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Abstract

Internal validity and measurement invariance of the Counseling Center Assessment of Psychological Symptoms-62 item (CCAPS-62) was examined via confirmatory factor analytic models among autistic (*n* = 1,268) and non-autistic (n = 3,776) college students. Findings reviewed the CCAPS-62 had a strong model fit and was invariant across groups.

Keywords: autism, mental health, assessment

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Validation of the Counseling Center Assessment of Psychological Symptoms- 62 for the Autistic College Population

A note from the authors: In this manuscript, we will use identity-first language when discussing autistic college students, i.e., saying "autistic" instead of "person with autism." The APA 7th edition states, "Both person-first and identity-first approaches to language are permissible… unless or until you know that a group clearly prefers one approach, in which case, you should use the preferred approach (Dunn & Andrews, n.d.)," (American Psychological Association, 2020, p. 137). It is well established in the literature (see Botha et al., 2021; Bottema-Beutel et al., 2021; Bradshaw et al., 2021; Bury et al., 2020; Chapple & Worsley, 2021; Kenny et al., 2016; Sinclair, 2013) and through autism advocacy organizations (Autistic Self-Advocacy Network, n.d.), that identity-first language is the preferred language amongst most autistic adults.

The Diagnostic and Statistical Manual of Mental Disorders (5th ed,; DSM-5) defines autism as including, "Persistent deficits in social communication and social interaction across multiple contexts" (American Psychiatric Association, APA, 2013). However, autistic adults have advocated for diagnosis criterion that is not rooted in pathology and includes, "…evidence-based neutral differences and strengths," (Kapp & Ne'eman, 2020, p. 189). Additionally, the DSM-5 criteria for autism have historically been built on the white male phenotype, without full representation of females or racial and ethnic minorities (Suckle, 2021). According to Nick Walker, an autistic advocate and scholar, autism is a naturally occurring neurological variation that results in "distinctive, atypical ways of thinking, moving, interaction, and sensory and cognitive processing" (Walker, 2014). These differences make interacting in a non-autistic world difficult and result in the need for additional support in a variety of settings like workplaces and

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higher education. We have incorporated these perspectives in the language used throughout this paper.

While prevalence in higher education is difficult to quantify, it is believed that autistic students are accessing higher education at higher rates than ever before (Snyder et al., 2016). In the U.S. it is estimated that between 0.7 % and 1.9 % (White et al., 2011) of students are autistic. In the UK, this number is estimated to be even higher, at 2.4% (MacLeod & Green, 2009). This increase in enrollment is likely due to more frequent diagnoses (one in 44 children with a diagnosis in the U.S.; Maenner et al., 2020), improved transition services in secondary education (Individuals with Disabilities Education Improvement Act, 2004), and the collegiate system's increased support of autistic individuals (Nachman et al., 2022).

Advocates and scholars have begun to establish the unique needs of autistic college students, which often extend beyond the traditional services offered by postsecondary institutions like support through disability offices and counseling centers. Many autistic students discuss difficulty in college due to a lack of autism knowledge on campuses, non-inclusive environments, difficulty with executive functioning, and mental health concerns (Nuske et al., 2019). Given that mental health challenges in the general college student population are predictive of diminished academic outcomes and non-degree completion (Eisenberg et al., 2009), it is critical to conduct studies to assist advocates, researchers, and practitioners in best supporting autistic college students' mental health.

Autism and Mental Health

It has been well established that autistic adults experience greater mental health challenges than non-autistic adults (Chen et al., 2017; Croen et al., 2015; Joshi et al., 2015). Croen and colleagues (2015) found that the risk for depression in autistic adults was almost three

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times higher and the risk of suicide attempts was five times higher than the general population. Additionally, co-occurring mental health conditions are more common in autistic adults than in the non-autistic population (Lai et al., 2019).

There are several variables that account for increased risk for mental health challenges among autistic adults. Many report the need to mask (hiding autistic traits to fit within neurotypical norms) as a common cause of mental health concerns (Cage et al., 2018; Cage & Troxell-Whitman, 2019; Mandy, 2019). Relatedly, autistic individuals discuss non-accommodating or non-inclusive environments as contributing to mental health concerns (Raymaker et al., 2020). Significant life changes or transitions are also cited as elevating the risk for such challenges (Raymaker et al., 2020). Therefore, college campuses represent a multitude of stressors that might contribute to increased distress and mental health challenges for autistic students. The transition from high school to college typically involves major changes across several domains (e.g., increased academic expectations; the need to advocate for oneself; new people and relationships). Additionally, while some faculty in higher education report the desire to be inclusive for autistic students, they struggle to implement inclusive practices in their teaching (von Below et al., 2021). In a 2018 study, autistic students identified that while they commonly receive typical academic accommodations (e.g., extra time on assessments), they believed they would more greatly benefit from social and sensory related supports, as well as systemic changes like increased autism awareness on college campuses (Sarrett, 2018).

While there is a paucity of research exploring mental health disparities and causes of mental health concerns in the autistic college population, preliminary research supports the fact that autistic college students have similar mental health challenges as autistic adults (Jackson et al., 2018), but may have unique contributors to their anxiety. For example, autistic college

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students have reported college-specific anxiety triggers like academics, sensory environments that are outside of their control (like residential halls and cafeterias), and social concerns (Monahan & Freedman, 2021). Autistic college students also report difficulty accessing support services and requiring more services than are available (McMorris et al., 2019). While current advocacy efforts and scholarly work will hopefully help to address environmental and inclusivity concerns in the long-term, it is important to consider more immediate resources that can be put forth to measure, understand, and support current autistic students experiencing mental health concerns (Accardo et al., 2019).

Across the country, many institutions of higher education now have programs that support autistic students to navigate the postsecondary experience (Nachman et al., 2022). Most programs serve as points of contact, supporting students in accessing existing campus resources or providing direct support, most commonly in academics, social interactions, and interdependent living (Cox et al., 2020; Viezel et al., 2020). Most autism support programs do not provide mental health services, as they are outside the scope of program staff expertise and availability of resources (Cox et al., 2020). Therefore, it is critical that all student-facing departments in higher education (like counseling centers) have the knowledge, resources, and tools necessary to fully support the autistic student body.

College Counseling Center Assessment

Many college students (including those with autism) access mental health services at the counseling centers on campus. The Counseling Center Assessment of Psychological Symptoms-62 (CCAPS-62) is a 62-item mental health assessment that is commonly used by colleges and universities in the U.S. to screen and assess mental health needs of students (Center for Collegiate Mental Health, CCMH, 2021). The instrument assesses a broad range of mental health

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concerns and includes eight subscales (Depression, Generalized Anxiety, Social Anxiety, Academic Distress, Eating Concerns, Family Distress, Frustration/Anger, and Substance Use) and a distress index. The Frustration/Anger subscale was previously known as "Hostility" and was recently changed to better reflect the item content. Students are often required to complete the instrument before they begin accessing counseling services on campus (CCMH, 2021). The CCAPS-62 has a strong factor structure matching the theoretical constructs, good convergent and discriminative validity, and acceptable reliability (Locke et al., 2011). The CCAPS-62 can be used for initial screening of mental health concerns, evaluation of the benefit of counseling services, or as a monitoring tool for students accessing services (CCMH, 2021).

Since its development, the CCAPS-62 (and shorter version, CCAPS-34) have been validated for subpopulations of college students like military students (Ghosh et al., 2020) and with students outside of the United States (Broglia et al., 2016). While autistic students regularly access services at college counseling centers that use the CCAPS-62 (CCMH, 2021), to date, there is no evidence that the constructs are measured in the same way for this population as the ones previously studied. Validation of the CCAPS-62 in autistic adults is critical as these students may interpret questions differently than the general population, specifically with regard to interpreting items too literally or becoming frustrated with vague wording (Williams et al., 2021). It is imperative that the psychometric properties of the CCAPS-62 be studied specifically for the autistic college population given that it is currently being used with autistic college students for mental health decision making, and these students have unique strengths and challenges, college experiences, and related stressors.

The primary purpose of this study was to examine the internal construct validity and reliability of the CCAPS-62 for students with autism using a national sample of autistic college

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students seeking mental health services. Second, we sought to determine if the CCAPS-62 measurement model holds in the same way for autistic students as it does the general student population.

Method

This study was approved by the Institutional Review Board at the University of Delaware. Data for this cross-sectional study came from the Center for College Mental Health (CCMH), which is a Practice Research Network that collects data from over 600 colleges and universities across the United States on the mental health of college students. Data are gathered from university student counseling centers that participate in the CCMH network. This study uses existing data from two different datasets from the CCMH network. The first is the Standardized Data Set (SDS), which includes student counseling experiences, critical incident forms, clinician indices of client concerns, termination data, and an extensive set of demographic variables related to previous mental health needs and treatment, academic status, identity, and more. We also used item-level data from the CCAPS-62 (along with the corresponding SDS data) for the 2015-2016, 2016-2017, and 2017-2018 academic years where participants completed at least one administration of the CCAPS-62 without any missing items. Administrations of the CCAPS-62 with one or more missing items (n = 43,533) were removed from the dataset. The SDS asks students if they are registered with a disability office on campus. If they are, the student is prompted to identify their disability. Within the SDS, there is no method of confirming autism diagnosis. Of the 248,863 individuals who fit the above referenced criteria, 1,268 (0.51%) reported being autistic.

Measure

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As previously discussed, the CCAPS-62 is a multidimensional assessment used to measure eight mental health constructs in college students. Within the data set there was variability in the frequency that college counseling centers administered the CCAPS-62, leading to some students having multiple instances of completed CCAP-62 assessments. In line with other CCAPS research (e.g., Fleming et al., 2018), only the initial administration was used for the analysis to understand how students presented at the counseling center on their first visit. If the SDS was completed on the same day as the CCAPS-62, information from that SDS was used. If the two assessments were completed on different dates, we used the SDS and the first CCAPS completed within a 30-day window (prior to or after the SDS completion). At times, students may have completed more than one SDS and identified disability status differently each time. In these cases, we included students in the autism sample (AUT) if they have ever identified as autistic. Only one SDS and CCAPS-62 was included per student.

Statistical Analysis

The data were cleaned, and reverse coded as necessary according to the CCAPS user's manual (CCMH, 2021). A control group was selected from the non-autistic (No AUT) sample using a three (no AUT) to one (autism, AUT) ratio. Matching was performed using the nearest neighbor method using R package MatchIt (Chen & Shah, 2018; Ho et al., 2011). The AUT and no AUT groups were matched based on race, gender, and international student status. While there was a statistically significant difference in age between the AUT and No AUT samples, the difference was four years and we determined that there is no developmental difference between the two age groups and chose not to match on age. After matching, a series of confirmatory factor analytic (CFA) models with robust weighted least squares estimation were used to determine the model that fit the data best. Three models were examined - unidimensional (all

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items load onto a single common factor or scale), eight-factor (items load onto eight separate factors or subscales as specified in the introduction), and second-order (items load onto eight subscales which are in turn influenced by a higher order factor). Several goodness of fit indices, namely the comparative fit index (CFI; Bentler, 1990), the Tucker–Lewis index (TLI; Bentler & Bonett, 1980), the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990), and the Standardized Root Mean Square Residual (SRMR; Chen, 2007), were used to compare model fit. CFI and TLI values between 0.90 and 0.92 indicate adequate fit, with 0.92–0.95 indicating a good fit, and greater than 0.95 supporting an excellent fit. RMSEA and SRMR values of less than 0.08 are considered adequate, while less than 0.06 are considered excellent (Hu & Bentler, 1998; Marsh et al., 2004). Reliability of the measure was calculated using Cronbach's alpha.

The best fitting CFA model was then used for measurement invariance testing. In a CFA approach, measurement invariance is used to measure psychometric equivalence across groups, in this case AUT versus no AUT. When a non-invariance is detected, it indicates that the construct does not have the same meaning to the different groups. If detected, differences in total scores and subsequently in means across groups cannot be meaningfully compared. Invariance was tested in four steps by sequentially adding restrictions to the factor model: (1) configural invariance or pattern of free and fixed factor loadings (items load on factors similarly across groups); (2) metric (weak) invariance or equivalence of factor loadings (every item contributes to the underlying latent construct similarly across groups); (3) scalar (strong) invariance or equivalence of item intercepts or thresholds (item mean across groups are due to differences in latent trait across groups); and (4) residual (strict) invariance or equivalence of item uniqueness and error. At each step, model-fit indices were compared to the previous step to determine invariance. While a significant chi-square is traditionally used for these comparisons, in larger

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samples it can be extremely sensitive to non-meaningful deviations from ideal fit. Thus, alternative fit indices like change in CFI, RMSEA and SRMR were used in conjunction. Meaningful change was defined as 0.01 reduction in CFI, with an increase in RMSEA of 0.015 and SRMR of 0.030 (for metric invariance) or 0.015 (for scalar or residual invariance). All analyses were performed using R package lavaan (Rosseel, 2012).

Results

Sample Characteristics

The sample used for analysis contained non-autistic students (No AUT; n = 3,776) and autistic students (AUT; n = 1,268). Table 1 contains demographic information for the analytic sample among 3:1 matched non-autistic and autistic students. Of note, males are more likely to be diagnosed with autism (Maenner et al., 2020). Thus, this sex disparity is a known characteristic in the autistic population and is evident in our sample.

Factor Model

Table 2 contains the model fit indices for the initial factor analysis. The unidimensional model (Model 1) was noticeably the poorest fit. The eight-factor model (Model 2) and the second-order model (Model 3) demonstrated a clear improvement across each of the fit indices. The RMSEA, TLI and CFI were excellent; however, the lower bound of the confidence interval for the RMSEA did not quite cross below 0.05. The SRMR was just below the acceptable cutoff. Cronbach's alpha for the measure was 0.94.

Measurement Invariance

As seen in Table 3, the configural model had an excellent fit, as indicated by configural invariance. This means the factor structure was correctly specified in both groups. The chi-square statistic was significant ($p < 0.001$) across all subsequent steps. Testing for metric

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invariance displayed the largest change in the fit statistics (ΔCFI = - .0026, ΔRMSEA .004, ΔSRMR = .0012) but this change was not large enough to be meaningful and thus indicated equivalent factor loadings across groups. Similarly, testing for scalar invariance did not produce a sufficiently large change in model fit (ΔCFI = - 0.0013, ΔRMSEA= 0.000, ΔSRMR = 0.0006), thus establishing equivalence of intercepts. Therefore, any differences in sample means are truly reflective of differences in latent construct. Finally, a test for residual invariance also yielded non-meaningful change in model fit (ΔCFI = - 0.0009, ΔRMSEA= 0.001, ΔSRMR = 0.0015).

Discussion

Despite strong indicators of a high risk for mental health challenges among autistic college students, and the growing number of college students who identify as autistic, there is a dearth of assessment options for this community. The CCAPS-62, which is used widely by college counseling centers across the United States (CCMH, 2021), is the standard measure used to assess autistic college students. However, the CCAPS-62 was not developed for autistic college students. Neither has there been any evidence of the validity of this instrument with this group.

Our study addresses questions of validity from the perspective of internal validity. Meaning, does the original measurement constructs of the CCAPS-62 hold within the autistic college student population? The factor analytic model shows this is indeed the case, with strong fit statistics. The rigorous invariance analyses further support no difference in the measurement constructs of the CCAPS-62 between autistic and non-autistic college students. These analyses are necessary so college counseling centers can feel confident that the CCAPS-62 is measuring the same mental health constructs for autistic college students as it is in the non-autistic population.

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Establishing internal validity of a measure is necessary for both clinicians and researchers. Clinicians in college counseling centers and/or community based mental health clinics, can use the CCAPS-62 to a) clarify areas of mental health concern among individual students; b) make accurate recommendations for clinical intervention; c) monitor the progress of students by administering the CCAPS-62 in its entirety or by subscales of interest or importance; and d) develop targeted interventions and other systems supports based on the results of the autistic community on that campus or region. For researchers, the CCAPS-62 could be a valuable tool for monitoring response to intervention, epidemiology of mental health among autistic college students, and identifying predictors of academic and post-academic outcomes.

This study should be considered in light of its strengths and limitations. For strengths, the sample was large and national and addressed an important gap in the literature. The data collected for this instrument is self-report. While this can be a limitation in terms of scientific rigor, it is a strength in that it allows us to understand the way the instrument functions in a natural setting. Many students may go to college counseling centers and identify as autistic without a diagnosis given the barriers that come along with a diagnosis (Bargiela et al., 2016; Huang et al., 2020; Lewis, 2017). Understanding how the instrument works for those who are autistic (with or without formal diagnoses) is critical.

For limitations, we were only able to test the CCAPS-62 for internal validity, leaving questions about other psychometric features of the measures (e.g., inter-rater reliability, predictive validity, etc.). This limitation is common in studies examining the CCAPS-62 with this dataset (see Ghosh et al., 2020). There was also substantial missing data and minimal information on the sample beyond demographics and the CCAPS-62. The SDS only allowed students to identify as autistic if they indicated that they were registered for disability services. It

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is likely that some students were not captured in this sample if they are autistic and did not register at a disability center on campus. Future research should attempt to account for these limitations, as well as explore new research questions that can be answered using the CCAPS-62 for autistic college students.

In the future, researchers should consider ways to identify evidence of external convergent validity through administering the CCAPS-62 alongside validated mental health measures for autistic adults, like the Beck Depression Inventory-II (Williams et al., 2021) or the Anxiety Scale for Autism-Adults (Rodgers et al., 2020). Additionally, scholars may consider using data from the CCAPS-62 to understand the mental health challenges of autistic college students more broadly and consider how such findings might be considered in the development and delivery of interventions for this community. Despite a shift to include the autistic community, most autism research is not reflective of what the autistic community would like to be researched, which contributes to a lack of science that directly benefits those in the community (Chown et al., 2017; Pellicano et al., 2014; Walmsley et al., 2018). Interpretation of the data from this study should consider how the autistic community interprets the findings, and what recommendations these students have for improving treatment and access to services on campus. This information would be vital to colleges and college counselors as they engage with autistic college students.

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Disclosure Statement

The authors report there are no competing interests to declare.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author (JM), upon reasonable request.

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Table 1

Autistic and Non- Autistic Sample Characteristics

	No AUT (*n* = 3776)	AUT (*n* = 1268)
Age (M, SD)	26.1 (6.0)	22.0 (4.7)
Gender Identity (*n*, %)		
Man	1885 (49.9%)	708 (55.8%)
Woman	884 (23.4%)	288 (22.7%)
Transgender	155 (4.1%)	21 (1.7%)
Other	226 (6.0%)	56 (4.4%)
Missing	626 (16.6%)	195 (15.4%)
Race/Ethnicity (*n*, %)		
White	2617 (69.3%)	849 (67.0%)
Asian	397 (10.5%)	49 (3.9%)
Black	66 (1.7%)	47 (3.7%)
Hispanic/Latino	262 (6.9%)	65 (5.1%)
Multiracial	244 (6.5%)	68 (5.4%)
Other	87 (2.3%)	36 (2.8%)
Missing	103 (2.7%)	154 (12.1%)
International student (n, %)		

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	No AUT (*n* = 3776)	AUT (*n* = 1268)
No	2797 (74.1%)	1034 (81.5%)
Yes	192 (5.1%)	13 (1.0%)
Missing	787 (20.8%)	221 (17.4%)

Note. No AUT = non-autistic sample; AUT = autistic sample.

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Table 2

Model Fit Statistics Assessing Three Models of CCAPS-62

Model	RMSEA (95% CI)	CFI	TLI	SRMR
Unidimensional	0.113 (0.113-0.112)	0.791	0.784	0.143
Second Order	0.056 (0.056-0.055)	0.953	0.951	0.077
Eight Factor	0.058 (0.058-0.057)	0.957	0.954	0.074
Eight Factor - No AUT	0.058 (0.058-0.057)	0.953	0.951	0.080
Eight Factor - AUT	0.057 (0.058-0.056)	0.962	0.960	0.070

Note. RMSEA = root mean squared error of approximation; TLI = Tucker–Lewis index; CFI = comparative fit index; SRMR = standard root mean error; No AUT = non-autistic; AUT = autistic.

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Table 3

Measurement Invariance of CCAPS-62 Across Groups

	χ^2	RMSEA	CFI	TLI	SRMR	ΔRMSEA	ΔCFI	ΔSRMR
Configural	34519.81	0.048 (0.048-0.047)	0.940	0.937	0.062	-	-	-
Metric (Weak)	35935.3	0.044 (0.044-0.043)	0.938	0.936	0.063	0.004	-0.0026	0.0012
Scalar (strong)	36675.07	0.044 (0.044-0.043)	0.937	0.935	0.064	0.000	-0.0013	0.0006
Residual (strict)	37158.76	0.043 (0.044-0.043)	0.936	0.936	0.065	0.001	-0.0009	0.0015

Note. Δ = change in; RMSEA = root mean squared error of approximation; TLI = Tucker–Lewis index; CFI = comparative fit index; SRMR = standard root mean error.