

The Pennsylvania State University

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**SCREENING FOR INTERNALIZING DISORDERS IN COLLEGE STUDENTS:  
EXPLORATION OF PREDICTIVE UTILITY OF THE BEHAVIOR ASSESSMENT  
SYSTEM FOR CHILDREN, THIRD EDITION (BASC-3) COLLEGE SELF-REPORT  
FORM**

A Dissertation in

School Psychology

by

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## ABSTRACT

Although numerous studies have focused on understanding the utility of the Behavior Assessment System for Children (BASC; Reynolds & Kamphaus, 2015) across multiple populations, many of the studies that focus on the use of this measure with the college population have used the previous edition (BASC-2). Given the rising rates of anxiety and depression in the college population (Center for Collegiate Mental Health [CCMH], 2020) and the resulting increased risk for negative outcomes such as academic failure, dropout, self-harm, and suicidality (American Psychiatric Association [APA], 2013; Bakken, 2021; BlackDeer, 2021), ordinal and binomial logistic regression analyses were used to examine the BASC-3 College Self-Report form (SRP-COL) in predicting mental health and academic outcomes for a sample of full-time college students ( $N = 136$ ) enrolled in a large university. The Internalizing Problems Composite, specifically the Anxiety subscale, significantly predicted self-reported diagnosis of anxiety and/or depression; however, gender and age were the only statistically significant predictors of college GPA. Practical implications regarding the use of the BASC-3 SRP COL in predicting academic and mental health outcomes for college students, as well as limitations and directions for future research, also are discussed.

*Keywords:* Anxiety, assessment, BASC-3, clinical utility, college students, depression, measurement, psychometrics, self-report, validity

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## **Chapter 1**

### **Introduction**

According to the Center for Collegiate Mental Health (CCMH, 2020), rates of anxiety and depression have increased significantly during the last decade in the college population. Although college students have begun to seek treatment at a higher rate, as of 2016, only 16% of students with a mental health disorder reported having received treatment (Auerbach et al., 2016). Further, anxiety and depression have been found to increase risk in college students for negative outcomes such as academic failure, dropout, self-harm, and suicidality (APA, 2013; Bakken, 2021; BlackDeer, 2021; Wolf, 2001). Substance use, specifically tobacco and nicotine, are also highly associated with anxiety disorders, and depression puts students at higher risk for alcohol and other substance abuse disorders (APA, 2013; Bierhoff et al., 2019). Given the increased risk for negative life outcomes, broadband screening measures for college-age populations have become valuable tools for identifying students at-risk for anxiety and depression and informing appropriate treatment courses throughout this profound transition period for young adults.

One such broadband measure, the Behavior Assessment System for Children, Third Edition – Self-Report, College form (BASC-3 SRP-COL; Reynolds & Kamphaus, 2015), is widely used by psychologists and counselors to address a broad range of internalizing and externalizing concerns ranging from preschool-aged children to adolescents, although a self-report college form has been created and normed for young adults aged 18-25 years. Although numerous studies have focused on understanding the utility of the BASC across multiple age groups and populations, recent published studies featuring college populations have tended to focus on the now outdated Behavior Assessment System for Children, Second Edition (BASC-2;

Reynolds & Kamphaus, 2004). Therefore, more information is needed to understand the clinical utility of the BASC-3 SRP-COL form in predicting outcomes for college students. The purpose of the current study was to explore the concurrent validity of the BASC-3 SRP-COL form in predicting self-reported diagnoses of anxiety and/or depression and GPA in a college sample.

### **Review of Literature**

According to the APA's (2013) *Diagnostic and Statistical Manual of Mental Disorders* (5<sup>th</sup> ed.; *DSM-5*), anxiety disorders are characterized by excessive and intense worry related to everyday concerns that interfere with daily living. Although adaptive anxiety consists of typical fear responses that occur in response to imminent danger, individuals with anxiety disorders tend to experience excessive worry regarding irrational future outcomes. The most common of the anxiety disorders is Generalized Anxiety Disorder (GAD). In North America, the mean age of onset is approximately 35 years of age. However, this age range is quite large, meaning that many adolescents and young adults also experience onset of GAD symptoms. GAD occurs in approximately 2.9% of adults within the United States, and the disorder is twice as likely to occur in females as compared to males. Further, reported symptoms consistent with diagnostic criteria for GAD are more common in high-income countries and in populations of European descent (APA, 2022).

Depressive disorders typically include changes in affect and cognition, such as intense feelings of sadness and/or loss of interest or pleasure, lasting for at least two weeks in duration (APA, 2013). Major depressive disorder (MDD) is the most common depressive disorder in adulthood. Somatization, specifically fatigue and sleep issues, is most associated with MDD. Prevalence in the United States for MDD is approximately 7%, although rates of MDD are three times higher in young adults aged 18-29 years. Further, women are 1.5 to 3 times more likely to

have MDD compared to males, and rates of MDD increase in adolescence, peaking in young adulthood (APA, 2013).

### **Clark and Watson's Tripartite Model of Emotion**

Given the high comorbidity and overlapping symptoms present in both anxiety and depressive disorders, Clark and Watson (1991) previously proposed a model for understanding how emotional traits contribute to distinct and comorbid states of anxiety and depression. Emotion can be understood through three unique factors – physiological hyperarousal, negative affect, and positive affect. Both anxiety and depressive disorders are typically characterized by negative affect. However, anxiety is also accompanied by physiological hyperarousal, whereas depressive states are typically characterized by loss of positive affect. Thus, negative affect tends to be characteristic of both anxiety and depressive disorders, such as increased irritability, guilt, and other negative emotions, whereas physiological hyperarousal and loss of positive affect should be identified by clinicians when providing a differential diagnosis or considering comorbidity between anxiety and depressive disorders.

### **College Prevalence**

Estimates from the World Health Organization indicate that approximately 20% of college students have a mental health disorder, with 83% of this population having received a diagnosis before college (Auerbach et al., 2016). Further, those college students who received a diagnosis before entering college had a higher likelihood of substance use disorders and lower likelihood of remaining in college until graduation. In women, MDD had the highest prevalence among college students. However, only 16% of students with a mental health disorder reported having received treatment (Auerbach et al., 2016). According to CCMH (2020), rates of anxiety and depression in the college population of the United States, United Kingdom, and Canada have

increased significantly during the past decade, and the number of students seeking treatment for mental health concerns has seen a similar trend as well. College students with disabilities who seek mental health treatment are more likely to have concerns related to anxiety, depression, self-harm, stress, and academic difficulties, whereas students without disabilities who seek treatment are more likely to have difficulties related to relationships or loss (Fleming et al., 2018).

In the United States, BlackDeer et al. (2021) explored the prevalence of depression and anxiety symptoms in a large sample of undergraduate students ( $N = 117,430$ ) from datasets collected in 2008 and 2009. Of the total sample, approximately 31% reported depressive symptoms and 49% reported anxiety symptoms. Of those reporting depressive symptoms, 22% had received a diagnosis of depression, and 17% of those reporting anxiety symptoms had received a diagnosis of anxiety. These prevalence rates are much higher than those observed in the general population, providing further support for increased assessment and treatment efforts to be available for college students (APA, 2013; BlackDeer et al., 2021).

Additionally, BlackDeer and colleagues (2021) examined group differences across gender and ethnicity, and analysis of variance (ANOVA) estimates led the researchers to conclude that female students were more likely to receive a diagnosis of anxiety or depression and to receive treatment for each condition. Females also reported more symptoms of anxiety and depression as compared to males. Related to ethnicity, self-reported rates of depressive symptoms were highest among those with multiple ethnicities (36.98%) and Asians (33.91%) and lowest for under-represented minorities (30.78%) and whites (30.12%), whereas self-reported rates of anxiety symptoms were highest among those with multiple ethnicities (51.31%) and whites (50.47%) and lowest among Asians (49.34%) and under-represented minorities (43.28%). Logistic regression analyses revealed that multiple ethnicities, under-represented

minorities, and whites were more likely to be diagnosed with both anxiety and depression as compared to Asians, whereas whites were significantly more likely to receive treatment for anxiety and depression as compared to Asians, under-represented minorities, and multiple ethnicities (BlackDeer et al., 2021). Further, lesbian, gay, bisexual, and queer students report higher levels of depression and stress, are more likely to have been diagnosed with an anxiety or mood disorder, and experience higher rates of substance use (Grant et al., 2014).

Further, these trends are not limited to the United States. In Ontario, 60.8% of college students ( $N = 1,964$ ) seeking services from campus counseling and disability centers reported having at least one mental health disorder reported in the *Diagnostic and Statistical Manual of Mental Disorders: Text Revision* (4<sup>th</sup> ed.; *DSM-IV-TR*; APA, 2000) with 15.3% of these students having comorbid disorders. Mood and anxiety disorders were the most common diagnosis in this sample (Holmes & Silvestri, 2016).

In a Chinese sample, Wenjuan (2020) longitudinally explored ratings from a large sample of college students ( $N = 1,892$ ) on the Depression Anxiety Stress Scale - 21 (DASS-21; Lovibond & Lovibond, 2004). Through ANOVA, Wenjuan (2020) concluded that females experienced significantly higher rates of anxiety as compared to males, especially in the first two years of university. However, significant differences were not present across gender for depression or stress. Meta-analyses have further revealed that rates of depression in Chinese college students, especially men, have been on the rise over the past decade, having increased .66 standard deviations since 2000 (Fong et al., 2020).

### **Comorbidity with Neurodevelopmental Disorders**

Another consideration, especially for the college population, includes comorbidity of internalizing disorders, such as anxiety and depression, with neurodevelopmental disorders,

specifically attention-deficit/hyperactivity disorder (ADHD). Difficulties related to concentration, focus, attention, and executive functioning are not uncommon in college students with ADHD and internalizing disorders. Although only a minority of individuals with ADHD have comorbid anxiety and depressive disorders, this co-occurrence is more common than for the general population (APA, 2013).

In a study of adults, Kessler et al. (2006) used multivariate logistic regression to explore comorbidity with ADHD using a sample of 3,199 participants (ages 18-44 years) from the National Comorbidity Survey Replication, and the researchers discovered that mood disorders (including major depressive disorder, dysthymia, and bipolar disorder), anxiety disorders, substance use disorders, and intermittent explosive disorder were significantly related to ADHD diagnosis.

Subsequently, van der Meer et al. (2018) used functional magnetic resonance imaging (fMRI) and a visuospatial working memory task (VSWM) to explore the relationship between anxiety and ADHD symptoms in a sample of 371 adolescents and young adults, 122 of which had a diagnosis of ADHD. Severity of ADHD symptoms were associated with a lower accuracy score on the VSWM, although severity of anxiety symptoms had no significant effect on the performance of this task. It was found, however, that anxiety symptoms modulated the relationship between ADHD symptoms and brain activity in the right cerebellum as well as in the bilateral dorsal striatum and thalamus. Although not a theoretical model, this study provides insight into the interaction of ADHD and anxiety in a young adult sample, and van der Meer's (2018) findings suggest that anxiety symptoms may moderate the relationship between ADHD symptoms and increased task demands or cognitive load.

## **Predictors of Anxiety and Depression**

### ***Genetic Factors***

Genetic components account for approximately 1/3 of the variance of developing a GAD, and this is also similar for depression, as unipolar depressive disorders are highly comorbid with GAD (APA, 2013). However, environmental factors are known to also play a large role in the etiology of psychopathology. Specifically, Perea et al. (2012) examined gene and environment interactions in the development of negative affect. As previously discussed, negative affect is common in both anxiety and depression, and the authors discovered that specific genes appear to moderate the effect of environmental predictors of negative affect, such as childhood maltreatment.

### ***Demographic Factors***

Many recent studies have further explored predictors of anxiety and depression. For example, Kamberi et al. (2019) explored predictors of anxiety disorders and symptoms in a random sample of 676 students across three universities in Kosovo. ANOVA and linear multiple regression were used to explore predictor variables in this sample. Overall, gender, study year, family income, age, and father's employment were significantly associated with symptoms of anxiety as evidenced by scores on the Beck Anxiety Inventory (Beck & Steer, 1993). Additionally, gender, living with extended family, mother's employment, and study year were associated with higher levels of anxiety. A diagnosis of anxiety was predicted by gender, study year, previous academic achievement, and family income. The results of this study suggest the role that demographic and family variables play in the development and levels of severity of anxiety.



Cultural factors may also play a role in the development of internalizing disorders. For example, interpersonal relations were found to play a mediating role in the relationship between parental rejection and depression in a Pakistani sample of college students ( $N = 321$ ; Saleem et al., 2019). Lian and Wallace (2020) further discovered that international Chinese students attending college in the U.S. were at higher risk for anxiety and depression if they were more likely to return to China after college and had experienced a high level of stress about returning to China, as well as having low levels of cultural humility and not having a romantic partner.

### ***Stress and Worry***

Stress is also known to have a large contribution to the development of anxiety and depressive disorders in the college population. Not surprisingly, it has been discovered that stress is significantly associated with anxiety and depression in college students, although mindfulness and resilience have been found to moderate this relationship (Cole et al., 2015). Jones et al. (2018) discovered a similar relationship between academic distress and financial stress with anxiety, although family and peer support has been shown to be a protective factor for both anxiety and depression (Jones et al., 2018; Taylor et al., 2014).

### ***Health Behaviors***

Finally, other behaviors such as sleep, alcohol use, diet, and internet use also need to be considered in predicting outcomes of anxiety and depression. Ye et al. (2016) examined these variables in predicting risk for developing depression or anxiety in a large Chinese sample of college students ( $N = 2,422$ ). Cluster analyses revealed that those students who engaged in more unhealthy behaviors were 2.21 times more likely to have depression and 2.32 times more likely to have anxiety.

Similar results were discovered by Hoying et al. (2020) with a smaller sample of incoming health science students ( $N = 197$ ) at a university in the midwestern United States, in which sleep, health, lifestyle, stress, and locus of control predicted anxiety and depression. Significant negative relationships between academic control and anxiety as well as significant positive relationships between self-esteem and both physical and mental health have been observed in the college population. Self-esteem has also been found to negatively predict stress (Stupnisky et al., 2013) and has been identified as a mediator between social anxiety and academic and social adjustment (Nordstrom et al., 2014).

### **Academic Outcomes for College Students**

Overall, higher levels of depression and anxiety have been found to negatively impact academic performance in college students (Keyes et al., 2012). Recent literature has continued to demonstrate this relationship to hold true. For example, Cheung et al. (2020) discovered that increased ratings for depression were significantly related to academic load and GPA in a sample of Chinese students ( $N = 9,479$ ). Additionally, social anxiety was found to significantly influence end-of-year grades in a large sample of Canadian college students ( $N = 942$ ), although increased number of social ties moderated the relationship between social anxiety and academic achievement (Brook & Willoughby, 2015).

However, studies focusing on academic outcomes for college students experiencing symptoms of anxiety and depression tend to focus on subjective outcome measures, such as self-report ratings of academic impact, performance, or distress, as compared to objective measures such as GPA. For example, the American College Health Association's National College Health Assessment (ACHA-NCHA) was used to explore outcomes of college students in an undergraduate ( $n = 1,355$ ) and graduate health science student ( $n = 712$ ) sample. Overall, those

undergraduate students who perceived negative academic impact reported more difficulties related to stress, depression, anxiety, and relationship problems, whereas graduate students reported higher rates of upper respiratory infections, concern about a family member or friend, sleep issues, relationship concerns, and internet/computer game use (Kernan et al., 2010).

In another study completed by Holmes and Silvestri (2016), students with at least one disorder in a college sample from Ontario ( $N = 1,964$ ) also reported significantly higher scores for academic performance difficulties. Specifically, students with a mood disorder reported significantly more difficulties with alertness, attention, and peer relationships, whereas those students with an anxiety disorder reported significantly more difficulty with memory and executive functioning (Holmes & Silvestri, 2016). Fleming et al. (2018) also tested a model for understanding predictors of academic distress that explained 21.0% of the total variance. After controlling for demographic information, social support, and campus involvement, variables reflecting ADHD, depression, self-harm, trauma and victimization, stress, and social support from peers and family significantly predicted academic distress (Fleming et al., 2018).

### ***Role of Substance Use***

Brook and Willoughby (2016) further investigated the role of alcohol use in predicting academic and psychosocial outcomes in a university sample ( $N = 1,132$ ). The investigators used latent class growth analysis and ANOVA, and they found that the group with higher social anxiety and higher alcohol use had statistically significant lower grades and higher frequency of self-injury as compared to those with social anxiety and low alcohol use.

Social anxiety disorder (SAD) and rates of comorbidity were also examined by Filho et al. (2010) in a sample ( $N = 355$ ) of Brazilian college students. ANOVA and chi-square tests suggested that rates of comorbidity of Axis I disorders in the *DSM-IV* (APA, 2000), as well as

resulting impairment, increased for those students with a SAD as compared to those with a subthreshold SAD or a control group. The most common comorbid disorders were mood and other anxiety disorders. Further, those students with social anxiety had higher rates of smoking, alcohol, and cannabis use, as well as psychotropic medication use.

### ***Role of Treatment***

BlackDeer et al. (2021) recently explored the interaction of treatment and internalizing symptoms in predicting GPA. Using the ACHA-NCHA sample ( $N = 117,430$ ), BlackDeer and colleagues (2021) applied ANOVA and reported a significant interaction for symptom-treatment involvement in both depression,  $F(3, 113,565) = 293.2, p < .001$ , and anxiety,  $F(3, 114,971) = 33.02, p < .001$ . In post-hoc analyses, students with a diagnosis of depression without treatment had significantly lower GPAs compared to those without a diagnosis and those with a diagnosis receiving treatment. Similar results were found for anxiety.

### ***Role of ADHD Symptoms***

Additionally, individuals with ADHD in the college setting have reported greater executive functioning difficulties and anxiety symptoms in comparison to their peers, and those that do not receive medication for ADHD report greater depression symptoms than those individuals who do receive medical intervention with ADHD (DuPaul et al., 2021). Using multiple-group latent growth curve modeling ( $N = 406$ ), the authors discovered that the students with ADHD had significantly lower GPAs with no differences between subgroups of medicated and non-medicated ADHD. Further, GPA in both the medicated ADHD subgroup and the comparison subgroup significantly decreased over time.

## **Assessment of Internalizing Disorders**

In addition to interview methods, self-report measures are largely relied upon to identify the presence of anxiety and depression symptoms when assessing a college student for psychopathology or screening for at-risk students. Therefore, multiple studies have contributed to the literature in better understanding the psychometric properties and utility of self-report measures of anxiety and depression in college populations. Given that college students with screening levels for depression and anxiety have been found to be at increased risk for suicidality (Keyes et al., 2012), coupled with the increasing rates of internalizing difficulties in the college population (CCMH, 2020), appropriate and effective assessment and treatment efforts for college students are becoming significantly more important.

### ***Measurement Studies of Rating Scales***

Multiple recent studies have contributed to the literature regarding the development and validation of self-report rating scales for internalizing disorders in the college population, such as the Individual and Relational Role Balance Scale (IRRBS; Bishop et al., 2016), Patient Health Questionnaire (PHQ; Spitzer et al., 1999), and a digital multidimensional stress scale created by Hall et al. (2021). Additionally, reliability, validity, and factor analysis have been explored for multiple self-report rating scales to better understand each one's psychometric properties, such as those completed with the Arabic Scale of Mental Health (Abdel-Khalek, 2012), Brief Adjustment Scale – 6 (BASE-6; Cruz et al., 2020), and the Revised Academic Locus of Control Scale (Curtis & Trice, 2013),

Additionally, Merz and Roesch (2011) explored the predictive validity of Watson and Clark's tripartite theory for explaining psychological functioning outcomes in college students using multilevel factor analysis to explore the predictive validity of the Positive and Negative

Affect Schedule (PANAS; Watson et al., 1988) among 364 college students. Overall, trait negative affect was significantly associated with anxiety and depression, although state negative affect also played a role in predicting change in depression. Although state positive affect was negatively associated with anxiety and depression, this was not the case for trait positive affect. Finally, self-esteem was predicted by both positive and negative affect.

The Counseling Center Assessment of Psychological Symptoms-62 (CCAPS-62; Locke et al., 2011) is a measure of internalizing symptoms and stress that measures symptoms of generalized and social anxiety, depression, substance use, and academic distress. Samlan et al. (2021) recently explored the predictive validity of the CCAPS-62 through examination of the correlation between the Academic Distress subscale and GPA or dropout in a final sample of 295 undergraduate students in the same cohort. Hierarchical regression analyses revealed that three scales on the CCAPS-62 were significantly associated with GPA, including Academic Distress,  $\beta = -.30, p < .001$ ; Social Anxiety,  $\beta = .20, p = .015$ ; and Hostility,  $\beta = -.26, p < .001$ . Academic Distress was also significantly predictive of dropout across second year,  $OR = 2.50, p < .001$ ; third year,  $OR = 1.94, p < .001$ ; and fourth year,  $OR = 1.87, p < .001$ . However, Social Anxiety was predictive of dropout in the second year only,  $OR = .58, p = .037$ , whereas Hostility was predictive of dropout in the third year only,  $OR = 1.70, p = .021$ .

### ***Behavior Assessment System for Children***

Although many studies in the literature are dedicated to the understanding of the utility of self-report measures, fewer studies have examined the utility of the Behavior Assessment System for Children (BASC; Reynolds & Kamphaus, 2015), a broadband assessment of behavioral, social, adaptive, and emotional functioning developed for preschool through college-aged students and widely used by psychologists in school and clinical settings. Given the relatively

recent release of the third edition of the BASC (BASC-3), previous studies have largely focused on exploring the utility of this measure's predecessor, the BASC-2. These studies have tended to focus on understanding group differences in child and adolescent populations with autism spectrum disorder (ASD; Bradstreet et al., 2017; Goldin et al., 2014; Mahan & Matson, 2010; Taylor et al., 2020; Volker, 2010). Other studies also explored the reliability, validity, and psychometric properties of the BASC-2's various forms (Ahn et al., 2014a; Ahn & Ebesutani, 2015; Bradstreet et al., 2017; Gardiner & Iarocci, 2018; Jaureguizar et al., 2017; Nugent et al., 2013; Perkins et al., 2014). However, since the release of the BASC-3, almost all studies contributing to the literature regarding its utility have focused on the parent and teacher rating scales (Canivez et al., 2021; Chan et al., 2022; Firestein et al., 2022; Klein et al., 2019; Peterson et al., 2021; Roussis et al., 2021; Wall et al., 2021; Willard et al., 2021; Zhou et al., 2020), whereas far fewer studies have focused on the self-report child and adolescent report forms (Fletcher-Janzen & Harrington, 2020; Reinke et al., 2022; Sonne et al., 2020; Tan et al., 2020).

Particular to the SRP-COL form, limited research is available as compared to other forms of the BASC. One such study completed by Schwanz et al. (2007) explored the ability of the Attention Problems and Hyperactivity scales on the BASC-2 SRP-COL form to predict college GPA. Overall, both scales significantly predicted GPA, with Attention Problems accounting for 7% of the total variance and hyperactivity accounting for 2% of the additional overall variance.

In 2008, Nowinski and colleagues studied the test-retest reliability and convergent and discriminant validity of the college version of the BASC-2, revealing moderate to large test-retest correlation coefficients. However, the authors found that almost all of the scales were able to differentiate a non-clinical from a clinical sample on other self-report measures with the exception of alcohol use, providing support for the validity of the BASC-2 SRP-COL. Additional

studies have focused on understanding the predictive validity of the BASC-2 SRP-COL for ADHD (Dvorsky et al., 2016) and psychiatric symptoms (Kanne et al., 2009; Thompson et al., 2021).

Researchers have also explored the psychometrics of the BASC-2 SRP-COL in diverse populations. For example, Ahn et al. (2014b) examined the results of the BASC-2 SRP-COL form in a Korean sample ( $N = 1,000$ ). Overall, the authors reported internal consistency and test-retest statistics suggestive of appropriate reliability in this sample across all subscales and composites, as well as appropriate convergent validity for the Anxiety, Depression, Somatization, Alcohol Abuse, Inattention, and Hyperactivity scales. The factor structure of the BASC-2 SRP-COL in this sample was examined through confirmatory factor analysis, and an acceptable to excellent model fit was discovered for each factor on the BASC-2 SRP-COL, providing support for the use of the BASC-2 SRP-COL in a Korean sample.

Drake et al. (2017) also explored the correlation between the clinical and adaptive scales of the BASC-2 as compared to a narrowband ADHD self-report assessment. The ADHD Index score on the narrowband assessment was highly correlated,  $p < .001$ , with the scales of Social Stress, Anxiety, Sense of Inadequacy, Attention Problems, Hyperactivity, and Self-Esteem on the BASC-2 SRP-COL form (Drake et al., 2017).

Finally, Sheehan and Iarocci (2019) explored the impact of ADHD symptoms and executive functioning above and beyond depression, age, and gender on academic and social adjustment. The sample consisted of 135 university students, although only two students self-reported a diagnosis of ADHD, and another eight students self-reported a diagnosis of depression. The Behavior Rating Inventory of Executive Function, Adult Version (BRIEF-A; Roth et al., 2005) was used to measure executive functioning, and the BASC-2 (Reynolds &



Kamphaus, 2004) was used to measure inattention, hyperactivity, and depression. To explore predictors of academic and social adjustment, hierarchical regression analyses were used. The full model for academic adjustment included gender, age, and depression in Block 1, inattention and hyperactivity in Block 2, and metacognition in Block 3, and the full model was found to be significant,  $R^2 = .37$ ,  $F(6,128) = 12.59$ ,  $p < .001$ . Gender, age, and depression also significantly predicted social adjustment, whereas inattention and hyperactivity did not significantly predict social adjustment in the second block. Further, behavioral regulation was used in the third block in place of metacognition, which was also found to be a non-significant predictor of social adjustment (Sheehan & Iarocci, 2019).

### **Rationale, Purpose, and Hypotheses**

Although most college students with a mental health disorder enter their college years with a current mental health diagnosis, the majority of these students do not receive treatment, thereby increasing their risk for negative outcomes such as school dropout and development of substance use disorders (World Health Organization; as cited in Auerbach et al., 2016). Specific to internalizing disorders, rates of anxiety and depression have been on the rise over the past 8 years (CCMH, 2020), with prevalence rates observed to be much higher than those observed in the general population (APA, 2013; BlackDeer et al., 2021).

Wolf (2001) further reports that students with “hidden” disabilities such as ADHD, learning disabilities, and other neuropsychiatric and neurodevelopmental disorders may have difficulty with the transition from high school to the post-secondary setting, some of whom may lack the prerequisite academic skills to be successful at the college level. Many of these students may also experience executive functioning deficits, which are important skills for success in college. Unfortunately, executive functioning deficits, including planning, organizing, attention,

and memory, as well as social skills difficulties, poor problem-solving skills, and low self-esteem, are common to students with ADHD, anxiety, and depressive disorders. These factors put students with disabilities at higher risk for academic failure and dropout (Wolf, 2001).

Additionally, students with internalizing disorders, specifically depression, are at higher risk for suicidality, self-harm, and other risky behaviors such as alcohol abuse (APA, 2013).

Although many studies have focused on academic outcomes for college students with disabilities, subjective measures of academic performance are often used in place of more objective measures such as GPA. Specifically, Sheehan and Iarocci (2019) note the importance for further research to consider GPA as an outcome measure instead of a self-report of perceived academic adjustment. Therefore, thoughtful screening approaches are needed to provide guidance in predicting diagnoses and academic outcomes to aid in providing appropriate treatment efforts to college students.

One way to approach screening is by using a broadband assessment measure developed for college students such as the BASC-3 SRP-COL form. Broadband measures are often used as an overall screening measure for comorbid disorders that may be contributing to a presenting problem or occurring alongside another mental health concern. Since practitioners, clinicians, and counselors are often forced to place a high reliance on self-reporting, more information is needed to understand the utility of self-report measures for college students, especially considering the high comorbidity rates of internalizing disorders and the role that other factors such as culture, stress, and health behaviors play in predicting outcomes for college students.

A review of the literature exploring self-report measures, including the widely used BASC, revealed a significant gap relative to understanding the clinical utility and validity of self-report measures when screening or assessing college students for anxiety and depression,

especially with the BASC-3 SRP-COL, which provides a cost effective and time efficient approach for screening and diagnosis efforts. Although a limited number of studies have focused on the utility of the BASC-2 SRP-COL, no studies utilizing the BASC-3 SRP-COL have been completed to date. As such, the purpose of this study is to explore the concurrent validity of the scales and composites of the BASC-3 SRP-COL form in predicting diagnosis of an internalizing disorder and GPA in a college sample.

### ***Research Question 1***

Which demographic variables (i.e., gender, age) and scales/composites of the BASC-3 SRP-COL form account for the maximum variance in explaining the likelihood that the study participants have received a diagnosis of anxiety and/or depression?

**Hypothesis for Research Question 1.** It was hypothesized that gender, age, and the Internalizing Problems Composite of the BASC-3 SRP-COL significantly predict college students' self-reports of anxiety and/or depression diagnoses.

### ***Research Question 2***

Which demographic variables (i.e., gender, age) and scales/composites of the BASC-3 SRP-COL form account for the maximum variance in predicting self-reported GPA in the study participants?

**Hypothesis for Research Question 2.** It was hypothesized that all composites of the BASC-3 SRP-COL composite scores, as well as student gender and age, significantly predict the GPA of college students.

## Chapter 2

### Method

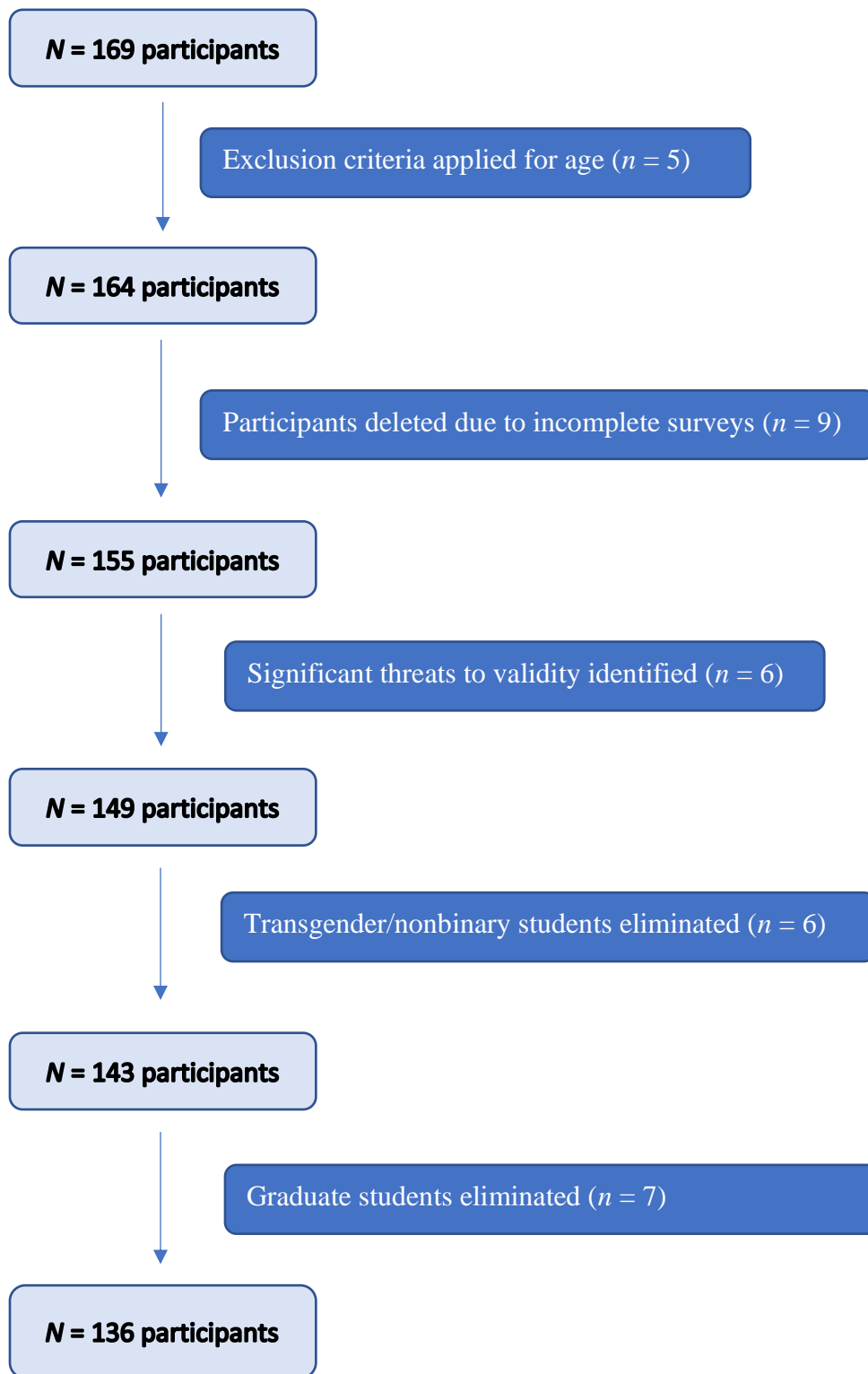
#### Participants

The sample for this study includes college students enrolled full-time at a large public university in the northeast region of the United States. A total of 169 participants completed an online survey; however, five participants were outside the targeted age range of 18-25 years and reported already having completed a master's degree. As such, their data were omitted from the analysis sample, reducing the sample size to 164 participants. An additional nine participants were excluded as they completed less than 50% of the survey.

To ensure validity of responses, the *V* Index on the BASC-3 was examined for each remaining participant. The *V* Index is designed to identify situations in which a participant has answered in a way that agrees with highly unlikely events, thus providing support that a participant's answers are invalid (Reynolds & Kamphaus, 2015). Upon calculation of the *V* Index, four participants endorsed *V* Index scores falling in the Extreme Caution range (sum of scores  $\geq 2$ ), and another two participants endorsed *V* Index scores falling in the Caution range (sum of scores = 1). Therefore, these six participants were deleted from the sample due to significant threat to validity.

When examining the responses of the remaining 149 participants, 2.7% of the participants identified as transgender, 1.3% identified as genderfluid, and 0.6% chose not to specify their gender. Although the original intent was to examine findings for all gender groups, the extremely small sample sizes for the transgender and gender nonconforming subsamples unfortunately were not of sufficient size to do so. Thus, they were excluded from the final analysis sample.

Further, of these remaining 143 participants, seven students reported having received a bachelor's degree or higher. Given the uniqueness of graduate students' experiences as compared to undergraduates, these seven students were removed. Thus, a final sample size of 136 cisgender, undergraduate students were included in the data analytic sample. This adjustment resulted in a deletion of data for 19.5% of the total respondent sample (see Figure 2-1).



**Figure 2-1:** *Flow of participants from consent (N = 169) to final analytic sample (N = 136).*

A total of 33.2% of the participants in the final sample reported having been diagnosed with anxiety and/or depression. Specifically, 16.2% reported having received a diagnosis of anxiety, 9.6% reported having received a diagnosis of depression, and the remaining 7.4% had a diagnosis of both anxiety and depression. Due to the high comorbidity between anxiety and depression and to further increase the power of the study, both groups were combined into one overall outcome measure in which internalizing disorders were measured by all students reporting having received a diagnosis of anxiety and/or depression.

The participants in this final analytic sample ranged from the ages of 18-22 years ( $M = 19.32$ ,  $SD = 1.30$ ), and participant age did not vary by condition. Of the final 136 participants, 95.6% of the sample identified as White, whereas the remaining participants identified as either Asian (2.2%) or white and Hispanic/Latinx (2.2%). The majority of the sample identified as female (83.8%), and the remaining 16.2% of participants identified as male (see Table 2-1). Given a high rate of completed surveys were returned from students pursuing an education-related degree ( $n = 85$ , 62.5%), the high rate of females in this sample is not surprising as 76% of public school teachers in 2017-2018 were reported to be female by the National Center for Education Statistics (2000).

**Table 2-1:** Final participants' age, gender, race/ethnicity, and self-report grade point average by subgroup.

	Anxiety/Depression (%) ( <i>n</i> = 45)	No Anxiety/Depression (%) ( <i>n</i> = 91)
Gender		
Male	15.6	16.5
Female	84.4	83.5
Race/Ethnicity		
White	95.6	95.6
Asian	2.2	2.2
Multi-racial	2.2	2.2
Major <sup>a</sup>		
Arts & Architecture	6.6	5.5
Business & Communications	4.4	3.3
Education	55.6	65.9
Health & Human Development	13.3	9.9
Mathematics & Engineering	4.4	1.1
Nursing & Pre-Medicine	0.0	2.2
Psychology	4.4	0.0
Undecided	8.9	9.9
Unspecified	2.2	2.2
GPA <sup>a</sup>		
2.00-2.99	17.8	5.6
3.00-3.49	24.4	33.3
3.50-3.99	51.1	47.8
4.00 and above	6.7	13.3

Note. *N* = 135.

<sup>a</sup> One missing value was present for GPA. Participant GPA did not differ by condition.

The omitted participants (*N* = 33) were majority female (57.5%), White (78.8%), and ranged in age from 18-44 years. The majority (57.6%) were education majors, with the remaining studying business, health and human development, psychology, information science and technology, linguistics, and undecided. Over half (60.6%) of these participants reported having received either a diagnosis of anxiety, depression, and/or another unspecified psychiatric disorder. This is in comparison to only 33.1% of the retained sample endorsing a diagnosis of anxiety and/or depression, whereas the remaining variable frequencies are consistent across the omitted and retained samples.



An independent samples  $t$  test revealed that ethnicity, age, and gender were not significantly different across those students reporting having received a diagnosis of either anxiety or depression as compared those students who did not report having received this type of diagnosis; age:  $t(134) = -1.471, p = .144$ ; ethnicity:  $t(134) = -.012, p = .990$ ; gender:  $t(134) = -.137, p = .891$ . Analysis of variance estimates indicate that participant age and GPA did not differ by condition; age:  $F(1,134) = 2.165, p = .144$ ; GPA:  $F(1,133) = .2278, p = .134$ . However, chi-square statistics indicate that the percentage of participants in each GPA rank significantly differed by gender,  $\chi^2(3) = 16.783, p < .001$ . Overall, a higher percentage of males than expected were in the lower GPA groups, whereas a higher percentage of females than expected fell in the higher GPA groups (see Table 2-2).

Table 2-2: Crosstabulation of percentages for gender and grade point average.

GPA	Male ( $n = 22$ )	Female ( $n = 113$ )
2.0-2.9	31.8	5.3
3.0-3.4	27.3	31.0
3.5-3.9	40.9	50.4
4.0 and above	0.0	13.3

Finally, the BASC-3  $F$  Index and  $L$  Index scores were also examined to determine any additional potential threats to validity. The  $F$  Index is designed to identify individuals who may indicate their own thoughts and behavior in an inordinately negative fashion (Reynolds & Kamphaus, 2015). A sum of scores equal to 2 indicates an  $F$  Index score falling in the Caution range, whereas a sum of scores greater than or equal to 3 falls in the Extreme Caution range. Approximately 13.4% of the individuals self-reporting a diagnosis of anxiety and/or depression endorsed elevated  $F$  Index scores, whereas only 3.3% of the general population group endorsed elevated  $F$  Index scores (see Table 2-3). Despite possible threats to validity, those participants

with an elevated *F* Index score were retained in the final sample as it is not necessarily surprising that those individuals with anxiety and depression were more likely to view themselves in a negative light. Further, a decrease in the final sample would reduce the power of the study.

The *L* Index is designed to identify those individuals who endorse items that display the person's characteristics or behaviors in an overly positive fashion (Reynolds & Kamphaus, 2015). Of the sample, 3.0% endorsed items that resulted in an *L* Index score falling in the Caution range (sum of scores = 6-7), whereas 3.7% of the sample endorsed an *L* Index score falling in the Extreme Caution range (sum of scores > 7; see Table 2-3). Additionally, no participants endorsed both an elevated *F* Index and an elevated *L* Index, which indicates consistency amongst the remaining responses. Additionally, elevated self-esteem may result in elevated *L* Index scores, which is more likely in the general population group, and removal of these participants would significantly reduce the power of the study. Therefore, these participants were ultimately retained.

Table 2-3: Percentage of elevated *F* Index and *L* Index scores.

Sample	<i>F</i> Index		<i>L</i> Index	
	Caution	Extreme Caution	Caution	Extreme Caution
Anxiety/Depression ( <i>n</i> = 45)	6.7	6.6	0.0	4.4
No Anxiety/Depression ( <i>n</i> = 90)	3.3	0.0	4.4	3.3

## Measure

### *Behavior Assessment System for Children – Third Edition (Reynolds & Kamphaus, 2015)*

The BASC-3 is a broadband assessment of youth behavior using parent, teacher, and self-report forms. In this study, the BASC-3 SRP-COL form was used, which is a self-report measure appropriate for students ages 18-25 years enrolled in postsecondary school. The first 57 items are

rated as *True* or *False* whereas the latter items are rated on a 4-point Likert scale that include responses of *Never*, *Sometimes*, *Often*, and *Almost Always* (Reynolds & Kamphaus, 2015).

The BASC-3 SRP-COL form includes four composites: Internalizing Problems, Inattention/Hyperactivity, Personal Adjustment, and Emotional Symptoms Index. The Atypicality, Locus of Control, Social Stress, Anxiety, Depression, Sense of Inadequacy, and Somatization scales contribute to the Internalizing Problems Composite. The Attention Problems and Hyperactivity scales contribute to the Inattention/Hyperactivity Composite, whereas the Social Stress, Anxiety, Depression, Sense of Inadequacy, Self-Esteem, and Self-Reliance scales contribute to the Emotional Symptoms Index. The Personal Adjustment composite includes the adaptive scales of Relations with Parents, Interpersonal Relations, Self-Esteem, and Self-Reliance. Three additional scales are also included on the college form of the BASC-3, which includes Sensation Seeking, Alcohol Abuse, and School Maladjustment. Scale and composite results are reported as *T* scores and percentile ranks (Reynolds & Kamphaus, 2015).

The BASC-3 SRP-COL was normed in 2013-2014 using a national sample ( $N = 300$ ) of students ages 18-25 years enrolled in a post-secondary program. Reliability coefficients using the combined gender norms sample were reported to be strong for internal consistency ( $\alpha \geq .80$ ) for most of the scales except for Somatization ( $\alpha = .79$ ). Similar results were obtained for test-retest reliability estimates across most of the scales obtained from the test-retest study sample ( $N = 69$ ) apart from Depression, Somatization, Hyperactivity, and Relations with Parents ( $r < .80$ ; Reynolds & Kamphaus, 2015).

Internal consistency was also calculated for the current sample to verify the reliability of the data collected and scales used (see Table 2-4). Overall, most of the reliability coefficients across scales and composites fell above .80 and were consistent with those reported by the

BASC-3 SRP-COL publishers (Reynolds & Kamphaus, 2015) apart from the Inattention/Hyperactivity and Personal Adjustment composites and the Sensation Seeking and Self-Reliance scales.

Table 2-4: *Psychometric properties and reliability coefficients for BASC-3 SRP-COL composites and scales.*

Composite/Scale	<i>M</i>	<i>SD</i>	Range	Cronbach's $\alpha$
<b>Internalizing Problems</b>	50.0	8.4	36-77	.93
Atypicality	49.8	10.0	39-91	.81
Locus of Control	49.7	9.9	38-75	.84
Social Stress	49.6	10.0	34-75	.84
Anxiety	49.7	10.0	27-71	.91
Depression	49.6	9.7	39-86	.92
Sense of Inadequacy	49.8	10.0	37-83	.88
Somatization	49.6	9.7	40-79	.81
<b>Inattention/Hyperactivity</b>	50.0	9.0	34-74	.78
Attention Problems	49.7	9.9	34-71	.92
Hyperactivity	49.7	10.0	34-80	.80
<b>Personal Adjustment</b>	50.0	3.6	40-61	.78
Relations with Parents	50.3	9.9	19-60	.91
Interpersonal Relations	50.5	9.9	18-64	.81
Self-Esteem	49.6	9.8	35-76	.88
Self-Reliance	49.6	9.9	30-75	.73
<b>Emotional Symptoms</b>	50.0	8.3	34-72	.90
Sensation Seeking	49.8	10.0	32-76	.79
Alcohol Abuse	50.1	10.1	41-102	.91
School Maladjustment	49.8	10.0	34-75	.86

## Procedure

This study featured a non-experimental, exploratory design. The study received approval for research with human subjects from the Institutional Review Board (IRB) at the Pennsylvania State University on April 13, 2020 (see Appendix A). Recruitment of participants occurred during the Fall 2020 semester by way of email to faculty members who taught undergraduate- and graduate-level courses at the university. Then, faculty members distributed the survey link to students, and students chose to complete the survey at their own discretion and at their earliest

convenience outside of class time. These participants were recruited from a range of undergraduate- and graduate-level courses, including Accounting, Acoustics, Agricultural and Biological Engineering, Arts & Architecture, Biobehavioral Health, Business Administration, Classics and Ancient Mediterranean Studies, Counselor Education, Curriculum & Instruction, Education, Educational Psychology, Educational Theory and Policy, Rehabilitation and Human Services, School Psychology, Special Education, and Workforce Education & Development.

The participants completed three surveys (i.e., consent survey, main survey, and incentive survey) through Qualtrics (Qualtrics® XM Survey Software, 2020). The consent survey required participants to read a consent form and provide written consent. The electronic written signature was collected in this consent survey to remove the association between their signatures and their responses on the main survey to honor confidentiality. Participants were then redirected to the main survey to complete questions related to demographic information, such as age, ethnicity, gender, status in school, major in school, current GPA, and mental health diagnosis. Next, participants completed a short, narrowband measure of ADHD<sup>1</sup> before completing the BASC-3 SRP-COL items. The researcher received permission to use the BASC-3 SRP-COL for research purposes from Pearson. Items from the BASC-3 SRP-COL were administered in the same order as they appear on the measure.

To provide incentive to students, extra credit was offered to some participants at the discretion of the faculty member. However, to eliminate potential research coercion, an alternative option was offered (i.e., write a two-page paper) for those students that did not meet inclusion criteria or did not wish to participate in the research study. Those students who received extra credit provided their student ID numbers in a final and separate survey (i.e.,

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<sup>1</sup>This measure was completed for a separate study focused on use of the BASC-3 with students with ADHD, and it was not utilized in the current study.

incentive survey) to remove the link between their responses on the main survey and their ID numbers. The ID numbers were provided to those instructors that chose to offer extra credit at the end of the Fall 2020 semester.

### **Data Analyses**

Gender and ethnicity were treated as categorical variables for each analysis. For gender, males were coded as 0 and females were coded as 1. In this case, males were treated as the reference group. Age was treated as a continuous variable, whereas GPA was treated as an ordinal variable with four categories (i.e., 2.0-2.9, 3.0-3.49, 3.5-3.99, 4.0 and above).

Stepwise binomial logistic regression was used to explore the first research question, whereas ordinal logistic regression was used to address the second research question. One of the main assumptions for binary and ordinal logistic regression includes independence of observations, no violations of multicollinearity, and proportional odds (Stoltzfus, 2011). The proportional odds assumption is explored in Chapter 3. Independent observations were collected by obtaining information about each of the variables from participants at one point in time.

Correlation statistics revealed that intercorrelations were in expected directions given that the adaptive scales significantly decreased as clinical scales increased. However, the correlation amongst the independent variables at the BASC-3 scale level suggest that issues related to multicollinearity are present when considering scale scores with correlations falling at or above 0.7. Further, the majority of the correlations across scales were statistically significant,  $p < .05$  (see Table 2-5).

Table 2-5: Intercorrelations for BASC-3 SRP-COL subscale scores.

	ATY	LOC	SOC	ANX	DEP	SEN	SOM	ATT	HYP	SES	ALC	SCH	REL	INT	EST
LOC	<i>.68</i>	-													
SOC	<i>.69</i>	<i>.75</i>	-												
ANX	<i>.63</i>	<i>.66</i>	<i>.73</i>	-											
DEP	<i>.63</i>	<i>.75</i>	<i>.78</i>	<i>.68</i>	-										
SEN	<i>.69</i>	<i>.78</i>	<i>.73</i>	<i>.68</i>	<i>.81</i>	-									
SOM	<i>.48</i>	<i>.56</i>	<i>.54</i>	<i>.63</i>	<i>.54</i>	<i>.53</i>	-								
ATT	<i>.47</i>	<i>.60</i>	<i>.54</i>	<i>.56</i>	<i>.52</i>	<i>.65</i>	<i>.43</i>	-							
HYP	<i>.45</i>	<i>.46</i>	<i>.38</i>	<i>.43</i>	<i>.34</i>	<i>.42</i>	<i>.34</i>	<i>.64</i>	-						
SES	<i>.39</i>	<i>.39</i>	<i>.22</i>	<i>.15</i>	<i>.31</i>	<i>.38</i>	<i>.16</i>	<i>.44</i>	<i>.39</i>	-					
ALC	<i>.31</i>	<i>.39</i>	<i>.33</i>	<i>.31</i>	<i>.44</i>	<i>.39</i>	<i>.29</i>	<i>.34</i>	<i>.18</i>	<i>.46</i>	-				
SCH	<i>.57</i>	<i>.70</i>	<i>.64</i>	<i>.56</i>	<i>.65</i>	<i>.75</i>	<i>.43</i>	<i>.59</i>	<i>.35</i>	<i>.35</i>	<i>.35</i>	-			
REL	<i>-.43</i>	<i>-.59</i>	<i>-.49</i>	<i>-.40</i>	<i>-.54</i>	<i>-.48</i>	<i>-.35</i>	<i>-.36</i>	<i>-.24</i>	<i>-.21</i>	<i>-.22</i>	<i>-.41</i>	-		
INT	<i>-.44</i>	<i>-.48</i>	<i>-.68</i>	<i>-.50</i>	<i>-.57</i>	<i>-.51</i>	<i>-.35</i>	<i>-.31</i>	<i>-.20</i>	<i>-.04</i>	<i>-.18</i>	<i>-.53</i>	<i>.52</i>	-	
EST	<i>-.45</i>	<i>-.65</i>	<i>-.59</i>	<i>-.61</i>	<i>-.74</i>	<i>-.62</i>	<i>-.53</i>	<i>-.41</i>	<i>-.25</i>	<i>-.16</i>	<i>-.32</i>	<i>-.54</i>	<i>.43</i>	<i>.60</i>	-
SRL	<i>-.28</i>	<i>-.44</i>	<i>-.49</i>	<i>-.34</i>	<i>-.41</i>	<i>-.50</i>	<i>-.28</i>	<i>-.54</i>	<i>-.28</i>	<i>-.18</i>	<i>-.22</i>	<i>-.51</i>	<i>.35</i>	<i>.49</i>	<i>.40</i>

Note. ATY = Atypicality; LOC = Locus of Control; SOC = Social Stress; ANX = Anxiety; DEP = Depression; SEN = Sense of Inadequacy; SOM = Somatization; ATT = Attention Problems; HYP = Hyperactivity; SES = Sensation Seeking; ALC = Alcohol Abuse; SCH = School Maladjustment; REL = Relations with Parents; INT = Interpersonal Relations; EST = Self-Esteem; SRL = Self-Reliance. **Bold:**  $p < .05$ . **Bold and italics:**  $p < .01$ .

Correlations between composites on the BASC-3 SRP-COL form revealed further concerns related to multicollinearity, with the Emotional Symptoms and Internalizing Problems correlation  $> .70$  and four of the intercorrelations falling in the statistically significant range,  $p < .05$  (see Table 2-6).

Table 2-6: Intercorrelations for BASC-3 SRP-COL composite scores.

	Internalizing Problems	Inattention/Hyperactivity	Personal Adjustment
Inattention/Hyperactivity	.61**	-	
Personal Adjustment	.04	.14	-
Emotional Symptoms	.95**	.60**	.17*

\* $p < .05$ . \*\* $p < .01$ .

Additionally, tolerance and variance inflation factor (*VIF*) statistics were estimated for each of the scales and composites of the BASC-3 SRP-COL (see Table 2-7). As can be observed, none of the *VIF* estimates for the BASC-3 SRP-COL scales fell above 5.0, with the exception of Sense of Inadequacy, although *VIF* statistics were higher for the composites, with Internalizing Problems and Emotional Symptoms falling above 10.0.

Table 2-7: Multicollinearity estimates for BASC-3 SRP-COL composites and scales.

Composite/Scale	Tolerance	<i>VIF</i>
<b>Internalizing Problems</b>	.081	12.357
Atypicality	.347	2.885
Locus of Control	.237	4.220
Social Stress	.216	4.632
Anxiety	.329	3.037
Depression	.206	4.863
Sense of Inadequacy	.193	5.175
Somatization	.559	1.789
<b>Inattention/Hyperactivity</b>	.605	1.653
Attention Problems	.327	3.057
Hyperactivity	.500	1.998
<b>Personal Adjustment</b>	.805	1.242
Relations with Parents	.571	1.750
Interpersonal Relations	.391	2.559
Self-Esteem	.354	2.825
Self-Reliance	.548	1.826
<b>Emotional Symptoms</b>	.084	11.905
Sensation Seeking	.550	1.817
Alcohol Abuse	.648	1.543
School Maladjustment	.335	2.981

Note. *VIF* = Variance Inflation Factor.



To alleviate concerns with multicollinearity, scales were combined into their relative composites on the BASC-3 SRP-COL form, and composites were included in the model to reduce multicollinearity amongst the scales. Additionally, the Emotional Symptoms Index was removed from the model to reduce multicollinearity concerns at the composite level. The resulting collinearity estimates after this adjustment are displayed in Table 2-8.

Table 2-8: *Adjusted multicollinearity estimates for BASC-3 SRP-COL composites.*

Composite	Tolerance	VIF
Internalizing Problems Composite	.619	1.616
Inattention/Hyperactivity Composite	.605	1.652
Personal Adjustment Composite	.970	1.031

*Note.* VIF = Variance Inflation Factor.

The Shapiro-Wilk test revealed issues with normality for the Internalizing Problems composite (.947;  $p < .001$ ), Inattention/Hyperactivity composite (.958;  $p < .001$ ), and age (.846,  $p < .001$ ). However, binomial and ordinal logistic regression are particularly robust to violations of normality (Lee Van Horn et al., 2012).

Generalized linear model estimates were then generated in order to provide odds ratios to further understand outcomes for students. Additionally, the age variable was centered to standardize the remaining continuous variable.

## Chapter 3

### Results

#### Binomial Logistic Regression

Standardized predicted values were plotted against standardized residual values to explore independence of observations and homogeneity of variance. The scatterplot revealed a parallel linear pattern, with standardized residuals falling between -1.870 and 2.029 and a Durbin-Watson statistic of 1.785, confirming that the independence of observations and homogeneity of variance assumptions are met.

Cook's distance revealed a range of .000 to .068, which means there were no significant outliers. A normal P-P plot of regression standardized residual values revealed a curvilinear relationship between the dependent and independent variables. However, binomial logistic regression is particularly robust to issues with linearity (Tabachnick & Fidell, 2012).

To explore the first hypothesis, a binomial logistic regression was performed to determine the influence that demographic variables, specifically gender, age, and ratings on the BASC-3 composites have on predicting the likelihood that the college student has a self-reported diagnosis of anxiety and/or depression. The logistic regression model was statistically significant,  $\chi^2(5) = 25.401, p < .001$ . According to the Nagelkerke  $R^2$ , the model explained 24.9% of the variance in anxiety/depression and correctly classified 72.1% of cases, as compared to 67.4% in the null model. Sensitivity (.615) estimates were lower than the specificity (.747) estimates. Further, the positive predictive value (PPV; .381) was much lower in comparison to the negative predictive value (NPV; .885).

However, when the specific variables were examined, the Internalizing Problems Composite,  $p < .001$ , was the only statistically significant independent variable. Odds ratios

suggest that increasing scores on the Internalizing Problems Composite score are associated with an increased likelihood of having anxiety and/or depression. Specifically, for each incremental increase in *T* score for Internalizing Problems, the odds of self-reported depression/anxiety increase by 12.8% (see Table 3-1).

**Table 3-1:** Binomial logistic regression of self-reported anxiety and depression diagnosis by predictor variables.

	B	SE	<i>p</i>	OR	95% CI for OR
Gender	-.507	.634	.424	.602	[.174, 2.087]
Age	.261	.165	.114	1.298	[.939, 1.793]
Inattention/Hyperactivity	-.006	.030	.830	.994	[.937, 1.054]
Personal Adjustment	-.041	.056	.457	.959	[.860, 1.070]
Internalizing Problems	.120	.034	<.001	1.128	[1.054, 1.206]

*Note.* OR = odds ratio; CI = confidence interval.

Based on these results, follow-up analyses were completed to explore potential significant effects from the Internalizing Problems composite and remaining subscales not included in the composites. Results indicated that the Anxiety subscale was the only significant predictor of diagnosis of anxiety/depression ( $B = .109, p = .004$ ). Odds ratio estimates suggests that, for each incremental increase in *T* score for Anxiety, the odds of self-reported depression/anxiety increase by 11.5% (see Table 3-2).

Table 3-2: Binomial logistic regression of self-reported anxiety and depression diagnosis by subscales.

	B	SE	p	OR	95% CI for OR
Atypicality	-.056	.034	.101	.946	[.885, 1.011]
Locus of Control	.040	.039	.302	1.041	[.965, 1.123]
Social Stress	.006	.041	.889	1.006	[.927, 1.091]
Anxiety	.109	.038	.004	1.115	[1.035, 1.201]
Depression	.066	.044	.129	1.068	[.981, 1.164]
Sense of Inadequacy	-.022	.043	.604	.978	[.898, 1.064]
Somatization	.023	.027	.390	1.024	[.970, 1.080]
Sensation Seeking	.031	.028	.263	1.032	[.977, 1.090]
Alcohol Abuse	-.034	.025	.177	.967	[.920, 1.015]
School Maladjustment	-.037	.034	.268	.964	[.902, 1.029]

Note. OR = odds ratio; CI = confidence interval.

According to the Nagelkerke  $R^2$ , the model explained 33.7% of the variance in diagnosis of anxiety/depression and correctly classified 75.6% of cases, as compared to 66.4% in the null model. Like the previous model, sensitivity (.523) estimates were lower than the specificity (.874) estimates. Further, the PPV (.676) was higher than in the first model, although NPV estimates were similar (.885).

### Ordinal Logistic Regression

Standardized predicted values were plotted against standardized residual values to explore independence of observations and homogeneity of variance. The scatterplot revealed a parallel linear pattern, with standardized residuals falling between -2.515 and 2.186 and a Durbin-Watson statistic of 1.807, confirming that the independence of observations and homogeneity of variance assumptions are met.

Cook's distance revealed a range of .000 to .099, which means there were no significant outliers. A normal P-P plot of regression standardized residual values revealed a curvilinear relationship between the dependent and independent variables. However, ordinal logistic

regression is particularly robust to issues with linearity (Tabachnick & Fidell, 2012).

Additionally, the proportional odds assumption for ordinal logistic regression was examined using the test of parallel lines, and a non-significant outcome revealed that this assumption was met,  $\chi^2(10) = 15.921, p = .102$ .

Ordinal logistic regression analyses were used to explore the second research question. Specifically, gender, age, and ratings on the BASC-3 Internalizing Problems, Inattention/Hyperactivity, and Personal Adjustment composites were examined as potential predictors of cumulative college GPA. The ordinal logistic regression model was statistically significant,  $\chi^2(5) = 24.049, p < .001$ . According to the Nagelkerke  $R^2$ , the model explained 18.9% of the variance in GPA.

At the individual variable level, age ( $p = .015$ ) and gender ( $p = .019$ ) were the only statistically significant independent variables (see Table 3-3). The odds ratios revealed that the odds of males being placed in a lower rather than a higher GPA category are 3.1 times that of individuals identifying as female. Further, as age increased, participants were more likely to be placed in a lower GPA category. Although the remaining variables were not statistically significantly associated with GPA, regression slopes indicate that as  $T$  scores on the BASC-3 SRP-COL composites increase, college GPA tends to decrease.

Table 3-3: Variable statistics for predicting GPA.

	Estimate	SE	95% CI		$p$	Odds Ratio
			LL	UL		
Gender	-1.143	.487	-2.098	-.188	.019	3.136
Age	-.329	.136	-.596	-.063	.015	.719
Inattention/Hyperactivity	-.032	.025	-.081	.016	.187	.968
Personal Adjustment	-.044	.048	-.138	.050	.363	.957
Internalizing Problems	-.040	.026	-.091	.010	.116	.960

Note. Number of students = 136. CI = confidence interval; LL = lower limit; UL = upper limit.

## Chapter 4

### Discussion

This study aimed to explore the predictive utility of the BASC-3 SRP-COL form with self-reported diagnoses of anxiety and depression in an undergraduate sample, as well as explored the concurrent validity of the BASC-3 SRP-COL form with current GPA. Binomial logistic regression analyses were used to explore the first research question, and the results provide partial support for the proposed hypothesis. Specifically, the Internalizing Problems Composite *T* score accounted for a statistically significant proportion of the variance in college students' self-report of a diagnosis of anxiety and/or depression.

Further, an increase in *T* scores on the Internalizing Problems Composite was associated with having a diagnosis of anxiety or depression, with an odds ratio suggesting that for each incremental increase in *T* score for Internalizing Problems, the likelihood of self-reported depression/anxiety increase by 12.8%. Follow-up analyses revealed that the anxiety subscale was likely accounting for this significant result, rather than the other BASC subscales (e.g., Depression, Social Stress, Somatization) contributing to the Internalizing Problems composite.

Contrary to predictions, however, student variables such as gender and age were not significant predictors for diagnosis of anxiety and/or depression. In previous literature, it has been reported that females tend to report higher rates of anxiety and depression as compared to males, and differences across race and ethnicity have also been identified across symptoms of anxiety and depression (APA, 2013; BlackDeer et al., 2021; Kamberi et al., 2019). One potential explanation for this finding is that the association between the BASC-3 Internalizing Composite, particularly the Anxiety subscale, and the presence of an anxiety or depression diagnosis

accounted for variance that otherwise would have been attributed to gender-related differences in anxiety similar to those reported in previous studies.

The second research question focused on the ability of student variables and self-report ratings on the BASC-3 SRP-COL form to predict college GPA. Ordinal logistic regression analyses also provided partial support for the second hypothesis. However, gender and age were the only independent variables that were statistically significantly associated with GPA. Further, the odds of male students being placed in a lower rather than a higher GPA category were 3.1 times that of students identifying as female. However, none of the scales on the BASC-3 SRP-COL hypothesized to be meaningful predictors of GPA met a priori criteria for being statistically significant. In the exploratory follow-up analysis, though, when the BASC-3 scale of School Maladjustment was added to the model, it essentially demonstrated a statistically significant effect ( $p = .054$ ). The School Maladjustment scale assesses behaviors that are more proximal to academic outcomes (e.g., difficulty with motivation, feelings of being overwhelmed at school) and potentially could be impacted by, and contribute to, comorbid mental health issues such as anxiety and depression. Thus, it is perhaps not surprising that the scale would demonstrate stronger relationships with GPA than the scales included in the original hypothesis.

### **Limitations**

This study has several limitations within which the findings must be considered. Due to insufficient sample sizes, certain racial/ethnic and gender variables were unable to be considered within the current analyses. Although gender and age were explored as independent variables, race and ethnicity was not included as an independent variable. Because gender diversity and race/ethnicity were eliminated from this study in order to gain a more cohesive perspective given

the response rates, these important factors were unable to be examined in this study, posing a significant limitation to this study.

Additionally, the PPV estimate for the model's ability to correctly classify those individuals with anxiety and depression was much lower than expected, with only 38.1% of positive cases correctly classified. Although NPV estimates were much better, with 88.5% of individuals without anxiety and depression being correctly classified as such, the PPV estimate for the BASC-3 SRP-COL's Internalizing Problems Composite is concerning if being used for the purposes of screening. However, this may have been due to the way in which data were collected, with the question about anxiety and depression asking if the participants had *ever* been diagnosed with anxiety or depression. Specifically, participants were asked in the demographic section about ADHD diagnoses and other comorbid diagnoses (i.e., "Have you ever been diagnosed with or received a diagnosis of ADHD?", "Have you received any of the following mental health, psychological, or psychiatric diagnoses?"). Given that the time in which participants were diagnosed is unknown, it is possible that respondents indicated "yes" to these questions even if they only had a previous diagnosis rather than a current one. Regardless, the BASC-3 SRP-COL form should only be used with additional assessment and collected information before arriving at a diagnostic conclusion.

It is also notable that almost half (44.4%) of the participants with incomplete surveys reported having received a diagnosis of anxiety, depression, and/or another unspecified psychiatric disorder. Thus, it is possible that individuals with psychiatric diagnoses are less likely to complete research surveys, leading the results of the sample to reflect those with motivation and resilience to complete a somewhat lengthy survey. Therefore, students on the higher end of the continuum (i.e., clinically significant ratings for anxiety and depression) may not have been



adequately represented in the sample, which may also explain the lack of statistically significant relationships between GPA and BASC composites focused on emotional or behavioral concerns (e.g., Internalizing composite).

Additionally, this study's generalizability to other college populations is limited due to the selective sample obtained. A large number of females and no Black students were retained in this study, which indicates problems related to disproportionality (National Center for Education Statistics, 2019). This study also utilized a relatively small sample size for logistic regression analyses, therefore leading this study to be somewhat underpowered in its ability to detect significant effects. Thus, this study should be replicated with a larger and more diverse sample that is more representative of the national college population before generalizing these results to the college population at large.

Further, this study did not consider the potential effect of psychostimulant or psychotropic medical interventions that may have caused diminished perceptions of difficulties or manageable symptomatology, thus resulting in decreased self-report ratings on the items of the BASC-3 SRP-COL, which poses a limitation to this study. Of additional note, data collection occurred during the COVID-19 pandemic, which necessitates further research to determine the potential effects of this pandemic on the self-report ratings collected in this study given the unique historical context of health concerns, social distancing, and remote learning and their potential impact on participants' well-being and perceptions.

Manor et al. (2010) further cautioned against the under- and over-reporting of symptoms when determining the clinical utility of self-report measures. Additionally, Fisher and Watkins (2008) provided additional information regarding the susceptibility for malingering in a college student sample on self-report rating scales for ADHD. Although validity index scores were used

to identify irregular response patterns that were removed from the analysis sample in the current study, self-report measures rely on accurate self-reporting. In this case, no independent confirmation of anxiety diagnosis or GPA was available, which poses another limitation to this study.

### **Practical Implications**

Despite the limitations of this study, the findings offer some potential implications for researchers, clinicians, and counselors in the college setting. This study offers insight into the utility of the BASC-3 SRP-COL form for identifying college students at-risk for internalizing disorders such as anxiety and depression as well as increased risk for academic failure and dropout. It also allows college counselors and clinicians to draw conclusions regarding the students who may require more support than others. Because the results of this study suggest that increasing *T* scores on the Internalizing Problems composite of the BASC-3 SRP-COL form, specifically the anxiety subscale, are associated with increasingly negative outcomes, standardized self-report rating scales such as the BASC-3 SRP-COL can assist with identifying students who may be in need of mental health supports and intervention. It is important to note that, given the observed associations between BASC-3 scores and the outcomes explored in the current study, additional assessment data will be necessary to inform accurate diagnosis and/or intervention planning.

### **Future Directions**

Future research studies should focus on replication of this study with a larger and more representative college student sample in order to explore generalizability of these results. Further, use of more advanced statistical analysis techniques, such as structural equation modeling (SEM), will allow for examining relationships between anxiety and depressive

symptoms, proximal variables (such as those assessed by School Maladjustment), and student achievement. Specifically, SEM would facilitate testing indirect causal relationships that were not considered in the current analyses. Additionally, GPA and self-report of diagnoses were collected at the same point in time as self-report ratings in this study, therefore limiting the ability to examine long-term predictive validity. Thus, future longitudinal studies will allow for conclusions to be drawn regarding the predictive validity of the BASC-3 SRP-COL.

Additionally, it should be considered that college students arrive at college campuses with differing backgrounds, experiences, and abilities. These different experiences are likely to lead to significant differences across skill levels, including academic readiness, executive functioning skills, and overall adaptability. Therefore, future research should also consider the impact that variables such as executive functioning and academic skills may have on GPA.

Studies have also shown that college students across different years in school may experience variable rates of anxiety and depression, as well as experience different types of stressors (Beiter et al., 2015; Conley et al., 2020). Although this study did not consider year in school as a covariate, additional studies that examine this variable may provide more insight into vulnerable college populations. Additionally, comorbid disorders such as ADHD and other mood disorders were not considered, and the utility of the BASC-3 SRP-COL in providing information regarding differential diagnosis could also prove useful.

Previous studies have noted the significant impact that additional variables such as substance abuse have on rates of anxiety and depression as well as GPA (Brook & Willoughby, 2016; Filho et al., 2010). Therefore, substance abuse should be provided careful attention in future studies in better understanding its role in the models examined in this study.

Although men were discovered to be more likely to have lower GPAs in this study, this may be due to a number of factors, including willingness to seek out assistance for mental health and academic concerns, as well as differing risk for substance use across gender. Gender differences should be further explored to better understand what may be causing these differences in academic performance across female and male students.

### **Conclusion**

Overall, results of this study suggest that the BASC-3 Internalizing Problems composite, particularly the anxiety subscale, may be helpful in identifying college undergraduates at risk for a diagnosis of an internalizing disorder. Lower values than expected for predictive accuracy, however, suggest that the BASC-3 scales should be supplemented with additional data sources as part of a comprehensive assessment to diagnose an internalizing disorder. Future studies are needed to focus on the predictive validity of self-report measures such as the BASC-3 SRP-COL, and these measures can be better utilized for providing more responsive and appropriate interventions and supports to the college population at large, especially given that increased intervention and treatment efforts are likely to decrease the risk of negative outcomes for college students.

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## Appendix

### Initial Letter of IRB Approval



**Office for Research Protections**  
 Vice President for Research  
 The Pennsylvania State University  
 205 The 330 Building  
 University Park, PA 16802

814-865-1775  
 Fax: 814-865-8699  
 orp@psu.edu  
 research.psu.edu/orp

#### EXEMPTION DETERMINATION

**Date:** April 13, 2020

**From:** Joanie Tan,

**To:** Amanda Zanko

Type of Submission:	Initial Study
Title of Study:	Examining the Clinical Utility of the BASC-3 in Identification of College Students with ADHD
Principal Investigator:	Amanda Zanko
Study ID:	STUDY00013024
Submission ID:	STUDY00013024
Funding:	Not Applicable
Documents Approved:	<ul style="list-style-type: none"> <li>• ASRS-5 Items.docx (0.01), Category: Data Collection Instrument</li> <li>• Background Measure.docx (0.01), Category: Data Collection Instrument</li> <li>• Demographic Questions.docx (0.01), Category: Data Collection Instrument</li> <li>• HRP 591.pdf (0.03), Category: IRB Protocol</li> <li>• Self-Report.pdf (0.02), Category: Data Collection Instrument</li> </ul>

The Office for Research Protections determined that the proposed activity, as described in the above-referenced submission, does not require formal IRB review because the research met the criteria for exempt research according to the policies of this institution and the provisions of applicable federal regulations.

Continuing Progress Reports are **not** required for exempt research. Record of this research determined to be exempt will be maintained for five years from the date of this notification. If your research will continue beyond five years, please contact the Office for Research Protections closer to the determination end date.

Changes to exempt research only need to be submitted to the Office for Research Protections in limited circumstances described in the below-referenced Investigator Manual. If changes are being considered and there are questions about whether IRB review is needed, please contact the Office for Research Protections.

We would like to know how the IRB Program can better serve you.  
 Please fill out our survey; it should take about a minute: <https://www.research.psu.edu/irb/feedback>.

ID27

Penn State researchers are required to follow the requirements listed in the Investigator Manual ([HRP-103](#)), which can be found by navigating to the IRB Library within CATS IRB (<http://irb.psu.edu>).

This correspondence should be maintained with your records.

# AMANDA E. ZANKO

## EDUCATION

**Candidate, PhD, School Psychology**, The Pennsylvania State University, *Anticipated 12/2022*.

**Ed.S., School Psychology**, Edinboro University of Pennsylvania, Awarded May 2018.

**M.Ed., Educational Psychology**, Edinboro University of Pennsylvania, Awarded May 2017.

**B.S., Neuroscience**, The Ohio State University, Awarded May 2015.

## PROFESSIONAL EXPERIENCE

- 2021-2022      **Predoctoral Psychology Intern**, Dr. Keating & Associates, Tampa, FL.
- 2021            **Psychometrist Technician**, Neuropsychology, Geisinger Scenery Park, State College, PA.
- 2019-2020      **Graduate Student/Research Assistant**, Child Attention and Learning Lab, Department of Psychology, The Pennsylvania State University.
- 2018-2021      **School Psychology Mobile Clinician**, Graduate Assistantship, Mount Union Area School District/The Pennsylvania State University.
- 2017-2018      **School Psychology Intern**, Fort LeBoeuf School District, Fort LeBoeuf, PA.
- 2015-2017      **School/Educational Psychology Program Assistant**, Graduate Assistantship, Edinboro University of Pennsylvania.
- 2016-2017      **School Psychology Practicum Student**, General McLane School District, Edinboro, PA.
- 2015-2016      **School-Wide Support and Classroom Interventionist**, Volunteer Position, Diehl Elementary School, Erie, PA.

## CERTIFICATIONS

Florida Certification in School Psychology (Grades PK-12), Issued: November 17, 2021.

Nationally Certified School Psychologist, Renewed: May 31, 2022. Certification Number: 52855

## PUBLICATIONS

**Zanko, A.** (2020). The law of service animals in schools. *The Pennsylvania Administrator*, 24(3), 28-29.

Snyder, E., Ferraro, M., & **Zanko, A.** (2017). Due process hearings in Pennsylvania 2014-2015. *Insight*, 37(3), 10-12.

## PRESENTATIONS

Woika, S., & **Zanko, A.** (September 10, 2021). *Writing Legally Defensible Reevaluation Reports*. Professional Development Presentation at New Day Charter School, Huntingdon, PA.

**Zanko, A.**, & Petit, V. (November 4, 2020). *ADHD and Autism: Making Data-Based Eligibility Decisions*. Workshop presented at the Association of School Psychologists of Pennsylvania & Pennsylvania State University 2020 Virtual Fall Conference, State College, PA.

**Zanko, A.**, & Woika, S. (October 2018). *Mobile Clinic at The Pennsylvania State University*. Poster presented at the Association of School Psychologists of Pennsylvania & Pennsylvania State University 2018 Annual Fall Conference, State College, PA.

**Zanko, A.**, & Woika, S. (September 2018). *Mobile Clinic at The Pennsylvania State University*. Poster presented at the PSU-Pitt Education Summit, State College, PA.