural factors (Omigbodun & Oyeboode, 2017). Unfortunately, many current instruments lack local and national norms, and do not include the cultural diversities (Lane et al., 2012). Cultural differences and societal norms should be embedded into the screening systems to differentiate normal from abnormal behaviors in the societies (Dowdy et al., 2014). This process should be handled cautiously, since there are fundamental cultural and religious differences between the different societies (Baker, 2012). Such differences, if not taken into consideration, may affect the characteristics of instruments and produce faulty results (Mahmood et al., 2015). Therefore, it is necessary to develop a culturally-appropriate scale that is based on Iranian culture and common mental health problems among college students.

The purpose of the present study was to develop and test a screening measure-College Mental Health Scale (CMHS)-for potential use by colleges to identify students who are at risk of the most prevalent mental health problems in this population. Notably, because the vast majority

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of students with mental health problems do not seek evaluation or treatment, we were most interested in developing a screening measure for use with the general student population. Instead of developing a diagnostic tool, we aimed to identify those who would be most likely to benefit from further evaluation and treatment. Even though there are some existing measures for assessing mental health problems in students who visit college counseling centers for treatment, we are not aware of any existing standardized measures designed specifically for screening the general college student population (Locke et al., 2011). Such a population-based screening measure would likely be of greatest benefit if it is multidimensional, reliable and valid, cost-effective, efficient, and easy to use by a variety of professionals.

Materials and Methods

The process used to develop the CMHS was based on DeVellis (2012), Clark and Watson's (2016) basic principles for quality scale development and reflective of the test development guidelines offered in the Standards for Educational and Psychological Testing (Joint Committee on Standards for Educational and Psychological Testing, 1999). Clark and Watson suggested that the primary concern in scale development is about construct validity, which encompasses many subtypes of validity as well as traditional notions of reliability, and such establishing substantive, structural, and external validity evidences. Establishing substantive validity evidence typically consists of two phases: determining the nature and scope of the construct of interest and creating an item structure. Next, structural validity is established through testing the measure on a target sample and evaluating the item distributions, latent structure, internal consistency, and construct boundaries using descriptive, factor analytic, reliability, measurement invariance, and concurrent or predictive correlational analyses. Lastly, if structural validity evidence is obtained, then external validity evidence is established via testing the

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generalizability of the measure's structure with diverse samples, its relations with other convergent and discriminant measures, and its utility in applied contexts.

The present study was conducted in four phases. Phase 1 was conducted in two steps. Step 1 involved defining mental health, identifying behaviors related to mental health based on cultural priorities, and developing an initial pool of items related to positive affect, life satisfaction (Well-being dimension), depression, anxiety, obsessive-compulsive disorder, social anxiety and sleep disorder (disaster dimension). Step 2 involved an iterative procedure utilizing content experts to evaluate the relevance and representativeness of the items developed in step 1. In the second phase, explanatory factor analysis (EFA) was used to determine the preliminary structure of the instrument. Also, the correlations among the CMHS subscales were examined. The third phase was conducted in two steps: In the first step, EFA was used for reaching a better factor structure and in the second phase the invariability of factor structure and correlation of CMHS with the construct-related scales were examined. In phase four, gender norm tables, professional manual, user manual, and expert system process were developed. Permission to conduct each of the phases was granted by the appropriate Institutional Review Boards.

Study 1

Developing a Conceptual Framework and Items

Since a strong theoretical model of mental health is required as a basis for instrument development (American Educational Research Association, 2014), a comprehensive literature review of mental health, including definitions, and existing instruments identified in screening mental health was conducted. Thirty specialists, who were directors of college student mental health centers in all 30 provinces of Iran, were invited to discuss extracting the native model of mental health and provide interpretation and expert opinion on this topic. Specialists were asked to determine the most prevalent mental difficulties in university students based on the literature.

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Finally, a six-factor model for distress and two factor model for the well-being dimension was agreed on. The six most prevalent problems (anxiety, depression, obsessive-compulsive disorder, social anxiety, generalized anxiety, and sleep disorder) for Distress (DI) dimension and two components (positive affect and life satisfaction) for Well-being (WB) dimension were considered- after extracting the culturally-based model, each components' indicator was extracted. The next step was to choose and design items related to each indicator. Dozens of screening tools were used for item gathering. Criteria for choosing items from these tools were: 1) validity and reliability of the instrument and items, 2) item-scale correlation coefficient, and 3) item's correlation coefficient with other items (Nunnally, 1978). Also, to enrich the pool of domain-relevant items, a number of items were developed by the specialist group.

Item and Response Format

A 6-point Likert-type response scale anchored only at the endpoints: 1 (*completely disagree*) to 6 (*completely agree*) was used to obtain an interval level of measurement. In order to prevent response bias, seven items were reversed. Further, to avoid possible bias brought about by items within each subscale appearing one after another, subscale items were randomly interspersed.

Content Validity

Following the initial item generation, content and face validity were established using a panel of eleven content experts with professional expertise in college mental health, health psychology, psychiatry, educational psychology, public health, and youth workers from culturally diverse backgrounds. The expert panel was employed from eight provinces of Iran to assess the relevance of each item to the domain of which the item was referenced and to assess the representativeness of the set of items retained. The items were presented to the panel members by subscale. One "*misfit*" item (an item from one of the seven other subscales) was added to each

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subscale to avoid members rating all items in a subscale highly due only to their presence in that subscale. The inclusion of misfit items helped to evaluate the expertise of the panel members and the care with which they completed their ratings. Thus, the panel members rated 15 items (14 subscale items and 1 marker item) for each subscale. The item content review was completed in two steps. First, each panel member independently evaluated the fit of the items to the intended scale using a 5-point Likert-type rating scale: 0 (*no fit*) to 4 (*excellent fit*). Second, the panel members were requested to indicate whether the items they indicated as fitting the subscale with a rating of 3 or 4 together sufficiently represented the category specified. Third, the members were asked open-ended questions regarding item clarity and readability.

Item Identification

The panel members' ratings of the items in each subscale were first examined to assess whether members gave a lower rating to the misfit item than to the other items in the subscale. The number of misfit items correctly identified by the panel members ranged from 5 to 11, with a median of 8.

Clarity and Understandability of Items

In order to test the clarity and understandability of items, sixty university students in a randomly selected sample (in two equal and separate groups) were asked to complete the preliminary version of scale and express the perceived meaning of each item. All students believed that the reading level of the items was appropriate for university students. At the item level, no items were flagged by more than two of the students as being unclear or difficult to read. Four students expressed concerns about the placement of items within subscales. They noted some subscale definitions were too broad, that items appeared to be relevant to more than one subscale, and that other items were not specific enough. In all cases, they provided a reason

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for their concerns, proposed which subscale items fit best, suggested item revisions, and recommended item additions. At last, 140 items were considered for further analysis.

Study 2

Participants

In the second study, 600 students from 6 universities completed the questionnaires. Proportionate stratified sampling was used for following reasons: 1) in cases where the population is heterogeneous and uncommon characteristics play an important role in results, randomized sampling is the best sampling method (SamPATH, 2000); 2) this sampling method is more precise compared to other methods (SamPATH, 2000); and 3) the sample size of each stratum in this technique is proportionate to the population size of the stratum when viewed against the entire population. This means each stratum has the same sampling fraction (Gall et al., 2004).

Findings

Item Analysis. Item analysis was conducted for each of the CMHS-WB and CMHS-DI using the SPSS 24 software. Analysis for each item included the calculation of eight criteria: Item Mean (IM), Standard Deviation (SD), Squared Multiple Correlation (SMC), Corrected Item-Total Correlation (CITC), Chronbach's Alpha If Item Deleted (CAIID), Skewness (SK), Kurtosis (KU), and answering to one option by more than fifty percent of subjects; Item subscale correlation with adverse subscale items removed, in addition, the internal consistency for each subscale was calculated (DeVellis, 2012). The results of item analysis showed that 10 items were omitted from CMHS.

Exploratory Factor Analysis (EFA) was used in the present study for validation of CMHS. One of the most significant challenges, when EFA is performed, is determining the number of factors to retain. Parallel analysis (PA) is an effective stopping rule that compares the eigenvalues of randomly generated data with those for the actual data. Parallel Analysis takes into account

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sampling error, and in the current researches, it is widely considered the best available method (Ruscio & Roche, 2012). EFA of the polychoric correlation matrix showed that the preliminary version of CMHS is composed of 56 items: two factors of Positive Affect (8 items) and Life Satisfaction (8 items) for CMHS-WB, and five factors of Depression (10 items), Social Anxiety (8 items), Sleep Disorder (7 items), Academic Anxiety/Academic Depression (9 items), and Obsessive-Compulsive Disorder (6 items) for CMHS-DI. The alpha coefficient for extracted factors was between 0.66 (obsessive-compulsive disorder), and 0.98 (positive affect). A summary of factor analysis results is presented in Table 1. *[Table 1 near here]*

Study 3

Participants

5550 students from 20 universities were asked to complete the CMHS-WB and DI. Proportionate stratified sampling was used as the sampling method. From all of the participants, 37.83% were males and 62.16% were females. In order to conduct validity evaluation of CMH-WB and DI, the following instruments were used.

Instruments

Satisfaction with Life Scale (SWLS; Diener et al., 1985). The SWLS is shown to have favorable psychometric properties, including high internal consistency and high temporal reliability (Diener et al. 1985). In addition, the SWLS has adequate psychometric properties for assessing life satisfaction in the Iranian population (Maroufizadeh et al., 2016).

Life Orientation Test (LOT; Carver et al., 2010). The LOT is an eight-item self-report measure (plus four filler items) that assesses generalized expectancies for positive versus negative outcomes. In Scheier study (1994), the Cronbach's alpha was 0.82. Hassanshahi (2002)

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validated the test in Persian and reported alpha Cronbach of 0.74 and 0.65 for test-retest reliability.

Spiritual Wellbeing Scale (SWC; Ellison, 2006). The SWC provides an overall measure of the perception of spiritual quality of life. The SWC has sufficient reliability and internal consistency (Bufford et al., 1991). This scale has been standardized in Persian with adequate internal consistency (Cronbach's $\alpha = 0.87$) (Farahaninia et al., 2006).

Adult Hope Scale (AHS; Snyder et al., 1991). AHS is a 12-item measure of dispositional hope. Respondents are asked to rate the extent of their agreement with these items using an 8-point Likert-type. In Rand's study (2009), the AHS had a Cronbach's alpha of 0.78.

Symptoms Checklist-25 (SCL-25; Najarian & Davoudi, 2001). SCL-25 is the short form of Symptoms Checklist-90. Cronbach's alpha was reported to be 0.97 and test-retest reliability (after five weeks) was 0.78. As the evidence for convergent validity, SCL-25 correlated positively ($r = 0.49$) with the Beck Depression Questionnaire (Beck & Beck, 1972).

Mental Health Inventory (MHI; Veit & Ware, 1983). MHI is designed to measure general psychological distress and well-being (Veit & Ware, 1983). Internal consistency of the scale indicated high reliability and the item-total correlation indicated that all items are highly consistent with the total score (Agresti & Finlay, 1986; Borsboom et al., 2004). The reliability and validity of the Persian form of scale in patients and normal samples are verified (Besharat, 2006).

General Health Questionnaire (GHQ; Goldberg & Hiller, 1979). The General Health Questionnaire (GHQ) is a self-administered screening questionnaire designed for use in consulting settings aimed at detecting those with a diagnosable psychiatric disorder (Goldberg, 1972). The GHQ is considered valid and reliable (Gnambs & Staufenbiel, 2018; Molavi, 2002).

Findings

Exploratory Factor Analysis. For conducting exploratory and confirmatory factor analysis (CFA), half of the sample was assigned to the calibration group and the other half was considered for the validation group (Khine, 2008). Exploratory Factorial Analysis of the polychoric correlation matrix showed that the factors obtained by the principal axis factor analysis and direct Oblimin rotation method had the highest agreement with the theoretical structure of the CMHS-WB and CMHS-DI. The KMO measure of sampling adequacy was 0.94 for CMHS-WB and 0.91 for CMHS-DI, and the degree of freedom was 78, for CMHS-WB and 496 for CMHS-DI, which was significant at a significance level of 0.001. Results of PA showed that a structure with 2 factors and total variance of 58.46 percent was probably an efficient structure for CMHS-WB and a structure with 5 factors and total variance of 56.72 was probably an efficient structure for CMHS-DI (Table 2). *[Table 2 near here]*

Confirmatory Factor Analysis. Most statistical methods only require one statistical test to determine the significance of the analyses. However, in CFA, several statistical tests are used to determine how well the model fits the data (Suhr, 2006). For acquiring model fit, the following indexes were used: chi-square statistics, Comparative Fit Index (CFI; Bentler, 1990), Non-Normed Fit Index (NNFI; Bentler and Bonet 1980), Root Mean Square Error of Approximation (RMSEA; Stieger, 1990), Root Mean Square Error of Approximation Confidence Interval (RMSEA-CI; Hu & Bentler, 1999), and Standardized Root Mean Square Residual (SRMSR; Hu & Bentler, 1999). Confirmatory factor analysis was conducted on validation group data.

Two extracted factors from CMHS-WB and five extracted factors from CMHS-DI were examined for invariability of factor structure for (Table 3). Results showed that CFI is 0.98, which is accepted as an indicator of the good fit (Hu & Bentler, 1999). Non-Normed Fit Index is also greater than the cutoff point of 0.95 which is indicative of a good model fit (Hu & Bentler,

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1999). Since smaller values of RMSEA indicate a good model fit, 0.072 can be accepted as a good index. In Distress Dimension, following indices are indicators of good model fit: CFI = 0.98, NNFI: 0.96, RMSEA: 0.071. *[Table 3 near here]*

Psychometric Properties. Cronbach's alpha was computed to internal consistency reliability. As it is presented in Table 4, all Cronbach's alpha estimates were above satisfactory levels and most of them were above 0.80 except for OCD ($\alpha = 0.62$). Pearson's correlations between the subscales are moderate to high and significant at the 0.01 level for both CMHS-WB and DI. Based on Table 4, ANX and DEP were highly correlated (0.60), followed by SANX and ANX (0.59), and LS and PA (0.63). Furthermore, the following subscales were negatively correlated: DEP and PA (-0.54), DEP and LS (-0.59). *[Table 4 near here]*

Convergent Validity Evidence. The correlations among the CMHS and related scales are presented in Table 5. Scores on CMHS-WB correlated (0.61) with the Satisfaction with Life Scale (SWLS), indicating that CMHS-WB is not evoking a social desirability response set. The correlations for CMHS-WB between scores on the life satisfaction and scores on the selected measures were the Satisfaction with Life Scale (SWLS), 0.60; the Life Orientation Test, 0.13; Spiritual Wellbeing Scale, 0.68; and the Adult Hope Scale, 0.51.

Scores on CMHS-DI were positively correlated with the Symptoms Checklist-25, Hopelessness subscale in Mental Health Inventory, General Health Questionnaire, and negatively correlated with Mental Well-being in Mental Health Inventory, an indication of convergent validity. The correlation between the disease subscale and these measures are shown in Table 5.

[Table 5 near here]

Study 4

Participants

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In data gathering, 68,471 students were asked to complete CMHS-WB and DI. Proportionate stratified sampling, a nationally representative sample of college students in Iran, was used as the sampling method. From all of the participants, 44.8% of the males were, and 55.1% were females. 92.5% of the participants were single, and 6.8% were married (0.7 of the participants didn't complete the marital status section). 36.6% of participants were living with their parents, 69.1% were living in the dormitory, 2.3% were living with their friends, and 0.1% were living alone. 1.9% of participants had associate's degree, 69.6% had a bachelor's degree, 26.5% had a master's degree, and 1.1% had doctorate degree.

Norm Tables

After analyzing the factor structure of CMHS, we started to collect data as the basis for developing female and male norms. A group of students (44.8% males, and 55.1% females) were chosen for this purpose. Table 6 presents a summary of the mean raw scores and standard scores for men and women respectively. *[Table 6 near here]*

User Manual

Raw test scores hold very little information without appropriate norms to provide context for their interpretation. According to Nunnally (1978), norms are any scores that provide a frame of reference for interpreting the scores of particular persons. Norms provide context and meaning to individual test scores. Tests report norms as either transformed standard scores or percentiles (Nunnally, 1978). The CMHS manual indicates the mean score of students based on gender.

Professional Manual

Over the past few years, we focused on CMHS validity and reliability research, using technical and methodological processes needed to promote evaluation of the validity and reliability. With sufficient validity evidence accumulated for CMHS, we began aggregating

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results and generalizing validity inferences. In 2015, we published a comprehensive CMHS meta-analysis report which showed validity and reliability results.

Expert system

The CMHS can be taken directly on the computer and it takes approximately 40 to 45 minutes to complete through the entire procedure of the expert system. The CMHS is easily scored and it only takes 17 to 20 minutes on average to complete individually. In this mode, the respondent uses the keyboard to complete the information requested on the computer screen. Each inventory question is displayed on the screen and the test taker selects and keys in responses using keys 1 through 6. The test administrator initiates the program for online administration. First, the test taker will see the title screen displayed and the first entry window. Using the keyboard, the test taker types in the name and ID number. Following this, instructions to complete the inventory are displayed. To summarize the findings from study 4, row and standard scores are presented in Table 6. Gender norms will help both researchers and clinicians in college counseling centers to interpret the CMHS-WB and CMHS-DI scores.

Discussion

We aimed to develop and test a brief and easy-to-use screening measure to identify college students who are at risk of mental health problems. To that end, the most prevalent mental disorders in Iranian college students (anxiety, depression, obsessive-compulsive disorder, sleep disorder, and social anxiety) were identified based on the prevalence of referral reasons to counseling centers. We believe this study filled an important research gap since no culture-oriented measurement scale is currently available to measure the mental health problems among Iranian college students.

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Psychometric analyses were conducted to determine how well the newly developed CMHS-WB and CMHS-DI respectively assessed two constructs (namely well-being and positive affect) and five constructs (namely depression, anxiety, obsessive-compulsive disorder, social anxiety, and sleep disorder) in the college student population. An EFA suggested that the CMHS-DI and WB items conformed to the hypothesized factor structure with the exception of the anxiety subscale in CMHS-DI.

One of the reasons for developing CMHS-DI was to make a subscale for assessing anxiety, however, it didn't emerge in EFA. Instead, a subscale emerged that was a combination of anxiety and depression, under the influence of academic factors. One reason for this could be the conceptual overlap between anxiety and other constructs such as depression (Cai et al., 2018), obsessive-compulsive disorder (Hofer et al., 2018) and even sleep disorder (Fletcher et al., 2018). Because of that, theoretical and research reviews were necessary for finding more suitable items that can differentiate between anxiety and other constructs. Ignoring the pure and specific symptoms of anxiety would lead to poor loading factors, and then achieving theoretical construct would be impossible (Guilford, 1954).

The second study was conducted for achieving a proper factor structure for CMHS-DI, the invariability of factor structure, and correlation of CMHS-DI and WB with related measures. In this study, all of the CMHS items formed robust factors that corresponded as expected with the subscales as expected, suggesting that these items are measuring the intended constructs. We found adequate internal consistency within each of the five CMHS-DI and two CMHS-WB subscales, providing evidence that the subscales are cohesive measures. Taken together, these results provide evidence that the CMHS presents a reliable measurement of mental health symptoms and well-being in college students.

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The criterion-related validity of the CMHS was evaluated by correlating participants CMHS scores with scores on well-established measures of the same constructs. As anticipated, examining convergent validity of CMHS-WB showed that both of its subscales are correlated with the Satisfaction with Life Scale (SWLS; Diener et al., 1985), the Life Orientation Test (LOT; Carver et al., 2010), Spiritual Wellbeing Scale (SWBS; Ellison, 2006), and the Adult Hope Scale (AHS; Snyder et al., 1991). Results of criterion validity of CMHS-DI indicated that these subscales are positively correlated with Distress Symptoms Checklist-25 (Najarian, 1995), hopelessness subscale in Mental Health Inventory (MHI; Veit & Ware, 1983), General Health Questionnaire (GHQ; Goldberg & Hiller, 1979), and negatively correlated with mental well-being in Mental Health Inventory. These results provide further evidence that the CMHS is a potentially useful tool for identifying college students who may have diagnosable mental health problems or who may be experiencing clinically significant distress or impairment and are in need of treatment.

College Mental Health Scale (CMHS) is a standardized, norm-referenced tool designed to screen mental health problems in university students. Several norm groups based on gender exist. The normative sample was representative of the 2015 population survey in terms of gender. In addition to raw scores, T scores ($M = 50$, $SD = 10$) are available. T scores between 39 and 49 fall within the normal range, T scores between 55 and 65 fall within the elevated risk range, and T scores above 65 falls within the extremely elevated risk range. The normal range represents individuals with a small risk of developing an emotional or behavioral problem, whereas the elevated risk range indicates that a significant number of students who fall into this category in the norm group also have a clinically mental health problem.

Implications

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The present study has a few implications for the theory and practice of college student mental health. In terms of theory, the findings of this study expand the available repertoire of mental health and mental distress indicators. This study offers a theoretical contribution to the conceptualization and operationalization of research into young people's psychology and support their needs; suggesting that assessing youth mental well-being is a promising endeavor that warrants further attention in both research and practice. In terms of practice, as the CMHS is going to be used in different regions of the country and all college counseling centers in Iran, initial assessment and referral of students to the counseling centers could be a risk factor, if they seek care at once. Depending on where the students are in the country and their cultural attitudes toward having mental health problems, lack of enough resources and staff may breach the privacy and confidentiality of students. As such, it may lead them to feel further stigmatized or exposed by participating in counseling sessions or screening programs (Brunner et al., 2014; Mier et al., 2008).

Whenever college students fill out the CMHS, those who score higher on CMHS-DI will be referred to counseling centers for further examination. Spitzer et al. (1999) show that a well-designed self-report questionnaire can also provide comparably valid diagnoses. As such, the CMHS, would be ideally administered in clinical practice to all new clients, those who are suspected of having a mental disorder, and established patients on a periodic basis, as is done with other screeners.

Limitations

One of the limitations of the present study was using the cross-sectional method. To remediate the construct of interest, several research (e.g., Morean et al., 2012; Schlosser & McNaughton, 2009) suggest conducting a longitudinal study as a part of the scale development procedure. Utilizing the longitudinal study in this process may also contribute to the assessment

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of the scale's predictive validity. Therefore, prospective studies should consider the longitudinal approach in the scale development process, both to facilitate greater understanding of the analyzed variables and to assess the predictive validity.

Another limitation was the self-reporting nature of the present study. Many researchers in this field, particularly those who work with questionnaires and quantitative surveys, are probably aware of the possibility of participant bias, social desirability and other biases on data quality. As a result, there may be an increased likelihood of certain limitations that can affect the validity of the findings (Mahudin et al., 2012). Future research may also include other objective or independent measures to enrich the subjective evaluation of the variables studied in the development of the new instruments and to improve the interpretation and analysis of the results.

Acknowledgement

We gratefully acknowledge the students who participated in this study throughout the country. Also, we would principally like to thank the Ministry of Science, Research and Technology and the Ministry of Health in Iran for their support. The authors would like to thank the staff of the college counselling centres in Iran.

Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest.

Funding

This work has been funded by the Ministry of Science, Research and Technology in Iran.

Ethics Approval

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All procedures performed in studies involving human participants were in accordance with the ethical standards of the Shahid Beheshti University Research Ethics Committee (UREC) and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent to Participate

Informed consent was obtained from all individual participants included in the study.

Availability of Data and Material

The data that support the findings of this study are available from the corresponding author, Hamid Poursharifi, upon reasonable request.

Authors' Contributions

SAZ and HP co-designed the study. HP and HY contributed to the acquisition of the data. SAZ and MR analysed and interpreted the participants data. MR and SAZ wrote the draft manuscript. SAZ, MR, HP, and HY provided support in editing the manuscript. All authors approved the final version.

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Table 1.

Results of Factor Analysis with Actual and Simulated Data

Scales	Subscales	Item Number	Eigenvalues from Actual data (%)	Percent of Variance (%)	Eigenvalues from simulated data (%)
WB	PA	8	7.56	27	1.42
	LS	8	2.43	8.67	1.36
DI	DEP	10	14.92	29.24	1.60
	SANX	8	3.67	7.34	1.54
	SD	7	2.39	4.78	1.50
	AANX/ADEP	9	2.04	4.07	1.46
	OCD	6	1.54	3.18	1.43

Note: PA: Positive Affect, LS: Life Satisfaction, DEP: Depression, SANX: Social Anxiety, SD: Sleep Disorder, AANX: Academic Anxiety, ADEP: Academic Depression, OCD: Obsessive-Compulsive Disorder.

Table 2.

Results of Factor Analysis with Actual and Simulated Data

	Eigenvalues from Actual data (%)	Explained Variance (%)	Cumulative Variance (%)	Eigenvalues from simulated data (%)
1	6.77	48.37	48.37	1.12
2	1.41	10.09	58.46	1.09
1	15.98	35.50	35.50	1.26
2	2.99	6.64	42.14	1.23
3	2.08	4.63	46.77	1.21
4	1.63	3.62	5.39	1.20
5	1.50	4.34	53.72	1.18

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Table 3.

Model of Fit Statistics for Different Constructs

Model		DF	AIC	CFI	NNFI	RMSEA	RMSEA (90% CI)	SRMR
WB	420.86	42	132	0.98	0.98	0.072	(0.07,0.08)	0.03
DI	5058.98	579	1332	0.98	0.96	0.071	(0.07,0.08)	0.05

Note: DF: Degree of Freedom, AIC: Akaike Information Criterion, CFI: Comparative Fit Index, NNFI: Non-Normed Fit Index, RMSEA: Root Mean Square Error of Approximation, SRMR: Standardized Root Mean Square Residual, WB: Wellbeing Dimension, DI: Distress Dimension

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Table 4.

Psychometric properties of items and subscales of CMHS

Subscales							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Item mean range	3.65-3.86	4.04-4.62	2.71-4.11	2.75-3.23	2.11-4.16	2.34-2.96	2.10-4.04
Alpha coefficient	0.93	0.80	0.84	0.86	0.62	0.81	0.81
Item subscale	0.78-0.83	0.40-0.60	0.52-0.75	0.60-0.70	0.24-0.47	0.52-0.68	0.43-0.68
Correlation range							
Correlations							
PA (1)	-						
LS (2)	0.63**						
DEP (3)	-0.54**	-0.59**					
ANX (4)	-0.39**	-0.37**	0.60**				
OCD (5)	-0.14**	-0.16**	0.33**	0.53**			
SANX (6)	-0.21**	-0.32**	0.44**	0.59**	0.53**		
SD (7)	-0.29**	-0.30**	0.52**	0.59**	0.46**	0.43**	

Note: PA: Positive Affect, LS: Life Satisfaction, DEP: Depression, ANX: Anxiety, OCD: Obsessive-Compulsive Disorder, SANX: Social Anxiety, and SD: Sleep Disorder.

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Table 5.

Correlations between CMHS and related measures

		CMHS						
		CMHS-WB		CMHS-DI				
Related Measures		PA	LS	DEP	ANX	OCD	SANX	SD
SWLS		0.60*	0.60*	-	-	-	-	-
LOT		0.21*	0.13*	-	-	-	-	-
SWS	RW	0.27*	0.45*	-	-	-	-	-
	EW	0.60*	0.67*	-	-	-	-	-
	TS	0.68*	0.68*	-	-	-	-	-
AHS	AGE	0.41*	0.58*	-	-	-	-	-
	PAT	0.22*	0.26*	-	-	-	-	-
	TS	0.37*	0.51*	-	-	-	-	-
SC		-	-	0.62*	0.69*	0.44*	0.49*	0.60*
MHI	W	-	-	-0.77*	-0.54*	-0.16*	-0.41*	-0.46*
	HOP	-	-	0.76*	0.74*	0.27*	0.51*	0.53*
GHQ	SS	-	-	0.49*	0.53*	0.25*	0.19*	0.51*
	ANX	-	-	0.61*	0.68*	0.31*	0.35*	0.63*
	SDY	-	-	0.61*	0.49*	0.10*	0.23*	0.36*
	DEP	-	-	0.72*	0.49*	0.12*	0.26*	0.39*
	Total	-	-	0.74*	0.67*	0.23*	0.29*	0.57*

Note: DEP: Depression, ANX: Anxiety, OCD: Obsessive-Compulsive Disorder, SA: Social Anxiety, SD: Sleep Disorder, HOP: Hopelessness, SS: Somatic Symptoms, SDY: Social Dysfunction, SWLS: Satisfaction with Life Scale, LOT: Life Orientation Test, SWS: Spiritually Wellbeing Scale, RW: Religious Wellbeing, EW: Existential Wellbeing, TS: Total Score, AHS: Adult Hope Scale, AGE: Agency, PAT: Pathway,

*p < 0.01

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Table 6.

Norm Tables of CMHS

PA				ANX				DEP				LS			
Male		Female		Male		Female		Male		Female		Male		Female	
RS	SS	RS	SS	RS	SS	RS	SS	RS	SS	RS	SS	RS	SS	RS	SS
6	22	6	22	6	36	6	37	6	37	6	38	6	5	6	3
7	24	7	23	7	38	7	39	7	39	7	39	7	7	7	5
8	25	8	25	8	39	8	40	8	41	8	40	8	9	8	7
9	27	9	26	9	41	9	40	9	43	9	41	9	11	9	9
10	28	10	27	10	42	10	42	10	44	10	43	10	13	10	11
11	30	11	29	11	44	11	43	11	46	11	44	11	15	11	14
12	31	12	30	12	45	12	45	12	48	12	48	12	17	12	16
13	33	13	32	13	47	13	46	13	50	13	49	13	19	13	18
14	34	14	33	14	48	14	48	14	51	14	51	14	21	14	20
15	36	15	35	15	50	15	49	15	53	15	53	15	23	15	22
16	37	16	36	16	51	16	50	16	55	16	54	16	25	16	24
17	39	17	38	17	53	17	52	17	57	17	56	17	27	17	26
18	40	18	39	18	54	18	53	18	58	18	58	18	29	18	28
19	42	19	41	19	56	19	55	19	60	19	60	19	30	19	30
20	43	20	42	20	57	20	56	20	62	20	61	20	33	20	32
21	45	21	44	21	59	21	58	21	64	21	63	21	34	21	34
22	46	22	45	22	60	22	59	22	65	22	65	22	37	22	36
SD				WB				OCD				OCD (Con)			
Male		Female		Male		Female		Male		Female		Male		Female	
RS	SS	RS	SS	RS	SS	RS	SS	RS	SS	RS	SS	RS	SS	RS	SS
6	38	6	38	6	5	12	9	6	33	6	36	23	65	23	60
7	40	7	40	7	6	13	10	7	35	7	38	24	64	24	62
8	42	8	42	8	7	14	11	8	37	8	39	25	65	25	63
9	43	9	43	9	8	15	12	9	39	9	40	26	67	26	65
10	45	10	45	10	9	16	13	10	41	10	42	27	68	27	66
11	47	11	47	11	10	17	14	11	43	11	44	28	70	28	68
12	49	12	48	12	11	18	15	12	45	12	46	29	71	29	69
13	51	13	50	13	11	19	15	13	46	13	47	30	73	30	71
14	53	14	52	14	12	20	16	14	48	14	49	31	74	31	72
15	55	15	54	15	13	21	17	15	50	15	51	32	76	32	73
16	56	16	55	16	14	22	18	16	52	16	53	33	77	33	75
17	58	17	57	17	15	23	19	17	54	17	55	34	79	34	76
18	60	18	59	18	16	24	20	18	56	18	57	35	80	35	78
19	62	19	60	19	17	25	21	19	58	19	58	36	82	36	79
20	64	20	62	20	18	26	22	20	60	20	60				
21	66	21	64	21	18	27	23	21	61	21	62				
22	68	22	65	22	19	28	23	22	63	22	64				

DEVELOPMENT OF COLLEGE MENTAL HEALTH SCALE IN IRAN

Note: PA: Positive Affect, ANX: Anxiety, DEP: Depression, LS: Life Satisfaction, OCD: Obsessive-Compulsive Disorder, SD: Sleep Disorder, WB: Well-Being, RS: Raw Score, and SS: Standard Score, Con: Continued.