A NEW SUBSCALE FOR THE PERSONALITY ASSESSMENT INVENTORY (PAI) TO SCREEN ADULTS FOR ATTENTION-DEFICIT/ HYPERACTIVITY DISORDER (ADHD)

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The Personality Assessment Inventory (PAI) is a widely used and available self-report measure designed to assess clinical syndromes and has the potential to assist in the process of ADHD assessment. Since the PAI's inception, several researchers have attempted to create other supplemental indicators, some so effective and useful that they were added to the second edition of the *Personality Assessment Inventory Professional Manual*. Previous researchers have offered important insights into the possibility of the creation of an ADHD item-level index for the PAI that would effectively decrease false positive rates and increase accurate detection of ADHD in the adult population. Previous researchers were not successful in creating an item-level subscale that reliably detected adult ADHD. Four experts in ADHD assessment rated PAI items that they believed could discriminate adults with ADHD from adults without ADHD. After performing a PCA on the top 16 items chosen by the experts, 12 items sufficiently loaded onto one factor that has clear face validity by conceptually matching the DSM-5 description of inattention and impulsivity commonly seen in adults with ADHD as well as the "internalized restlessness" Hallowell and Ratey describe for adult ADHD. The PAI-ADHD was found to have good internal consistency, a = .84. The PAI-ADHD has good convergent validity with the Conners' Adult ADHD Rating Scale – Self-Report – Long Version (CAARS-Self) and Wender Utah Rating Scale (WURS). The PAI-ADHD also has good concurrent validity. Two cut scores are suggested, 13 and 22, to maximize sensitivity (.88) and specificity (.89), create three screening groups: ruled-out, at-risk, and probable ADHD, and increase utility for clinicians.

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CHAPTER 1

INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is a complex psychiatric disorder that is often first diagnosed in childhood (American Psychiatric Association, 2013) and typically associated with a range of negative outcomes if not treated (Barkley, Murphy & Kwasnik, 1996; Capelatto et al., 2014; Frazier, Youngstrom & Glutting, 2007). Individuals can also be first diagnosed with ADHD for the first time in adulthood; however, to receive a diagnosis, symptomatology must have been present before the age of 12 years (APA, 2013). Diagnostic criteria for ADHD include inattentive, hyperactive, and impulsive behaviors that significantly impair functioning in more than one setting (APA, 2013). Since 1994, American mental health professionals have recognized three subtypes of ADHD: Attention-deficit/hyperactivity disorder, predominantly inattentive type (ADHD-I), Attention-deficit/hyperactivity disorder, predominantly hyperactive-impulsive type (ADHD-HI), and Attention-deficit/hyperactivity disorder, combined type (ADHD-C) (APA, 1994).

ADHD Diagnosis in Adulthood

Debate about whether or not ADHD could continue into adult years began in the 1970's (Barkley, 1996; DuPaul, Guevermont & Barkley, 1991; Shelley & Reister, 1972; Weil, 1970). ADHD was originally thought to be a childhood disorder that affected individuals would "outgrow" (Adler & Cohen, 2004). Modern researchers, however, assert that children with ADHD can experience symptomatology throughout adulthood (Barkley et al., 2002; Guzelow, Loya & Hinshaw, 2017; Sibley et al., 2016). In fact, between 41% and 77% of children diagnosed with ADHD experience clinical levels of impairment as adults (Faraone, Biederman & Mick, 2006; Sibley et al., 2016; Uchida et al., 2018).

In the adult population, inattentive symptoms are clearly more common than hyperactive symptoms. In 2010, Kessler et al. examined the stability of ADHD from childhood through adulthood, per a physician-administered ADHD scale given to patients. Their findings indicated that 94.9% of the participants experienced inattentive symptoms into adulthood. By contrast, only 34.6% of the participants still reported hyperactive symptoms as an adult (Kessler et al., 2010). It is important to consider, however, that many adults with ADHD struggle with a symptom that is likely a manifestation of hyperactivity. Specifically, the fidgeting and excess energy of their youth is often described as internalized restlessness as adults (Kessler et al., 2006; Weyandt et al., 2003).

In 2003, Weyandt et al. assessed the efficacy of internal restlessness as a clinical indicator to diagnose ADHD in adults. After a rigorous assessment process, 20 college students with ADHD and 20 college students without ADHD or another mental health disorder were identified as participants. Participants completed the Internal Restless Scale (IRS) (Weyandt et al., 2003). The IRS utilizes a 7-point Likert scale to measure subjective feelings of restlessness. Items include, “I dislike sitting still” and (reverse-scored) “I feel mentally calm” (Iwaszuk et al., 1997). College students with ADHD scored significantly higher on the IRS when compared to their non-ADHD peers (Weyandt et al., 2003).

Hallowell and Ratey (1994) described similar findings in their book, “Driven to Distraction.” They explain the transition from externalized restlessness to internalized restlessness as the logical outcome of a child with ADHD learning to cope with hyperactivity over time. Resnick (2005) postulates that the change in symptomatology could be due to the increased demand for independence, restraint, and accountability in adulthood. The tendency for individuals to cognitively mature and improve impulse control is another likely reason for the

noted shift in clinical presentation (Resnick, 2005). For more information on the diagnosis of ADHD in adulthood and childhood see Appendix A Extended Literature Review.

Difficulty Diagnosing ADHD and ADHD Comorbidities

Psychologists and psychiatrists remain divided about the best practices for assessment of adults with ADHD (Barkley, 2006). First, ADHD adults seem to under-report their inattentive and hyperactive-impulsive symptoms. Data received from self-reports indicated that ADHD adults' understanding of their own impairments is significantly less accurate than a clinical evaluation (Manor et al., 2012). Psychiatrists and general practitioners alike acknowledge that they have difficulty in assessing ADHD in adults because it has much symptom overlap with other common diagnoses (Montano, 2004). It is challenging, therefore, to find accurate prevalence rates of ADHD in the adult population.

One reason ADHD is a challenging diagnosis to determine in adults is the high number of psychiatric and medical disorders that also include problems with attention and concentration. For example, adults with major depression, generalized anxiety disorder, and post-traumatic stress disorder commonly experience difficulties with memory, attentiveness, and organization (Milberger et al., 1995). Medical conditions that negatively affect an individual's sleep or cognitive activity, such as sleep apnea, hyperthyroidism, chronic headaches, and seizure disorders are associated with problems with attention, concentration, and memory that resemble core symptoms or associated features of ADHD (Ball, Wooten & Crowell, 1999; Lavenstern, 1995). Not only is ADHD difficult to assess because of the number of different diagnoses that must be ruled out, but practitioners are also challenged by the number of diagnoses that present as comorbidities.

ADHD is highly comorbid with a number of psychiatric conditions and psychological

problems. Adults with ADHD are more likely than those without the disorder to be diagnosed with an internalizing disorder and have low self-esteem (Blasé et al., 2008). Major depressive disorder is the most commonly diagnosed comorbid psychiatric disorder among adults with ADHD; anxiety is the second most common (Fischer et al., 2007). Regardless of the ADHD subtype an adult has, internalizing disorders are equally likely (Nelson & Gregg, 2012). According to the National Comorbidity Survey Replication (NCS-R), an epidemiological survey that evaluated American adults with ADHD for comorbid disorders, 38.3% of adults with ADHD also have a mood disorder (Adler et al., 2008; Kessler et al., 2006). Among adults with ADHD, up to 87% will be diagnosed with another psychiatric disorder in their lifetime. Of those ADHD adults, about 30% of them will be diagnosed with two or more comorbid disorders (Adler et al., 2008; Biederman et al., 1993; Fischer et al., 2007).

Overall, adults with ADHD experience greater levels of difficulty with emotional regulation, emotional lability, and emotional impulsivity than their non-ADHD peers (APA, 2013; Mitchell et al., 2012; Skirrow & Asherson, 2013). Adults with ADHD describe their internal states in various ways such as being highly distractible, having cognitive agitation, experiencing racing thoughts, and feeling unable to relax (Milberger et al., 1995; Searight, Burke & Rottnek, 2000). Moreover, one of the most common internalizing symptoms adults with ADHD have is anxiety (Barkley, 2004). In fact, rates of generalized anxiety disorder in the adult ADHD population can reach 53% (Moss et al., 2007).

Complicating ADHD diagnosis further is that some people are motivated to feign the disorder for secondary gain. Pretending to have ADHD is likely easier than it was in the past because lists of ADHD symptoms are readily available on the internet. Individuals can learn how to feign ADHD through a Google search (Jachimowicz & Geiselman, 2004). One incentive to do

so are the academic accommodations available for students with ADHD (e.g., extra time on exams in college) (Harrison, 2006). These supports and a growing awareness of disabilities in the United States, has led to an increase in the request for evaluation and treatment of learning disorders and ADHD (Jachimowicz & Geiselman, 2004). When diagnoses are based on symptom checklists and ADHD rating scales alone, ADHD can be easily feigned. Clinically significant scale scores are easily obtained and often observed when individuals are attempting to receive an ADHD diagnosis and simply given ADHD checklists (Harrison, Edwards, & Parker, 2007). For more on the challenges of diagnosing ADHD in adulthood see Appendix A Extended Literature Review.

Personality Assessment Inventory (PAI)

The Personality Assessment Inventory is a self-report measure designed to assess clinical syndromes, personality traits, and psychopathological symptoms (Morey, 1991). The PAI is comprised of 344 4-point Likert-scale items (ranging from 0-false to 3-very true) that are then divided into 22 subscales of four types: validity scales, clinical scales, treatment consideration scales, and interpersonal scales (Morey, 1991). For more on the PAI scales, subscales, and creation see Appendix A Extended Literature Review. Since the PAI's inception, several researchers have attempted to create supplemental indicators to assess additional disorders, protocol validity, and treatment concerns (McCredie & Morey, 2018). Some new indicators were so effective and useful that they were added to the second edition of the *Personality Assessment Inventory Professional Manual* (Morey, 2007). The majority of the supplemental indicators created have focused on response distortion (McCredie & Morey, 2018).

Additional supplemental indicators of the PAI have also been created for diagnostic and treatment-related considerations (McCredie & Morey, 2018; Morey, 2007). The Neuro-item Sum

is used to detect neurological difficulties stemming from severe closed head injury (Keiski, 2007). Sinclair et al. (2013) created the Level of Care Index (LOCI) to differentiate patients who need either inpatient our outpatient treatment. The Chronic Suicide Risk Indicator (S_Chron) was created to differentiate clients who have attempted suicide on multiple occasions and those who have not attempted or only attempted once (Sinclair et al., 2016). Antonius et al., created two scales that assessed the risk of danger the participant is to others: The Reactive Aggression Scale and Instrumental Aggression Scale (Antonius et al., 2013). The Violence and Aggression Risk Index (VARI), identifies those who have a history of violence (Roche et al., 2017). Finally, the Inattention Index (INATTN) identifies ADHD symptomatology (Watson & Liljequist, 2015).

Community normative, clinical, malingering, and positive impression samples were utilized to identify T-scores necessary for clinical cut-off of all 12 indices identified by McCredie and Morey in 2018. Receiver operating characteristics (ROC) were utilized to determine the overall diagnostic accuracy of each index by calculating the area under the ROC curve (McCredie & Morey, 2018). The researchers concluded that supportive indices can significantly discriminate between groups beyond existing PAI scales and prove clinically useful. The researchers were also sure to note, however, that the validity of clinical cut-off T-scores is dependent on the appropriateness of the new scale for the sample of informants. Furthermore, the supplemental scale overlap with the original PAI scales and subscales—that are more thoroughly evaluated and have no overlap—limits the construct validity of each new scale (McCredie & Morey, 2018). More specifically, the INATTN had poor concurrent validity, was based on convergent validity with the CAARS-H Scale: ADHD Index, and did not include suggested cut scores for clinical utility (Watson & Liljequist, 2015).

PAI and ADHD

Many PAI items reflect some of the characteristics of individuals with ADHD, including restlessness, irritability, impulsivity, risk taking, alcohol usage, and illegal activities. When these characteristics are endorsed, existing PAI scale scores can become elevated (Morey, 1991). See Appendix A Extended Literature Review, for more information on the specific PAI scales and subscales that can be elevated for adults with ADHD. However, the PAI does not have an existing scale or subscale that specifically assesses ADHD symptomatology, so such elevations may be misleading. The research on the connection between the PAI and ADHD is limited. Yet, as previously identified in various dissertations and theses, and one peer-reviewed article, some PAI scales are more likely than others to be elevated for individuals with ADHD (Calmenson, 2017; DeLong, 2008; Douget, 2000; Pancner, 2006; Walker, 2013; Watson & Liljequist, 2015).

A 2008 unpublished dissertation by DeLong included a comparison of PAI elevations across ADHD subtypes. The author utilized archival data from a university counseling center to create four groups: ADHD – Inattentive type (ADHD-I), ADHD – Combined type (ADHD-C), ADHD – Not otherwise specified (ADHD-NOS), and a clinical control group (DeLong, 2008). When all ADHD groups were combined, a significant MANOVA indicated that the ADHD and control group significantly differed across scales (DeLong, 2008). Large differences were observed on the Mania, Antisocial features, and Aggression PAI scales. Moderate differences were observed on the Anxiety, Depression, Paranoia, Borderline Features, and Suicide PAI scales. The discriminate prediction equation created from the observed elevated scales correctly determined group membership 61.5% of the time (DeLong, 2008).

Walker completed an unpublished exploratory dissertation in 2013. The author hypothesized that ADHD and non-ADHD groups would significantly differ on several scales of

the PAI (Walker, 2013). A one-tailed ANOVA yielded significant mean differences on the Mania (MAN), Drugs (DRG), and Warmth (WRM) scales, and Depression – Cognitive (DEP-C), Mania – Activity Level (MAN-A), Mania – Irritability (MAN-I), Schizophrenia – Thought Disorder (SCZ-T), and Borderline – Self-Harm (BOR-S) subscales. Walker utilized archival data from a university counseling center, and ADHD diagnosis was based on a short assessment battery that included the Test of Variables of Attention (T.O.V.A.), self-report measures, and a clinical interview (Walker, 2013).

In a 2006 unpublished dissertation, data was collected from an outpatient clinic that performed full-battery assessments as part of treatment. The DSM ADHD Symptom Checklist (DSM-CL), Woodcock-Johnson III Test of Achievement (WJ-III), T.O.V.A. and the PAI were all included in the battery. Participants ($N = 52$) who experienced some degree of impairment from their ADHD symptomatology were identified and utilized for the study (Pancner, 2006). After forming a non-ADHD comparison group ($N = 30$), the researcher evaluated PAI scale scores using a two-tailed *t*-test with an established significance level of $p < .05$. The ANX-C and DEP-C subscales were found to be the most consistent with ADHD but did not discriminate groups efficiently on their own. However, the authors also determined that a cut-off T-score > 73 on the SCZ-T subscale effectively discriminates between ADHD and non-ADHD groups 69% of the time (Pancner, 2006).

In 2015, Watson and Liljequist published the only study that created an ADHD scale (INATTN) for the PAI. The researchers collected data from a university affiliated outpatient community mental health clinic. Participants ($N = 199$) completed the PAI and the Conners' Adult ADHD Rating Scale – Self-Report – Long Version (CAARS-S-R:L). ADHD diagnosis was based on previously given diagnoses from the clinic and were confirmed by elevated T-

scores on the CAARS-S-R:L (Watson & Liljequist, 2015). First, the CAARS-H index was used as the dependent variable, and PAI scales and subscales were used as the independent variable for a stepwise regression. High scores on Somatic Complaints – Somatization (SOM-S), Anxiety – Related Disorders – Traumatic Stress (ARD-T), Mania – Activity (MAN-A), and Schizophrenia – Thought Disorder (SCZ-T) scales and low scores on Positive Impression Management (PIM), and Treatment Rejection (RXR) scales accounted for 39% of the variance in CAARS score. A discriminant function analysis determined that the proposed combination of six scales correctly classified 76.09% of the sample (Watson & Liljequist, 2015).

The researchers also utilized a MANOVA to examine group differences between those with and without ADHD. The Antisocial features – Stimulus Seeking (ANT-S), Borderline Features – Self-Harm (BOR-S), Schizophrenia – Thought Disorder (SCZ-T), Mania – Grandiosity (MAN-G), Mania – Activity Level (MAN-A), and Anxiety – Cognitive Features (ANX-C) were identified as subscales that significantly differed across groups (Watson & Liljequist, 2015). Those diagnosed with ADHD scored significantly higher on those scales, yet the composite scale only correctly distinguished between those with ADHD and those who do not have the disorder 41.3% of the time (Watson & Liljequist, 2015). Despite these correlations and potential for capturing much ADHD symptomatology, there is limited research on PAI applicability or efficacy for the treatment or assessment of the adult ADHD population.

The Current Study

The PAI is a widely used and available self-report instrument that could assist in the process of ADHD diagnosis (Pitrowski, 2000; Watson & Liljequist, 2015). Researchers have already identified positive correlations between PAI and CAARS scale scores (Watson & Liljequist, 2015). PAI scale-level indices, based on combinations of the clinical elevations

endorsed by ADHD adults, moderately discriminate between adults with and without ADHD (DeLong, 2008; Watson & Liljequist, 2015). The current ADHD assessment literature points to the possibility of the creation of an ADHD item-level index for the PAI that would effectively decrease false positive rates and increase accurate detection of ADHD in the adult population (Aita et al., 2017). The purpose of the current study, therefore, is to develop and test rationally-determined "ADHD" items within a standard administration of the PAI that discriminates adults with ADHD from adults without ADHD. I will label this new scale as the "PAI-ADHD." Convergent and concurrent validity of the PAI-ADHD subscale will be examined with procedures salient in the literature (Cicchetti, 1994).

Hypotheses

- *Hypothesis 1.* A group of experts in ADHD will agree on which items from the Personality Assessment Inventory (PAI) will differentiate between adults with and without ADHD.
- *Hypothesis 2.* The "ADHD" items identified by experts will load adequately onto a single factor.
- *Hypothesis 3.* The PAI-ADHD will be positively correlated with the Conners' Adult ADHD Rating Scale – Self-Report – Long Version (CAARS-Self) subscales and the Wender Utah Rating Scale (WURS) sub-score.
- *Hypothesis 4.* Participants with ADHD will score significantly higher on the PAI-ADHD than participants without ADHD or an LD.
- *Hypothesis 5.* The PAI-ADHD scores of participants diagnosed with ADHD will be significantly higher than the scores of participants diagnosed with a learning disability (e.g., specific learning disorder with impairment in reading and written expression) and no comorbid ADHD diagnosis.

CHAPTER 2

METHODS

Procedures

To begin determining which items from the PAI should be included in the PAI-ADHD, we contacted experts in the field of ADHD assessment through their email or website and asked them to participate in an online Qualtrics survey. We defined "expert" as someone who published a study about adult ADHD in a peer reviewed journal and/or is a licensed psychologist or psychiatrist that has completed at least 50 ADHD assessments. The first author of this study also completed the survey. We instructed evaluators to estimate the likelihood an item would be endorsed by an adult with ADHD and discriminate between adults with and without ADHD, based on a 4-point Likert scale (0 = *unlikely*, 4 = *likely*). Per our instructions, items that were scored as a 0 by evaluators indicated a discriminative ability of 0 to 10%; 1 = 20 to 30%; 2 = 40 to 50%; 3 = 60 to 70%; and 4 = 80 to 90%. Evaluators were asked to only highly endorse (i.e., give a rating of 4) items that they believed only adults with ADHD would endorse. In keeping with the literature on adult ADHD, they were reminded to give special consideration to items that related closely to an internalized sense of restlessness and place less emphasis on externalized restlessness. See Appendix B for the email and instructions sent to experts.

The scales and subscales selected for evaluation and potential inclusion in our scale were based on previous studies that researched the correlation between the PAI and ADHD. See Appendix C for a comparison table that includes the noted scales and pertinent psychometric information from each study. All items from scales or subscales that were correlated with ADHD diagnosis in two or more studies were included in our survey for evaluation. Items from the

following scales and subscales met the stated criteria: Anxiety Scale, Depression Scale, Mania Scale, Antisocial Features Scale, Thought Disorder Subscale, and Self-harm Subscale.

Four experts completed the survey. Two (50%) experts identified as male and 2 (50%) as female. All experts reported their ethnicity to be "White." All experts, except for the first author, reported having earned a Ph.D. in either Counseling or Clinical Psychology. The experts earned their degrees between 3 and 20 years (M = 11.5 years, SD = 9.54) years prior to the evaluation. These four experts reported having assessed between 50 and 500 (M = 212.5, SD = 229.13) adults with ADHD. One expert reported publishing 125 articles on ADHD. Another expert reported two publications, and another reported four. None of the experts reported having ADHD themselves.

Participants

In order to ultimately examine the convergent and concurrent validity of the PAI-ADHD, I first obtained approval form the University of North Texas (UNT) Institutional Review Board (IRB). See Appendix D for the approval letter from the UNT IRB. Participant data collection involved the attainment of archival and new data to create three participant groups: a) ADHD-Archival, b) LD-Archival, and c) Comparison-New. For the ADHD and LD Archival groups, data were collected from the files of individuals who previously completed psychological assessments at the UNT Psychology Clinic (hereafter referred to as "The Clinic"), a community mental health/training clinic, between the years of 2012 and 2019 and were subsequently diagnosed with either ADHD or an LD. The Clinic's policies ensure that comprehensive psychological evaluations with in-depth clinical interviews are used to determine diagnoses. See Appendix D for the approval letter from the Clinic IRB.

For files to be included in our study, three main inclusion criteria were implemented.

First, participants must have consented to having their assessment data, diagnoses, and demographic data used for research purposes. Second, the participants must have completed the PAI as part of their assessment battery. Third, the participants must have received an ADHD diagnosis of any subtype or an LD diagnosis of any type, but not both. This means that an individual who was diagnosed with ADHD and a comorbid LD was disqualified from inclusion in our study. Participants were not excluded based on any other additional diagnoses such as depression or bipolar disorder. See Tables 2, 3, and 4 for comorbid diagnoses of each group. A total of 98 files were drawn from The Clinic. The demographic, PAI, CAARS-Self, and WURS data were collected from those files and utilized for analyses. See Appendix E IRB Data Security, for detailed information regarding the data collection and measures taken to ensure confidentiality of the individuals whose file were used for data collection.

The ADHD group was comprised of 41 individuals with an average age of 25.93 years (range: 18 – 52 years). Of the 41 individuals included in the ADHD group, 19.5% (n = 8) were diagnosed with combined type, 53.7% (n = 22) inattentive type, 9.8% (n = 4) other specified, and 17.1% (n = 7) unspecified. Sixteen (39%) identified as male and 25 (61%) as female. The sexual orientation of the individuals was only reported in 4 of the files (i.e., 3 – straight and 1 – gay). The relationship status of the individuals was only reported in about half of the files that met criteria for the ADHD group. Of those 21 files, 19.5% (n = 8) reported being single/never married, 22% (n = 9) single/in a committed relationship of 6+ months, 2.4% (n = 1) cohabitating, 2.4% (n = 1) single/divorced, and 4.9% (n = 2) married. Regarding ethnicity, only one file was missing that information. Almost half of the individuals reported White/European American as their ethnicity (46.3%, n = 19). Of the remaining 21 individuals, 7 (17.1%) were Hispanic/Latino/Mexican American, 6 (14.6%) were Black/African American, 7 (17.1%) were

Biracial, Multiracial, or other, and one (2.4%) was Asian/Pacific Islander. Of the 16 individuals (39%) whose file noted they were currently in college, one was in their first year, four were sophomores, nine were juniors, and two were seniors. See Table 1 for ADHD Group comorbid diagnoses.See Table 2 for the demographics of the ADHD Group and group comparisons.

Table 1

*ADHD Group Comorbid Diagnoses (*n = *41)*

		n	%
ADHD Subtype	Inattentive	22	53.70
	Combined	8	19.50
	Unspecified	7	17.10
	Other Specified	4	9.80
Special Education Qualification	Other Health Impairment	1	2.40
	Mental Retardation	1	2.40
	Speech Impairment	1	2.40
	Traumatic Brain Injury	1	2.40
Current Mental Health Diagnosis	Major Depressive Disorder	11	26.80
	Social Anxiety Disorder	6	14.60
	Alcohol Use Disorder	5	12.20
	Bipolar Disorder	3	7.30
	Dysthymia	3	7.30
	Generalized Anxiety Disorder	3	7.30
	Post-Traumatic Stress Disorder	3	7.30
	Adjustment Disorder	2	4.90
	Avoidant Personality Disorder	1	2.40
	Schizophrenia	1	2.40
	Somatic Symptom Disorder	1	2.40

Table 2

Comparisons of Demographic Variables by ADHD, LD, and Comparison Groups

Demographics		ADHD Group (n = 41)		LD Group (n = 56)		Comparison Group (n = 49)		χ^2	P
		n	%	n	%	n	%		
Sex	Female	25	61.00	38	66.70	42	85.70	7.51	.02
	Male	16	39.00	18	31.60	7	14.30		
Sexual Orientation	Straight	3	7.30	5	8.80	35	71.40	N/A*	N/A*
	Gay/Lesbian	1	2.40	1	1.80	2	4.10		
	Other	1	2.40	0	0.00	2	4.10		
	Bisexual	0	.00	0	.00	10	20.40		
Relationship Status	1.	8	19.50	12	21.10	34	69.40	N/A*	N/A*
	2.	9	22.00	2	3.50	13	26.50		
	3.	2	4.90	6	10.50	0	0		
	4.	1	2.40	1	1.80	1	2		
	5.	1	2.40	31	54.40	0	0		
	6.	0	.00	0	.00	0	0		
Ethnicity	7.	19	46.30	31	54.40	16	32.70	N/A*	N/A*
	8.	7	17.10	7	12.30	12	24.50		
	9.	5	12.20	3	5.30	1	4.10		
	10.	2	4.90	2	3.50	1	2.00		
	11.	1	2.40	1	1.80	5	10.20		

(table continues)

Demographics		ADHD Group (n = 41)		LD Group (n = 56)		Comparison Group (n = 49)		χ^2	P
		n	%	n	%	n	%		
	12.	0	14.60	8	14.00	13	26.50		
	13.	0	.00	1	1.80	0	.00		
Class Rank	First Years	1	2.40	4	7.00	25	51.00	N/A*	N/A*
	Sophomores	4	9.80	1	1.80	6	12.20		
	Juniors	9	22.00	3	5.30	9	18.40		
	Seniors	2	4.90	0	0	8	16.30		
		M(SD)	Range	M(SD)	Range	M(SD)	Range	F	p
Age		25.93 (7.88)	34	24.65 (7.88)	35	19.80 (4.19)	29	10.4	<.001

*Insufficient cell sizes for χ^2 analysis. 1. Single/ never married 2. Single/ in a committed relationship (6+ months duration) 3. Married 4. Cohabitating 5. Single/ Divorced 6. Separated 7. White/ European American 8. Hispanic/ Latino/ Mexican American 9. Bi- racial or multi-racial 10. Other 11. Asian/ Pacific Islander 12. African American 13. Native American

The LD group was comprised of 57 individuals. Twenty-one (36.8%) were diagnosed with an LD in reading, 18 (31.6%) with an LD in math, 7 (12.3%) with an LD in reading and math, 8 (14%) with an LD in reading and writing, 2 (3.5%) with an LD in reading, writing, and math, and one (1.8%) with an LD in math and writing. The average age of the group at the time of the assessment was 24.65 years (range: 18 – 53 years). Eighteen (31.6%) people in the LD group identified themselves as male and 38 (66.7%) as female. Only 6 of the 57 files contained information about the client's sexual orientation (straight: *n* = 5, 8.8%; gay: *n* = 1, 1.8%). Only 21 files noted the individual's relationship status (single/never married: *n* = 12, 21.1%; single/in a committed relationship 6+ months: *n* = 2, 3.5%; single/divorced: *n* = 1, 1.8%; married: *n* = 6, 10.5%). Thirty-one (54.4%) individuals self-identified as White/European American, eight (14%) as Black/African American, seven (12.3%) as Hispanic/Latino/Mexican American, one (1.8%) as Native American, and five (8.8%) as biracial, multiracial, or other. Of the seven individuals whose files noted their class rank, four were first years, one was a sophomore, and three were juniors at the time of the assessment. See Table 1 for the demographics of the LD group and group comparisons. See Table 3 for LD Group comorbid diagnoses.

Table 3

*LD Group Comorbid Diagnoses (*n = *57)*

		n	**%**
Learning Disorder Specification	Reading	21	36.80
	Math	18	31.60
	Reading and Writing	8	14.00
	Reading and Math	7	12.30
	Reading, Writing, and Math	2	3.50
	Math and Writing	1	1.80
Other Special Education Qualification	Mental Retardation	1	1.80

(table continues)

		n	%
Current Mental Health Diagnosis	Generalized Anxiety Disorder	6	10.50
	Major Depressive Disorder	6	10.50
	Dysthymia	5	8.80
	Post-Traumatic Stress Disorder	2	3.50
	Avoidant Personality Disorder	1	1.80
	Bulimia-Nervosa	1	1.80
	Obsessive Compulsive Disorder	1	1.80
	Obsessive Compulsive Personality Disorder	1	1.80
	Panic Disorder	1	1.80
	Social Communication Disorder	1	1.80

College student participants were recruited for the Comparison group from a web-based research program, SONA (Kraha, n.d.). The site allows participants to complete Qualtrics surveys and receive varying levels of extra credit points in instructor approved courses. After initial recruitment, all SONA participants completed the online survey that included a detailed consent notice, information about the study, potential risks and benefits of the study (Appendices F and G), and a demographic questionnaire (Appendix H). Participants then completed the self-report measures: WURS, CAARS-Self, and PAI. The software randomized the order in which measures were presented to minimize order effects.

Strict inclusion criteria for the Comparison group were followed because only 41 to 60 participants were needed to have sufficient power and similar sample sizes across groups. Initial inclusion criteria were as follows: participants were required to be at least 18 years old or older; and, participants could neither currently meet criteria for, nor have received a past diagnosis of, an LD or ADHD. A total of 294 students were initially recruited through SONA between August and December 2020. Sixteen (5.4%) students did not complete the survey and their cases were

removed from the dataset. One-hundred and seventy-nine (60.9%) students completed the survey in less than an hour. Those cases were removed from our dataset because completing the PAI alone takes an average of 50 to 60 minutes (Morrey, 1991) and the validity of the data could not be ensured. Eight (2.7%) students reported receiving or suspecting an LD diagnosis and 12 (4.1%) students reported receiving or suspecting an ADHD diagnosis. Those 20 cases were removed due to the stated inclusion criteria.

To screen for potential students who currently meet criteria for ADHD, I first screened cases that received a WURS sub-score of 46 or above (n = 12, 4.1%) because a cutoff score of 46 on the WURS, can correctly classify 86% of individuals with ADHD (Ward, Wender, & Reimherr, 1993). Therefore, I removed those 12 cases from the dataset. Second, I screened cases that received a CAARS-Self subtest T-score of 65 or above (n = 18, 6.1%). On the CAARS-Self, subtest T-scores $\geq$ 66 indicate a response style that is "much above average" (Conners, Erhardt, & Sparrow, 1999). After removing those 18 cases due to high CAARS-Self scores, 49 cases remained and comprised the Comparison group.

The average age of the Comparison group was 19.8 years (range: 18 – 47 years). Seven (14.3%) individuals identified as male and 42 (85.7%) identified as female. Sexual orientation of the participants is as follows: 71.4% (n = 35) straight; 4.1% (n = 2) gay/lesbian; 20.4% (n = 10) bi-sexual; and 4.1% (n = 2) other. Most of the respondents reported they were single/never married (69.4%, n = 34). Thirteen (26.5%) reported they were single/in a committed relationship 6+ months and one (2%) reported cohabitating. Sixteen (32.7%) participants self-identified as White/European American; 13 (26.5%) Black/African American; five (10.2%) Asian/Pacific Islander; 12 (24.5%) Hispanic/Latino/Mexican American; two (4.1%) Biracial or Multiracial, and one (2%) other. All participants reported being currently in college. Twenty-six (53.1%)

were first years; six (12.2%) were sophomores; nine (18.4%) were juniors; seven (14.3%) were seniors, and one (2%) did not report their class rank. See Table 1 for the demographics of the Comparison group and demographic group comparisons. See Table 4 for Comparison group comorbid diagnoses.

Table 4

*Comparison Group Comorbid Diagnoses (*n = *49)*

		n	**%**
Special Education Qualification	Other Health Impairment	1	2.00
	Visual Impairment	1	2.00
	Speech Impairment	1	2.00
Mental Health Disorders	Generalized Anxiety Disorder	6	12.20
	Major Depressive Disorder	4	8.20
	Bipolar Disorder	1	2.00
	Social Anxiety Disorder	1	2.00

Measures

Demographic Questionnaire

Participants completed a questionnaire designed for this study to assess demographic information, such as age, gender, ethnicity, sexual orientation, level of education, etc. Participants were also asked if and when they were first diagnosed with a number of psychological disorders, their historical and current use of medication, and academic accommodations. See Appendix H for the Demographic Questionnaire used.

Wender Utah Rating Scale (WURS)

The WURS is a retrospective self-report objective measure used to assess childhood ADHD symptomatology among adults. The scale includes 61 questions that can be answered on

a 4-point Likert scale, where a score of 0 indicates "not at all or very slightly" and 4 indicates "very much." Higher scores indicate greater symptomatology. The WURS takes less than five minutes to complete. In the current study, the internal consistency was good (a = .89). Ward, Wender, and Reimherr (1993) explored the measure's discriminant validity and reported the WURS differentiated between clinical and comparison samples (e.g., participants without ADHD) with an 86.0% accuracy rate. In a college sample of 111 students, the WURS was found to have questionable test-re-test reliability (r = .68) as estimated by the Pearson product-moment correlation (Wierzbicki, 2005). In the same study, the WURS was moderately correlated with depressive symptoms (r = .38, p > .01) and automatic thoughts (r = .43, p > .01) (Wierzbicki, 2005).

Conners' Adult ADHD Rating Scale – Self-Report – Long Version (CAARS-Self)

The CAARS-Self is a self-report measure used to help diagnose ADHD in adults (Conners, Erhardt & Sparrow, 1999). The CAARS-Self includes 66 questions and takes about 10 to 20 minutes to complete. The CAARS-Self is divided into four factors: Inattention/Memory Problems, Hyperactivity/Restlessness, Impulsivity/Emotional Lability, and Problems with Self-Concept. The items from the Inattention/Memory Problems factor describe difficulties with concentration and completing tasks. The items from the Hyperactivity/Restlessness factor describe difficulties with fidgeting and staying on task. The items from the Emotional Lability factor describe difficulties with impulsivity and mood changes. The items from the Problems with Self-Concept factor describe difficulties stemming from poor social relationships and low self-esteem. The CAARS-Self also includes three DSM-IV ADHD subscales for diagnosis: Inattentive Symptoms, Hyperactive-Impulsive Symptoms and Total ADHD Symptoms (Conners, Erhardt & Sparrow, 1999).

In the current study, the CAARS-Self had acceptable to good internal consistency reliabilities on each of the eight subscales (Subscale A: *a* = .84, Subscale B: *a* = .83, Subscale C: a = .76, Subscale D: *a* = .82, Subscale E: a = .73, Subscale F: *a* = .69, Subscale G: *a* = .75, Subscale H: *a* = .76). Test-retest reliabilities for the four factors range from *r* = .88 to .91. The CAARS-Self total classification rating is approximately 85%, with 82% accuracy for true ADHD cases and 87% accuracy for non-ADHD cases (Conners, Erhardt & Sparrow, 19999; Taylor, Deb & Unwin, 2011). Additionally, Adler et al. (2007) concluded that the CAARS is the "gold standard" among ADHD self-report measures due to strong construct and criterion validity.

Personality Assessment Inventory (PAI)

The PAI is a self-report measure used to assess an individual's personality traits and psychopathological symptoms. The PAI is comprised of 344 4-point Likert-scale items (ranging from 1-false to 4-always) that are then divided into 22 subscales of four types: validity scales, clinical scales, treatment consideration scales, and interpersonal scales (Morey, 1991). A strength of the PAI is that no one item loads on more than one of the 22 subscales (Morey, 1991).

In the current study, internal consistency reliabilities ranged from acceptable to good (Anxiety Scale: *a* = .66, Depression Scale: *a* = .62, Mania Scale: *a* = .70, Schizophrenia Scale: *a* = .60, Borderline Features Scale: *a* = .69). PAI scores have successfully discriminated between college students with a wide range of diagnoses including trauma, depression, social phobia, and anxiety disorders (McDevitt-Murphy et al., 2007). The ease, accessibility, short duration (on average 50 minutes to administer), and low required reading level (4^{th} grade) of the PAI has made the measure one of the most popular assessment instruments in counseling centers and private practices across the United States (Morey, 1991; Piotrowski, 2000).

CHAPTER 3

RESULTS

Data Preparation

I performed data cleaning procedures and calculated variables (WURS and CAARS Subtests) in order to conduct the proposed data analyses. Frequency tables were examined to confirm that less than 2% of all PAI items and WURS and CAARS subtest data were missing. Moreover, the data showed to be missing at random (MCAR). I used the "exclude cases pairwise" option to ensure that participants with missing data on the PAI were only included in analyses that did not require their missing variables for analysis (Pallant, 2007). Missing data from the CAARS and WURS were accounted for by replacing missing items with the average of the items answered, mean imputation (Schlomer, Bauman & Card, 2007; Tabachnik & Fidell, 2013).

I also checked for any univariate outliers on the PAI-ADHD with standardized scores, because examination of validity is highly sensitive to outliers (Hubert & Olejnik, 2006; Tabachnik & Fidell, 2007). No outliers were found. I also tested the assumptions of ANCOVA (i.e., normality of dependent variables, level of measurement, independence of observations, and homogeneity of variance) (Tabachnick & Fidell, 2007). All assumptions of ANCOVA were met except for homogeneity of variance. I rejected the null hypothesis due to a significant Levene's test, $F(2,138) = 4.35$, $p = .02$. Therefore, I used the Brown-Forsythe test to determine the ANCOVA's significance and the Games-Howell Post-Hoc test for pair-wise comparisons (Tabachnik & Fidell, 2013).

I considered whether significant differences exist across demographic groups to determine if covariates would be appropriate. Groups significantly differed from each other on

sex and age. See Table 1. Therefore, an ANCOVA was warranted to control for both sex and age. This limitation of the study will be further addressed in Chapter 4. I also ran t-tests and a Pearson correlation to determine if any of our dependent variables (PAI-ADHD, CAARS-Self, or WURS) were significantly correlated with any of our measured demographic variables. No significant relationships were found.

I prepared the data obtained from the experts in two different ways. I calculated an average score based on the experts' ratings (0 = Unlikely, 4 = Likely) for each PAI item evaluated. This gave all experts equal voice and mitigated the slight variation among expert raters. I also recoded the evaluators' scores to "Yes" (include in the PAI-ADHD) – "No" (do not include in the PAI-ADHD). Scores of 0 or 1 were coded as "No." Scores of 2, 3, or 4 were coded as "Yes." Additionally, I tested the assumptions of Principle Component Analysis (PCA) (i.e. multiple continuous variables, linear relationship between all variables, sampling adequacy, suitability for data reduction, no significant outliers). All assumptions were met (Bartlett's test of sphericity: χ^2 (120) = 26.44, $p < .001$; KMO = .66).

Data Analysis

First, I examined the expert rating data by determining the mean, standard deviation, and range of scores given to each PAI item. I noted the items with the highest average scores and there were sixteen items with a mean greater than or equal to 3. See Table 5. That is, on average, this set of 16 items were the ones raters thought were most likely to discriminate respondents with ADHD from other respondents. A value of three corresponds to an expert rater's opinion that an item had 60 – 70% discriminant ability.

The first hypothesis states the experts will reliably agree on which items from the PAI would most accurately distinguish ADHD from other diagnoses. To estimate the inter-rater

reliability of the experts, I performed a series of Pearson's correlations between each pair of experts across the 110 total PAI items given to the experts for evaluation. The mean of all of the correlations was large, $r = .53$. Then, when utilizing the recoded "Yes-No" data, the experts unanimously agreed that the top 16 items should be included in the scale. Given their 100% agreement, no additional analysis was required.

Table 5

PAI Items, Scale Origins, and Expert Ratings for the 16 Rationally-Derived "ADHD" Items

PAI Items	PAI Scale Origin	Expert Ratings Mean (SD)
7. Often I think and talk so quickly that other people cannot follow my train of thought.	MAN-A	3.25 (.96)
75. I have no trouble falling asleep.*	DEP-P	3.00 (.00)
78. My thoughts get scrambled sometimes.	SCZ-T	3.75 (.50)
86. Everything seems like a big effort.	DEP-A	3.75 (.50)
115. I rarely have trouble sleeping.*	DEP-P	3.50 (.58)
118. Sometimes I have trouble keeping different thoughts separate.	SCZ-T	3.50 (.58)
127. At times my thoughts move very quicky.	MAN-A	3.25 (.96)
143. I sometimes do things so impulsively that I get into trouble.	BOR-S	3.50 (1.00)
147. I can't seem to concentrate very well.	DEP-C	4.00 (.00)
193. It's easy for me to relax.*	ANX-P	4.00 (.00)
198. My thoughts tend to quickly shift around to different things.	SCZ-T	4.00 (.00)
207. I feel like I need to keep active and not rest.	MAN-A	3.25 (.50)
223. I'm too impulsive for my own good.	BOR-S	3.75 (.50)
276. At times I am very touchy and easily annoyed.	MAN-I	3.75 (.50)
278. Thoughts in my head suddenly disappear.	SCZ-T	3.75 (.50)
287. I hardly ever buy things on impulse.*	MAN-A	3.75 (.50)

*. Reverse scored items. ANX-P = Anxiety – Physiological; DEP-C = Depression – Cognitive; DEP-A = Depression -Affective; DEP-P = Depression – Physiological; MAN-A = Mania - Activity Level; MAN-I = Mania – Irritability; SCZ-T = Thought Disorder; BOR-S = Borderline Features – Self-Harm

The second hypothesis states PAI items chosen by the experts will load adequately onto a single factor. I performed a principal component analysis (PCA) with an oblique direct oblimin rotation and examined the eigenvalues to determine the number of factors within the 16 "ADHD" items. PCAs analyze the total variance of items. I used a PCA because I wanted to evaluate how well the information gleaned from the original 16 "ADHD" items could be best summarized with the least number of factors. I chose a PCA instead of an exploratory factor analysis (EFA) because a PCA is better able to capture observed and expected variables. An EFA is more likely to measure unobserved or latent variables. I did not expect any latent variables because the initial items chosen were based on theory. I chose an oblique direct oblimin rotation because this type of rotation allows multiple factors to be correlated with each other when they are theoretically related. Eigenvalues represent the amount of variance accounted for by a factor (Hair et al., 2010; Tabachnik & Fidell, 2007). Tabachnik and Fidell (2007) suggest utilizing any factor that has an eigenvalue greater than one. When no limit was placed on the number of factors, four factors emerged. However, the first accounted for 33% of the variance and the second three factors combined accounted for less variance (26.28%) than the first alone.

Tabachnik and Fidell also suggest examining the scree plot, a graph that compares eigenvalues to number of factors, in order to determine where the plotted points seem to make an elbow, indicating the least number of factors that that should be included in analyses to account for the maximum amount of variability. I noted that at the one factor point, there seems to be a leveling off. This suggests that one factor met the scree plot criteria Tabachnik and Fidell describe (2007). Therefore, I ran another PCA with a forced single factor on each of the diagnostic groupings to determine the individual contribution of each item to the total variance. See Table 6. Generally, .4 is considered the minimum acceptable factor loading for inclusion

(Tabachnik & Fidell, 2007). After applying that criterion, I determined that PAI items 75, 115, 193, and 207 should be eliminated, and the remaining 12 items should comprise the new PAI-ADHD subscale. The 12-item version was used for the following analyses.

Table 6

Factor Loadings of the PCA with Oblique Rotation and One Fixed Factor Using 16 Rationally-Derived "ADHD" Items

PAI Items	ADHD Group (n = 41)	LD Group (n = 57)	Comparison Group (n = 49)
	Factor 1	Factor 1	Factor 1
7. Often I think and talk so quickly that other people cannot follow my train of thought.	.46	.56	.66
75. I have no trouble falling asleep.*	.25	.35	.26
78. My thoughts get scrambled sometimes.	.81	.67	.64
86. Everything seems like a big effort.	.45	.49	.53
115. I rarely have trouble sleeping.*	.16	.30	.12
118. Sometimes I have trouble keeping different thoughts separate.	.78	.72	.67
127. At times my thoughts move very quicky.	.71	.81	.67
143. I sometimes do things so impulsively that I get into trouble.	.57	.29	.50
147. I can't seem to concentrate very well.	.59	.73	.50
193. It's easy for me to relax.*	.15	.56	.19
198. My thoughts tend to quickly shift around to different things.	.86	.84	.68
207. I feel like I need to keep active and not rest.	.25	.40	.55
223. I'm too impulsive for my own good.	.46	.46	.37
276. At times I am very touchy and easily annoyed.	.42	.39	.21
278. Thoughts in my head suddenly disappear.	.53	.58	.43
287. I hardly ever buy things on impulse.*	.46	.32	-.02

*. Reverse scored items.

The internal consistency for the PAI-ADHD across the entire sample was good, a = .84.

The internal consistency of the PAI-ADHD for each diagnostic group was good and are as follows: ADHD group *a* = .83; LD group *a* = .77; Comparison group *a* = .74. See Table 7 for the means and standard deviations of each item in the PAI-ADHD for all diagnostic groups. For the total sample, the average inter-item correlation was good, .34. Of the item-item bivariate pairs, 92.42% were significantly positive correlated. Of the item-total bivariate pairs, 100% of the pairs were significantly and positive correlated. See Tables 8 and 9 for the item - item bivariate correlations for the PAI-ADHD. See Table 10 for the item – total bivariate correlations for the PAI-ADHD.

Table 7

Means and Standard Deviations of the 12 PAI-ADHD Items for All Groups

PAI Items	ADHD Group (*n* = 41)	LD Group (*n* = 57)	Comparison Group (*n* = 49)
	Mean (SD)	Mean (SD)	Mean (SD)
7. Often I think and talk so quickly that other people cannot follow my train of thought.	1.76 (1.14)	1.09 (1.12)	.90 (1.07)
78. My thoughts get scrambled sometimes.	2.20 (1.08)	1.38 (1.05)	1.02 (.75)
86. Everything seems like a big effort.	1.44 (1.10)	.86 (.92)	.49 (.79)
118. Sometimes I have trouble keeping different thoughts separate.	1.66 (1.17)	.84 (1.01)	.56 (.72)
127. At times my thoughts move very quicky.	2.32 (.82)	1.54 (1.14)	1.04 (.93)
143. I sometimes do things so impulsively that I get into trouble.	.88 (1.05)	.48 (.85)	.31 (.63)
147. I can't seem to concentrate very well.	2.56 (.74)	1.43 (1.11)	.71 (.84)
198. My thoughts tend to quickly shift around to different things.	2.46 (.84)	1.39 (1.02)	.90 (.88)
223. I'm too impulsive for my own good.	.90 (.94)	.41 (0.83)	.36 (.68)
276. At times I am very touchy and easily annoyed.	1.37 (1.04)	1.70 (2.81)	1.07 (.78)
278. Thoughts in my head suddenly disappear.	1.41 (1.22)	.70 (1.06)	.60 (.78)
287. I hardly ever buy things on impulse.*	2.90 (1.11)	2.80 (1.02)	2.78 (1.00)

*. Reverse scored item.

Table 8

Item – Item Bivariate Correlations of PAI-ADHD Items for Total Sample

	7	78	86	118	127	143	147	198	223	276	278	287
7	-											
78	.45**	-										
86	.25**	.38**	-									
118	.34**	.64**	.48**	-								
127	.54**	.60**	.36**	.58**	-							
143	.28**	.34**	.21*	.37**	.34**	-						
147	.34**	.62**	.45**	.55**	.58**	.25**	-					
198	.49**	.68**	.37**	.64**	.70**	.42**	.65**	-				
223	.28**	.25**	.25**	.37**	.31**	.57**	.26**	.44**	-			
276	.14*	.19*	.17*	.18*	.14*	.16*	.22**	.20**	.06	-		
278	.32**	.38**	.32**	.46**	.41**	.17*	.45**	.48**	.29**	.19*	-	
287	.03	.14*	.16*	.21**	.09	.21**	.19**	.21**	.27**	-.02	.09	-

* $p < .05$; ** $p < .01$

Table 9

Item – Item Bivariate Correlations of PAI-ADHD for the ADHD Group

	7	78	86	118	127	143	147	198	223	276	278	287
7	-											
78	.43**	-										
86	.11	.26*	-									
118	.18	.75**	.27*	-								
127	.46**	.61**	.18	.48**	-							
143	.18	.31*	.18	.41**	.34*	-						
147	.11	.52**	.21	.43**	.44**	.25	-					
198	.46**	.70**	.32*	.62**	.69**	.29*	.49**	-				
223	.19	.12	.19	.31*	.17	.64**	.19	.19	-			
276	-.09	.25	.36*	.37**	.01	.13	.15	.34*	.27*	-		
278	.11	.43**	.14	.45**	.24	.23	.32*	.51**	.10	.19	-	
287	.258	.23	.12	.18	.31*	.35*	.13	.29*	.44**	.18	.09	-

* $p < .05$; ** $p < .01$

Table 10

Item – Total Bivariate Correlations of the PAI-ADHD for the Total Sample and ADHD Group

	All Diagnostic Groups (*N* = 142)	**ADHD Group (*n* = 41)**
7.	.59**	48**
78.	.75**	.78**
86.	.57**	.47**
118.	.76**	.77**
127.	.75**	.66**
143.	.54**	.60**
147.	.75**	.56**
198.	.83**	.81**
223.	.53**	.53**
276.	.44**	.45**
278.	.61**	.55**
287.	.31**	.50**

** $p < .01$

Hypotheses 3, 4, and 5 all refer to the establishment of validity for the PAI-ADHD. To establish convergent validity, I performed a series of Pearson correlations between the PAI-ADHD T-scores and subscales from the WURS and CAARS-Self. To account for family-wise error, significant levels were established at $\leq .005$, the Bonferroni correction. See Table 11 for correlations, means, and standard deviations for each subscale. The PAI-ADHD – T was significantly and positively correlated with the WURS sub-score ($r(84) = .70$, $p \leq .001$). The PAI-ADHD was also positively and significantly correlated with all CAARS-Self subtests. The correlations of the CAARS-Self subtests are as follows: CAARS Subtest A – Inattention/Memory Problems ($r(103) = .72$, $p \leq .001$); CAARS Subtest B – Hyperactivity/Restlessness ($r(103) = .55$, $p \leq .001$); CAARS Subtest C – Impulsivity/Emotional

Lability ($r(103) = .81$, $p \leq .001$); CAARS Subtest D – Problems with Self-Concept ($r(103) = .55$, $p \leq .001$); CAARS Subtest E – DSM IV Inattentive Symptoms ($r(103) = .72$, $p \leq .001$); CAARS Subtest F – DSM IV Hyperactive-Impulsive Symptoms ($r(103) = .68$, $p \leq .001$); CAARS Subtest G – DSM IV ADHD Symptoms ($r(103) = .76$, $p \leq .001$); and CAARS Subtest H – ADHD Index ($r(103) = .81$, $p \leq .001$).

Table 11

PAI-ADHD – T Correlations, Means, and Standard Deviations for Continuous Variables

Measures	*r*	*p*	ADHD Group	LD Group	Comparison Group
			Mean (SD)	Mean (SD)	Mean (SD)
1. WURS Sub score	.70	<.001	45.41 (16.62)	34.60 (19.26)	19.71 (11.26)
2. CAARS – A – T	.72	<.001	72.09 (8.14)	58.52 (15.27)	46.14 (9.94)
3. CAARS – B – T	.55	<.001	60.29 (8.83)	52.33 (13.52)	48.47 (8.34)
4. CAARS – C – T	.81	<.001	56.24 (10.17)	51.07 (16.02)	41.88 (6.37)
5. CAARS – D – T	.55	<.001	59.44 (12.17)	52.96 (13.06)	48.65 (8.64)
6. CAARS – E – T	.72	<.001	81.47 (7.75)	64.85 (16.40)	48.24 (8.00)
7. CAARS – F – T	.68	<.001	61.24 (12.42)	52.89 (13.38)	44.22 (8.73)
8. CAARS – G – T	.76	<.001	75.91 (10.35)	61.04 (14.95)	46.22 (7.85)
9. CAARS – H – T	.81	<.001	64.74 (6.89)	55.41 (19.26)	45.69 (7.00)

1. Wender Utah Rating Scale. 2. CAARS – A: Inattention/Memory Problems. 3. CAARS – B: Hyperactivity/Restlessness. 4. CAARS – C: Impulsivity/Emotional Lability. 5. CAARS – D: Problems with Self-Concept. 6. CAARS – E: DSM-IV Inattentive Symptoms. 7. CAARS – F: DSM-IV Hyperactive-Impulsive Symptoms 8. CAARS – G: DSM-IV ADHD Symptoms Total 9. CAARS – H: ADHD Index

To establish concurrent validity for the PAI-ADHD, I conducted a One-way ANCOVA and interpreted the Brown-Forsythe statistic to compare PAI-ADHD means across the three diagnostic groups (Brown & Forsythe, 1974). After controlling for sex and age, there was a significant effect of diagnostic group membership on PAI-ADHD score [$F(2,135) = 24.42$, $p < .001$, partial eta squared = .27]. See Table 12.

Table 12

Results of ANCOVA Comparing PAI-ADHD Scores across Diagnostic Groups Controlling for Age and Sex

SS	*df*	MS	*F*	Sig.	Partial Eta Squared
2468.56	2	1234.282	24.42	<.001	.27

Post hoc comparisons using the Games-Howell test indicated that the mean score of the PAI-ADHD for the ADHD group (M = 21.98, SD = 7.35) was significantly higher than the LD group (M = 14.61, SD = 8.13, $p < .001$) and the Comparison group (M = 10.71, SD = 5.09, $p < .001$). The LD group PAI-ADHD mean was also significantly ($p = .03$) higher than the Comparison group at the .05 level. See Table 13.

Table 13

Games-Howell PAI-ADHD Comparisons across Diagnostic Groups

Comparisons	Mean Difference	SE	Sig.
ADHD Group to LD Group	7.36	1.48	<.001
ADHD Group to Comparison Group	11.28	1.65	<.001
LD Group to Comparison Group	3.92	1.50	.03

Multiple steps were taken to determine preliminary cut-off scores for the PAI-ADHD. To determine the overall diagnostic accuracy of the PAI-ADHD, I examined an ROC curve. ROC analysis showed significantly high predictive power (auc = .82, $p < .001$). See Table 14 for the sensitivity and specificity levels for all cut-off scores considered for the PAI-ADHD. Next, I created histograms of PAI-ADHD scores for the ADHD, LD, and Comparison groups and put them on the same graphs. See Figures 1, 2, and 3. I inspected histogram overlap to determine where the top 10% of the LD and Comparison combined histogram crossed with the bottom of

the ADHD histogram (Tabachnik & Fidell, 2007). The curves overlapped at a raw PAI-ADHD score of about 22. The mean of the ADHD group is 21.98, *SD* = 7.35. The mean of the LD and Comparison groups combined is 12.87, *SD* = 7.18. A raw PAI-ADHD score of 13 aligns with the bottom 12% of the ADHD group.

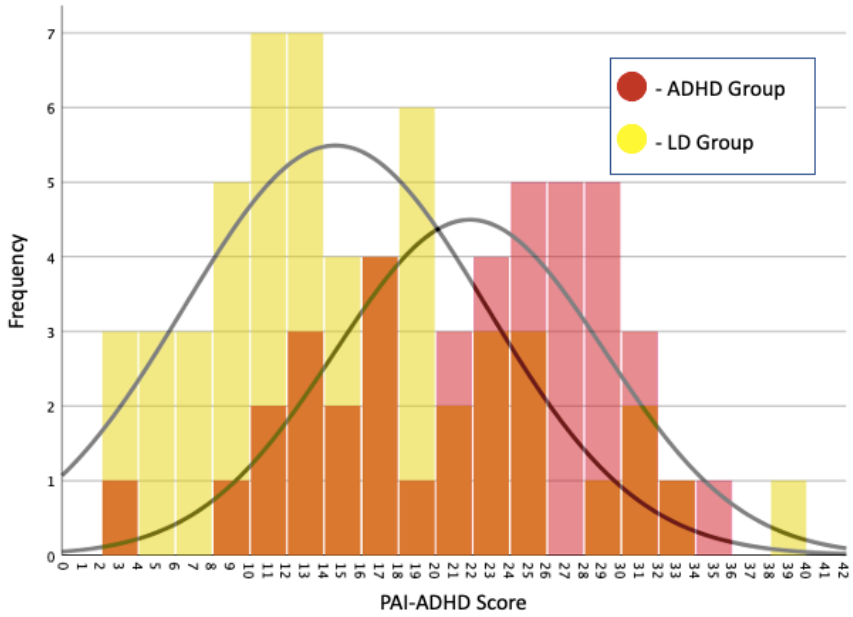
Table 14

ROC Analysis of Screening Ability of PAI-ADHD

Cut Off Point	Sensitivity	*n* of True Positive ADHD	*n* of False Negative ADHD (Type II Error)	Specificity	*n* of True Negative ADHD	*n* of False Positive ADHD (Type I Error)
11	.95	39	2	.41	41	59
12	.90	37	4	.49	49	51
13	.88	36	5	.56	56	44
14	.83	34	7	.62	62	38
15	.81	33	8	.66	66	34
16	.78	32	9	.71	71	29
17	.76	31	10	.75	75	25
18	.68	28	13	.77	77	23
19	.66	27	14	.80	80	20
20	.66	27	14	.84	84	16
21	.63	26	15	.85	85	15
22	.59	24	17	.89	89	11
23	.56	23	18	.92	92	8
24	.49	20	21	.92	92	8
25	.44	18	23	.95	93	5

Figure 1

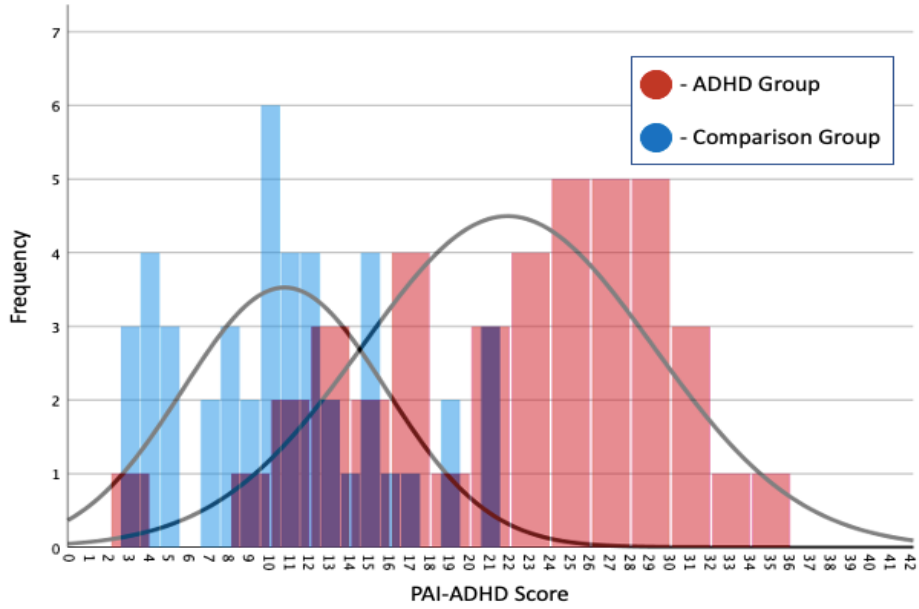
Overlapping Histograms of PAI-ADHD Scores for the ADHD and LD Groups



Note. The appearance of a potential third group, with a darker color in the middle of the graph, is the overlap of the two groups.

Figure 2

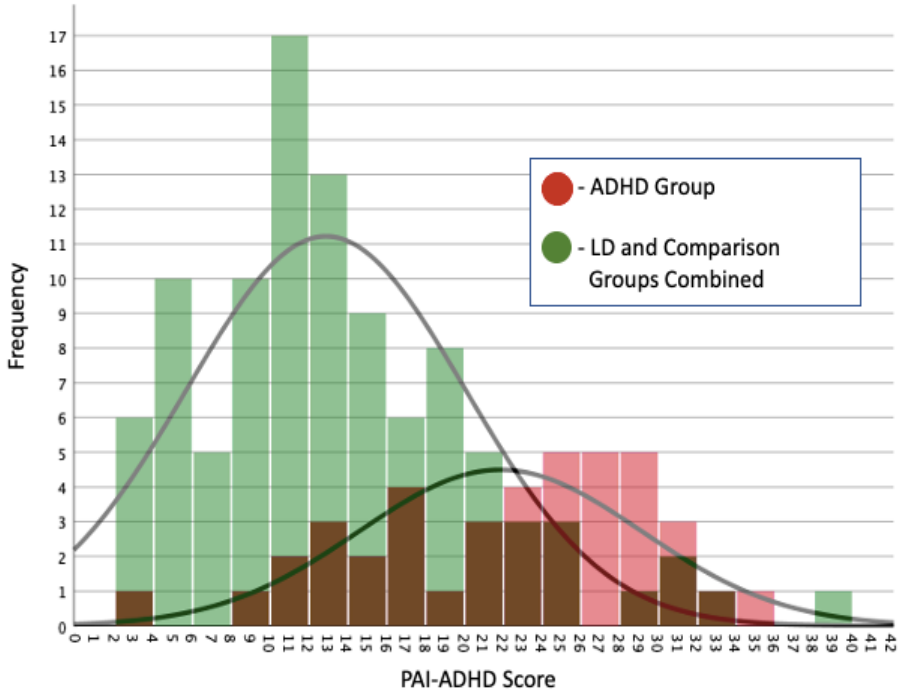
Overlapping Histograms of PAI-ADHD Scores for the ADHD and Comparison Groups



Note. The appearance of a potential third group, with a darker color in the middle of the graph, is the overlap of the two groups.

Figure 3

Overlapping Histograms of PAI-ADHD Scores for the ADHD Group and LD and Comparison Groups Combined



Note. The appearance of a potential third group, with a darker color in the middle of the graph, is the overlap of the two groups.

I then evaluated individual cut scores to determine best fit for the current sample. I suggest a lower cut score of 13 (sensitivity = .88, specificity = .56) to maximize sensitivity, true positives. A lower cut score of 13 falsely identified five participants as non-ADHD when they met criteria for the disorder and falsely identified 44 participants as ADHD when they did not meet criteria for the disorder. Meaning, 12.20% of the ADHD sample would be misclassified as non-ADHD and 44% of the non-ADHD sample would be misclassified as ADHD. I suggest a higher cut score of 22 (sensitivity = .59, specificity = .89) to maximize specificity, true negatives. An upper cut score of 22 falsely identified 17 (41.50% of the ADHD sample) participants as non-ADHD when they met criteria for the disorder and falsely identified 11 (11%

of the non-ADHD sample) participants as ADHD when they did not meet criteria for the disorder. Two cut scores create three screening groups: ruled-out, at-risk, and probable ADHD.

Exploratory Analyses

In order to explore a potential difference in response style between the ADHD and the Comparison group, I conducted two One-way ANCOVAs and interpreted the Brown-Forsythe statistic to compare PAI – Negative Impression (PAI-NIM) scores and PAI – Positive Impression (PAI-PIM) scores across the diagnostic groups (Brown & Forsythe, 1974). After controlling for sex and age, there was not a significant effect of diagnostic group membership on PAI-NIM scores. However, there was a significant effect of diagnostic group membership on PAI-PIM scores [$F(2,139) = 9.74$, $p < .001$, partial eta squared = .12]. *Post hoc* comparisons using the Games-Howell test indicated that the mean score of the PAI-PIM for the ADHD group ($M = 11.03$, $SD = 5.21$) was significantly lower than the LD group ($M = 14.43$, $SD = .5.59$, $p = .004$) and the Comparison group ($M = 16.06$, $SD = 3.73$, $p < .001$). The LD and Comparison groups did not significantly differ.

I was also interested in whether the groups differed on their overall functioning. The PAI does not have a scale that directly measures difficulties with daily living. I chose the PAI – Stress (PAI-STR) scale to approximate this. I conducted two One-way ANCOVAs and interpreted the Brown-Forsythe statistic to compare PAI-STR scores across the diagnostic groups (Brown & Forsythe, 1974). After controlling for sex and age, there was not a significant effect of diagnostic group membership on PAI-STR scores.

Finally, I was interested in some of the demographic and clinical variables of the individuals who were not diagnosed with ADHD and earned scores ≤ 22 on the PAI-ADHD. I identified 11 (11%) individuals, all of whom were diagnosed with a Learning Disorder. Of those

11 individuals, 9 (81.80%) identified as female and two (18.20%) as male. Four (36.40%) were single and one (9.10%) divorced. Six (54.50%) identified as "White," three (27.30%) as Hispanic/Latino/Mexican American, one (9.10%) as Black/African-America, and one (9.10%) as Biracial/Multiracial/Other. Three (27.30%) were currently diagnosed with Generalized Anxiety Disorder. One (9.10%) was diagnosed with Post-traumatic Stress Disorder. Three (27.3%) were diagnosed with Major Depressive Disorder and two (18.20%) with Dysthymia. There were insufficient cell sizes for χ^2 analyses.

CHAPTER 4

DISCUSSION

The purpose of the current study was to develop and test a rationally-determined subset of items from a standard administration of the PAI that discriminates adults with ADHD from adults without ADHD. I labeled this new subscale PAI-ADHD. Results suggest that the PAI-ADHD is a valid measure that has good internal consistency and high correct classification rates based on the current sample. Although the PAI was not initially designed to test for ADHD, the results suggest that the PAI can be a valuable tool for screening for ADHD in adulthood. That is, with further validity testing on larger norm groups, the PAI-ADHD could be a useful subscale for daily use by clinicians to help them determine if their adult therapy or assessment client should be tested further for an ADHD diagnosis.

Utilizing data from psychologists in the field who have expert knowledge of ADHD in adulthood allowed me to rationally and statistically determine the best set of PAI items for the new subscale. The 16 rationally-determined "ADHD" items with the highest average scores across four experts had 100% inter-rater agreement when dichotomized. These findings support my first hypothesis that a group of experts will agree on which items from the PAI will differentiate between adults with and without ADHD. Moreover, my second hypothesis was also supported rationally and statistically. That is, items chosen for the PAI-ADHD adequately loaded on a single factor with face validity that conceptually matches clinical and empirical descriptions of adult ADHD. Specifically, the PAI-ADHD assesses symptoms of inattention and impulsivity commonly seen in adults with ADHD (APA, 2013) as well as the "internalized restlessness" Hallowell and Ratey (1994) describe for adult ADHD.

The PAI-ADHD is comprised of 12 items from the Depression, Mania, Schizophrenia,

and Borderline Features scales of the PAI. Each of these PAI-ADHD origin scales have demonstrated significant mean differences between adults with and without ADHD (DeLong, 2008; Walker, 2013; Watson & Liljequist, 2015) All of the scales were also significantly correlated with CAARS Subscales among a group of clients with and without ADHD from an outpatient mental health clinic (Stewart & Liljequist, 2015). Yet, all of the previous studies noted failed to explore the specific items within the PAI scales that were endorsed the most highly by adults with ADHD.

Scale elevations can be driven by one or two items within the scale if the items are highly endorsed (i.e. 4 – always). It is possible that some PAI items are written in such a way that participants with different mental health disorders may read the same item and interpret it's meaning differently because of their individual world-view and psychological experiences. For example, two items in the PAI-ADHD stem from the Borderline Features – Self-Harm subscale: item "143. I sometimes do things so impulsively that I get into trouble;" and item "223. I'm too impulsive for my own good (Morey, 1991)." Morey (2003) explains that the BOR-S subscale can be indicative of a tendency to act impulsively or recklessly and it can also be an indicator of a higher risk for suicide or self-mutilation. Findings from the current study indicate that both an adult with ADHD and an adult who engages in self-mutilation could endorse those items similarly but for different reasons.

In the current study, the PAI-ADHD yielded a good alpha coefficient of .84. Internal consistency was also demonstrated with item – item correlations (92.42% of the bivariate pairs were positive and significantly correlated) and item – total correlations (100% of the bivariate pairs were positive and significantly correlated). The average inter-item correlation was also good, .34. It seems that the 12 items chosen for the PAI-ADHD seem to co-occur and are all

measuring the same overarching construct. These results suggest that the PAI-ADHD is a reliable subscale and that the PAI-ADHD items chosen by the experts are not overly redundant.

Data from clinical and college samples allowed me to begin establishing validity of the PAI-ADHD. The PAI-ADHD was significantly and positively correlated with all of the CAARS-Self subscales and WURS sub-score. In support of my third hypothesis, convergent validity of the PAI-ADHD was established because both the CAARS-Self and WURS are well validated and reliable measures of ADHD (Conners, Erhardt & Sparrow, 1999; Erhardt et al., 1999; Taylor, Deb, & Unwin, 2011; Weyandt, Linterman, & Rice, 1995; Wierzbicki, 2005). These results suggest that the PAI-ADHD is measuring the occurrence of ADHD symptoms in adulthood and is correlated with ADHD symptoms in childhood.

I established concurrent validity of the PAI-ADHD by demonstrating that the PAI-ADHD mean score was significantly different across groups (Hypothesis 4). Members of the ADHD group received scores on the PAI-ADHD that were significantly different than the scores of members of the LD and Comparison groups (i.e. a group without ADHD or LD). Moreover, the PAI-ADHD score of the ADHD group was significantly higher than both the LD and Comparison groups. Although there are many symptom commonalities between ADHD and LD, the PAI-ADHD was able to distinguish between the two disorders at a large effect size (η^2 = .27). This speaks to the PAI-ADHD's strong concurrent validity. The data suggests that the PAI-ADHD is very likely measuring ADHD symptoms and not a similar but related construct.

To determine possible cut scores for the PAI-ADHD, I examined both the ROC curve and PAI-ADHD score histograms. Recognizing that the PAI-ADHD will be used as a screening measure, my first goal was to optimize sensitivity. This means that I wanted to err on the side of caution by choosing a lower cut score to minimize false negative cases. That is, with a screening

instrument, the identification of false positives is typically less problematic than false negatives. The former results in additional assessment of an individual who does not meet full diagnostic criteria for ADHD. A false negative, however, means missing an adult with ADHD and not providing them with the correct diagnosis and subsequent treatment they need. Therefore, I chose a lower cut score of 13, which only misclassified 12.20% of the ADHD sample. Meaning, the five ADHD group participants with the lowest PAI-ADHD scores in our sample would be classified as "ruled-out" and not asked by their clinician to complete further testing for ADHD.

I chose an upper cut score of 22 (ADHD group $M = 21.98$, $SD = 7.28$). This score misclassified the top 11% of the LD and Comparison combined sample. This means that 11% of the participants without ADHD would be classified as "probable ADHD" and asked to do further testing for ADHD when not warranted.

Two cut scores create three screening groups: ruled-out, at-risk, and probable ADHD. The three groups represent three levels of possible impairment from ADHD. The "ruled-out" group are cases that earned a score ≥ 13 on the PAI-ADHD, are less likely to need further ADHD testing, and likely do not have ADHD symptomatology that would interfere with their daily functioning. The "probable ADHD" group are cases that earned a score ≤ 22, are more likely to need further testing for ADHD diagnosis, and likely have clinically significant levels of ADHD symptomatology that could possibly impair their functioning on a daily basis. Cases that earned a score ≤ 14 and ≥ 21 are defined as the "at-risk" group. Individuals in the "at-risk" group can be likened to individuals who earn a T-score ≤ 60 and ≥ 69 on the PAI. Their score is short of clinical significance and yet, they may experience some concerns that effect their functioning.

Clinical Implications

This study adds to the current body of literature on the assessment and diagnosis of

ADHD in adulthood. While, like any self-report measure, the PAI-ADHD should not be used independently to diagnose ADHD in adulthood, the subscale can be used as a valuable screening tool for clinicians and researchers.

Moreover, this study supports the creation of more supplemental scales for the PAI. The PAI is a reasonably inexpensive personality measure that can be easily administered to people of varying demographics (Morey, 1991; Pitrowski, 2000). Creating supplemental subscales for existing personality measures could allow more people to get the mental health support they need. For example, people who have been historically underserved and underrepresented in psychological assessment may be better served if a wider range of possible psychiatric disorders could be more easily screened. If the psychological assessment community's existing assessments can give clinicians more value for their clients' time and money, a small part of assessment inequities could be addressed. At the minimum, time and money could be saved, because clinicians could more wisely choose assessments for a full psychological battery.

It is currently not standard practice to screen adult clients for ADHD, especially if they do not mention childhood struggles (Weiss & Murray, 2003). Given the prevalence of undiagnosed and suspected ADHD in adulthood (Weiss & Murray, 2003), however, a supplemental screener in a commonly utilized personality measure could be extremely useful and decrease the likelihood of misattributing ADHD symptoms to another diagnosis. Moreover, the two cut scores I suggest for the PAI-ADHD, providing three levels of ADHD likelihood and clinical strength—ruled-out, at-risk, and probable ADHD—will allow clinicians to easily gauge whether or not their client is a good candidate for further ADHD testing.

I suggest that clinicians provide their assessment clients with a standard administration of the PAI and examine their client's PAI-ADHD score. If their client's score falls within the

"ruled-out" group, I would not suggest further testing for ADHD. If their client's score falls within the "at-risk" group, I would suggest the clinician proceed with caution. First, the clinician could inspect the individual items of the PAI-ADHD to determine which items elevated the overall score. Second, a clinician could determine if the original PAI scale could be a better diagnostic fit for their client. Third, a clinician could consider factors such as client medical problems, sleep disturbances, generalized anxiety, or other difficulties that could contribute to inattention and memory problems and a positive endorsement of PAI-ADHD items. Fourth, they could verbally ask their client about adult ADHD symptomatology they experience without providing another ADHD assessment. Fifth, a clinician could involve their client in the assessment process and discuss options for further assessment of ADHD symptomatology to determine if more testing is warranted. Finally, if a client's score falls within the "probable ADHD" group, I would suggest further ADHD assessment to confirm a possible ADHD diagnosis in adulthood.

Future Research Directions

The initial and successful validation of the PAI-ADHD provides reason to utilize mental health experts in the creation of future supplemental scales. Studies that utilize statistical analyses alone may find coincidental correlations or factors which are too often poorly replicable and statistically susceptible to idiosyncrasies of the sample used (Smith, 2018). By utilizing experts to evaluate items, the PAI-ADHD was based in the theoretical and clinical understanding of ADHD from the beginning. Only after a firm theoretical and clinical foundation was established, did I statistically evaluate the items that should be included in the scale. These efforts create a balance between the rational and empirical (Dörendahl & Greiff, 2020). The PAI was constructed similarly. Morey (1991) placed emphasis on selecting items that not only

discriminated between members and nonmembers of a diagnostic group, but also ensured that the full diagnostic spectrum of the disorder was captured in the scale. Only after items were considered for bias by a review panel made up of professionals and citizens, and evaluated by experts in the field of psychological assessment, were items included for empirical evaluation (Morey, 1991).

I hope that our efforts to create an item-level subtest for an existing assessment encourages others to utilize this methodology again and for other disorders. Specifically, I believe that if properly validated, the PAI-ADHD could be utilized for the PAI-Adolescent. Additionally, I encourage others to replicate our study on other ADHD data sets.

The current study adds to the small body of literature on PAI scale and subscale elevations due to ADHD symptomatology. My findings are in line with previous studies that found that ADHD adults may have elevations on Depression, Mania, Schizophrenia, or Borderline Features scales stemming from their ADHD symptoms (DeLong, 2008; Pancner, 2006; Stewart & Liljequist, 2015, Walker, 2014; Watson & Liljequist, 2015). More research on the effect of how having ADHD can artificially elevate these scales is needed. It could be that after ADHD symptoms are controlled, once clinically significant PAI scales could become non-significant. Indeed, the 11 individuals who were not diagnosed with ADHD and earned scores $\leq$ 22 on the PAI-ADHD were diagnosed with Generalized Anxiety Disorder (27.30%), Post-Traumatic Stress Disorder (9.10%), Major Depressive Disorder (27.3%), and Dysthymia (18.20%).

Limitations

There are a number of limitations to the current study. First, like other studies that attempted to create supplemental indices for the PAI, the items used to calculate the PAI-ADHD

are already utilized for other scales of the PAI. A noted strength of the PAI is that it does not have any overlapping items. This lack of overlap lends itself to the PAI Scales content validity (Morey, 1991). Items chosen for the PAI-ADHD may better measure the PAI scale the item originated from than ADHD.

Additionally, the cut scores I chose for the PAI-ADHD are only based on the current sample. The diagnostic efficacy of a cut score is highly dependent on the sample utilized to create the cut score (Meehl & Rosen, 1955). Therefore, clinicians must carefully consider if the identity variables of their assessment client match the original sample well enough to utilize the cut scores suggested. If the clinician's assessment client is not well represented in the original sample, the scale will more likely produce either a Type I or Type II error.

To the previous point, the current sample lacked diversity and some demographic variables differed across groups. Our sample was mostly comprised of individuals who identified as female, white, and straight. Males were underrepresented compared to the general population of the U.S (U.S. Census, 2019). The underrepresentation of men in our sample warrants particular concern because ADHD is diagnosed in males twice as much as it is in females (APA, 2013)**.** Ethnic/racial minorities and sexual minorities, however, were similarly represented in our sample to the general US population (U.S. Census, 2019). In addition, demographic data was missing from The Clinic files. Thus, the generalizability of the PAI-ADHD should be utilized with caution.

Moreover, participants in the ADHD group were significantly older than those in the Comparison group. For many adults with ADHD, symptomatology becomes less pronounced with age (Asherson, et al., 2012). It stands to reason that the differences found between groups

on their PAI-ADHD scores could have been larger if the ADHD clinical sample was as young as the Comparison sample.

My data may have also been distorted because our Comparison group came from a college sample, and the other two groups came from a community mental health/training clinic. Individuals who are accepted into a 4-year university often have better coping skills for ADHD-like symptoms than adults who chose not to go to a university or were not accepted (Fuermaier et al., 2012; Heiligenstein et al., 1999; Wilmhurst, Peele & Wilmhurst, 2011). It is possible, therefore, that my Comparison group could be higher functioning than a more demographically-matched community sample without ADHD or an LD would have been. Although this question could not be directly tested with the data available in the current study, in the exploratory analyses, I was able to find that the groups did not differ on the PAI-STR scale. The Stress scale is a broad measure of overall life stressors that can contribute to an individual's difficulties. The items in the scale are broad and designed to evaluate a range of possible challenging circumstances (Morey, 1991).

Additionally, people who come to a clinic for an ADHD or LD assessment are often seeking the diagnosis for renewal or attainment of academic accommodations. Those individuals may be more motivated to freely and highly endorse items that are related to ADHD or an LD as compared to those not seeking accommodations. It stands to reason that individuals seeking an assessment may also take more time and care in answering the questions given on a self-report measure. I tested this assumption by comparing the means of the PAI-NIM and PIM-PIM scores across groups. PAI-NIM scores did not differ. However, the PAI-PIM scores of the ADHD group were significantly lower than the scores of the LD and Comparison groups. The average PAI-PIM T-score for the ADHD group was 40.15, *SD* = 11.85. Low sores on the PAI-PIM (i.e.,

< 44), indicate a response style that is more candid and without restraint (Morey, 1991). Lower PAI-PIM scores do not equate to high PAI-NIM scores. Meaning, this finding does not suggest that the ADHD group gave exaggerated responses of their difficulties. Instead, it could mean that individuals with ADHD are more likely to honestly admit their personal faults

The initial Comparison sample from SONA data had a high number of invalid respondents. This could be because extra credit was offered in classes to individuals who completed my study, regardless of how long they took to complete it. Students may not have been properly incentivized to invest the time necessary to accurately respond to the survey.

Another limitation of the current study was the assessment and classification process of the Comparison group. Determining that those participants did not have ADHD or an LD was solely based on their self-report on the CAARS-Self and WURS. No external corroborative data was received. A more rigorous assessment process that paralleled the comprehensive assessment every participant in the ADHD and LD groups received would have been ideal.

Conclusion

The current study extended the literature on creating supplemental scales for the PAI. Through the use of rationally chosen "ADHD" items by experts in adult ADHD, I was able to create a new subscale that effectively discriminates between adults with ADHD and: 1) adults with Learning Disorders, and 2) adults without ADHD within a standard administration of the PAI. Our findings suggest that the PAI-ADHD has good internal consistency, convergent validity, and concurrent validity. I encourage clinicians to use the PAI-ADHD, with some caution, as a screening measure for adult ADHD when they are including the PAI in their assessment battery. With further research and testing on larger norm groups, the PAI-ADHD could be used even more universally.

APPENDIX A

EXTENDED LITERATURE REVIEW

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a complex psychiatric disorder that is often first diagnosed in childhood (American Psychiatric Association, 2013) and can be associated with poorer outcomes if not treated (Barkley, Murphy & Kwasnik, 1996; Capelatto, de Lima, Ciasca & Salgado-Azoni, 2014; Frazier, Youngstrom & Glutting, 2007). Diagnostic criteria for ADHD includes: inattentive, hyperactive and impulsive behaviors that significantly impair functioning at school, work, social settings and at home (American Psychiatric Association, 2013). George Still first described a combination of challenging childhood behaviors and symptoms that have come to be referred to as ADHD (Attention, 2017; Still, 1909). The first DSM marked this same class of symptomatology as, "minimal brain dysfunction" (American Psychiatric Association, 1952). DSM-II changed the label to "hyperkinetic reaction to childhood" (American Psychiatric Association, 1968). The third edition of the DSM finally defined, "Attention Deficit Disorder" (American Psychiatric Association, 1980).

Since 1994, American mental health professionals have recognized three subtypes of ADHD: Attention-deficit/hyperactivity disorder, predominantly inattentive type (ADHD-I), Attention-deficit/hyperactivity disorder, predominantly hyperactive-impulsive type (ADHD-HI) and Attention-deficit/hyperactivity disorder, combined type (ADHD-C) (APA, 1994). Individuals can be diagnosed with ADHD for the first time in adulthood; however, to receive a diagnosis, symptomatology must be present before the age of 12 (APA, 2013). In previous additions of the DSM, onset of ADHD symptomatology had to be present before the age of 7 (APA, 2000). This shift in diagnostic qualification between the DSM-IV-TR and DSM-5 was made to accommodate adults who could not accurately remember their inattentive or hyperactive

symptoms before the age of 7. The partial intention for this accommodation was to increase the likelihood of correctly diagnosing ADHD for the first time in adulthood (APA, 2013; Kessler et al., 2005).

Inattention symptoms include, "[making] careless mistakes," failing to "follow through on instructions," "[having] difficulty organizing tasks and activities," and becoming "easily distracted by extraneous stimuli" (APA, 2013). Hyperactive and impulsive symptoms include, fidgeting, running or climbing at inappropriate times, excessive talking, and difficulty waiting (APA, 2013). Children with ADHD are more likely to experience mild developmental delays, have low frustration tolerance and struggle to stabilize their moods. These symptoms often lead children with ADHD to experience more familial conflict and have more negative peer and familial interactions (APA, 2013).

Prevalence of ADHD Diagnoses in Children

Since the late 1990's, children between the ages of 5 and 18 have been diagnosed with ADHD at increasing rates. Upward trends in the diagnosis of ADHD in children between the ages of 5 and 18 have been documented from as early as 1987 to as late as 2011 (Lane, 2015; Olfson, Gameroff, Marcus & Jensen, 2003; Robison, Sclar & Skaer, 2005; Schwarz & Cohen, 2013; Visser et al., 2014). According to the DSM-IV-TR, prevalence rates of ADHD range from 9.6% to 19.7% (Sibley et al., 2012). However, when rigorous assessment processes precede diagnosis, ADHD prevalence is only 5.29%. A 2007 metaregression utilized well over 9,000 records, almost 200 research studies, and 171,756 subjects, to come to this statistic (Polanczyk, Silva de Lima, Horta, Biderman & Rohde, 2007). Moreover, Visser et al. determined that over 11% of children/adolescents aged 4 to 17 years have received an ADHD diagnosis in their lifetime (Visser et al., 2014). Additionally, the popularity of ADHD medication seems to have

also steadily increased from 2007 to 2011 among the same population. This upward trend in diagnosis in the U.S. has led researchers, clinicians, and even the general public to be concerned about overdiagnosis and overmedication of children (Olfson, Gameroff, Marcus & Jensen, 2003; Reuters, 2015).

Despite upwards trends in overall diagnosis, boys are consistently diagnosed three times more often than girls (Singh, 2008; Staller & Faraone, 2006; Poissant, Emond & Joyal, 2008.) Reasons for this finding is still debated. Some contend that boys are more genetically inclined to having the disorder. Others maintain that boys are more likely to be diagnosed because of stereotypical norms, i.e. aggression, high energy levels, and externalization, that are unreasonably placed on them (Staller & Faraone, 2006).

ADHD Diagnosis in Adulthood

Debate about whether or not ADHD could continue into adult years began in the 1970's (Barkley, 1996; DuPaul, Guevermont & Barkley, 1991; Shelley & Reister, 1972; Weil, 1970). ADHD was originally thought to be a childhood disorder that affected individuals would "outgrow" (Adler & Cohen, 2004). However, modern researchers assert that children with ADHD can experience symptomatology well into adulthood (Barkley, Fischer, Smallish & Fletcher, 2002; Guzelow, Loya & Hinshaw, 2017; Sibley et al., 2016). In fact, between 41 and 77% of children diagnosed with ADHD experience clinical levels of impairment as adults (Faraone, Biederman &Mick, 2006; Sibley et al., 2016; Uchida, Spencer, Faraone & Biederman, 2018).

In the adult population, inattentive symptoms are clearly more common than hyperactive symptoms. In 2010, Kessler et al. examined the stability of ADHD from childhood through adulthood, per a physician-administered ADHD scale given to patients. Their findings indicated

that 94.9% of the participants experienced inattentive symptoms into adulthood. By contrast, only 34.6% of the participants still reported hyperactive symptoms as an adult (Kessler et al., 2010). It is important to consider, however, that many adults with ADHD struggle with a symptom that is likely a manifestation of hyperactivity. Specifically, the fidgeting and excess energy of their youth is often described as internalized restlessness as adults (Kessler et al., 2006; Weyandt et al., 2003).

In 2003, Weyandt et al. assessed the efficacy of internal restlessness as a clinical indicator to diagnose ADHD in adults. After a rigorous assessment process, 20 college students with ADHD and 20 college students without ADHD or another mental health disorder were identified as participants. Participants completed the Internal Restless Scale (IRS) (Weyandt et al., 2003). The IRS utilizes a 7-point Likert scale to measure subjective feelings of restlessness. Items include, "I dislike sitting still" and (reversed-scored) "I feel mentally calm" (Iwaszuk et al., 1997). Researchers concluded that college students with ADHD endorsed these types of items significantly more than their non-ADHD peers (Weyandt et al., 2003). Hallowell and Ratey (1994) described similar findings in their book, "Driven to Distraction.". They explain the transition from externalized restlessness to internalized restlessness as the logical outcome of a child with ADHD learning to cope with hyperactivity over time.

An adult with ADHD may continue to exhibit the archetypal triad of symptoms: a) inattention or distractibility, b) impulsivity, and c) hyperactivity or restlessness. Yet, the presentation of these symptoms would have likely changed as the individual learned coping skills or ways to hide their disability (Hallowell & Ratey, 1994). Resnick postulates that the change in symptomatology could be because of the increased demand on independence, restraint, and accountability in adulthood. The tendency for individuals to cognitively mature and improve

impulse control is another likely reason for the noted shift in clinical presentation (Resnick, 2005).

The psychological community is still quite divided as to the best practices for assessment and clear presentation of adults with ADHD (Barkley, 2006). This could be because the field lacks a "gold standard" for assessment of ADHD, regardless of age or developmental level. Another reason is a lack of evidence-based methods for recognizing ADHD in adulthood (Sibley et al., 2012).

Difficulty in Diagnosing ADHD

Psychiatrists and general practitioners alike admit that they have difficulty in assessing ADHD in adults because it is complicated, has easy to miss key symptoms, and has much symptom overlap with other common diagnoses (Montano, 2004). Therefore, it is challenging to find accurate prevalence rates of ADHD in the adult population. In a 2012 study, researchers found that young adults without ADHD were likely to over report their ADHD-like symptoms (Sibley, et al. 2016). In the same study, Sibley et al. also found that young adults with ADHD under reported their symptoms on self-report measures. This finding highlights the need for informant reports (e.g., romantic partners, roommates, parents), in combination with structured interviews (e.g. SCID, DIVA), self-report measures, and other standardized assessment tools (e.g. T.O.V.A.), for accurate diagnosis of ADHD (Sibley, et al., 2012).

ADHD adults do not seem to report their own impairments accurately. In a 2012 study, researchers completed full-battery assessments on college students placed in three diagnostic groups: individuals who reported a childhood diagnosis of ADHD, individuals who reported a learning disability (LD) without an ADHD diagnosis, and a comparison group who reported neither an ADHD nor an LD diagnosis. Data received from self-reports indicated that ADHD

adults' understanding of their own impairments is significantly less accurate than a clinical evaluation (Manor, Vurembrandt, Rozen, Gevah, Weizman & Zalsman, 2012).

Diagnoses based on self-report measures alone are likely to have poor validity (Loney, Ledolter, Kramer & Volpe, 2007). Using DSM-II diagnostic criteria and several self-report measures for ADHD, researchers assessed 295 boys seeking outpatient services for behavior and learning disorders. In this longitudinal study, Loney, Ledolter, Kramer and Volpe (2007) compared the participants' behavioral and symptomatology ratings from their peers, siblings who did not have ADHD or a learning disorder, and the participants themselves. Participants were evaluated at three different time periods: 8 to 10 years (Time 1), 13 to 15 years (Time 2), and 18 to 20 years (Time 3). At Times 2 and 3, participants were asked to evaluate their behavior and symptomatology for the previous time period. Male participants with ADHD had an overwhelming tendency to report that their behavior and symptomatology had improved over the years and that they became more similar to their peers. However, little agreement was found between the informants and participants. Siblings and peers consistently rated the participants' behavior to be more, "impulsive, fidgety, aggressive and … inattentive" than participants rated themselves to be (Loney, Ledolter, Kramer & Volpe).

One of the most complicated reasons ADHD is a challenging diagnosis to give to an adult is the high number of psychiatric and medical disorders that include attention and concentration problems including, major depression, generalized anxiety disorder, and post-traumatic stress disorder (Milberger, Biederman, Faraone, Murphy, & Tsuang, 1995). Medical conditions that affect an individual's sleep or cognitions, such as sleep apnea, hyperthyroidism, chronic headaches or seizure disorders, can also look like ADHD symptoms (Ball, Wooten & Crowell,

1999; Lavenstern, 1995). Differential diagnosis is, therefore, essential for an accurate assessment of ADHD in adulthood.

Complicating ADHD diagnosis further is how easily accessible a list of ADHD symptomatology is on the internet. So much so, that individuals can learn how to feign ADHD through a Google search (Jachimowicz & Geiselman, 2004). There may also be an incentive to do so because accommodations are available for students who are diagnosed with ADHD (Harrison, 2006). These supports, and a growing awareness of disabilities in the United States, has led to an increase in the request for evaluation and treatment of learning disorders and ADHD (Jachimowicz & Geiselman, 2004).

Although taking prescribed stimulant medication, in the rare case, can increase the risk of cardiovascular complications, the benefits of prescribing ADHD medication to those in need clearly outweighs the potential danger (Aagaard and Hansen, 201; Dalsgaard et al., 2014). Still, there are some that engage in stimulant use illegally; estimates of illegal amphetamine usage among college students range from 6.9% to 35.5% (Lakhan & Kirchgesser, 2012; Low & Gendaszek, 2002; McCabe et al., 2005). Among those prescribed stimulant medication, estimates of misuse range from 7.5% to 43% (Advokat, Guidry & Martino, 2010; McCabe, Teter, & Boyd, 2006).

DeSantis and Hane explain in their qualitative study that college students seem to justify their usage in three ways (2010). First, college students report that their usage of psychostimulant medication is not as bad as taking "party drugs" such as narcotics or methamphetamines. In other words, students compare their usage to the possibility of engaging in worse or more dangerous activity. Second, college students report that they only use the stimulants in moderation or when they feel they really need the medication to succeed. Third, college students claim that they are

self-medicating and skipping the step of going to a psychiatrist. The students explain that they likely have ADHD and believe that they are able to treat themselves by taking the medication they know they need illegally (DeSantis & Hane, 2010).

The majority of the literature on stimulant misuse is on the college population (Benson, Flory, Humphreys & Lee, 2015; Weyandt et al., 2016). Recent research, however, has looked outside of the college population. For example, Pederson, Sandberg, and Copes (2015) interviewed 55 illegal stimulant users in Norway. From their qualitative analysis, the researchers determined that illegal stimulant usage is not seen as counter to culture as other highly addictive and illegal substances are. Men who have exceptionally strenuous jobs that require long hours, and mothers who work more than one job seem to be more likely to be drawn to stimulant medication for performance enhancement (Pederson, Sandberg & Copes, 2015). CBS, The Atlantic, and Netflix have recently conducted investigative reports on the illegal usage of stimulants among the general population. These media asserted that the usage of stimulant medication is largely driven by society's increased pressure to perform, work hard, and strive for higher levels of success. It seems from these reports that employers may have even been known to support their employees in feigning ADHD to get a prescription or suggesting that their employees find another way to obtain the medication (Cetta & Bourg, 2010; Klayman, 2018; Petrow, 2016).

When diagnosis is simply based on symptom checklists and ADHD rating scales alone, ADHD can be easily feigned. Extremely high scale scores are easily obtained and often observed when individuals are attempting to receive an ADHD diagnosis and simply given a ADHD checklists (Harrison, Edwards and Parker, 2007). Among participants who were incentivized to feign ADHD, ADHD diagnoses were more accurately given when the Conner's Continuous

Performance Task (C-CPT-II) was included in the assessment than when self-report measures were used alone (Sollman, Ranseen & Berry, 2010). The literature clearly supports the use of continuous performance tests (CPTs) for ADHD diagnosis because they are less susceptible to bias or faked symptomatology. Yet, some question the validity and reliability of CPTs for ADHD diagnosis (Abikoff, Courtney, Pelham & Koplewicz, 1993; Christensen, Margolin & Sullaway, 1992; See, Howe, Warm & Dember, 1995).

The aim of CPTs is to assess for executive functioning, inhibitory abilities, and attention skills. There is evidence, however, to suggest that this is not the case (Demurie, Roeyers, Wiersema & Songua-Barke, 2016). In 2004, Nichols and Waschbusch completed a literature review of studies that utilized cognitive tasks to diagnose ADHD (Nichols & Waschbusch, 2004). In their review, the authors analyzed the convergent validity, discriminant validity, and predictive validity of popular CPTs. They asserted that, despite the high levels of acceptance and use, CPT task validity is extremely mixed for eventual diagnosis of ADHD. Across the literature reviewed, the authors concluded that CPTs could only successfully and consistently discriminate between ADHD and typical control groups. CPTs could not successfully discriminate between ADHD groups and comparison groups with other mental health diagnoses such as depression and anxiety (Nichols & Waschbusch, 2004). Moreover, discriminant validity between ADHD and non-ADHD groups was even worse when ADHD groups were allowed to have taken their stimulant medication before testing (Nichols & Waschbusch, 2004). Poor validity could also be due to most CPT's being boring, not challenging enough to require much cognitive processing, and too long (Lufi & Pan, 2015).

Finally, a retrospective account of symptomatology is necessary when assessing the adult population for ADHD. Retrospective accounts of behavior are necessary for ADHD diagnosis

because ADHD symptomatology must be present before the age of twelve (American Psychiatric Association, 2013). Unfortunately, when individuals are asked to give retrospective reports about themselves as children, accounts tend to be vague and have poor predictive power for current impairment (Suhr, Zimak, Buelow & Fox, 2009). Even the minimum age at which onset of ADHD symptoms occur seems arbitrary. For decades, the DSM criteria for onset of symptoms and impairments was before the age of 7. Only the most recent DSM changed this criterion to be for age 12. This change was instituted because many individuals with ADHD only experience significant impairment once expectations for self-management increase (Epstein & Loren, 2013). For children in families who have parents with ADHD, their impairment may seem normal. For children who grow up in a highly structured environment, have high intelligence, or have predominantly inattentive symptoms, their impairments may go unnoticed by their families and teachers. The change of onset was an attempt to reduce these diagnostic issues (American Psychiatric Association, 2013; Epstein & Loren, 2013).

ADHD Comorbidities

ADHD has a high association with a number of psychiatric conditions and social problems. Adults with ADHD are more likely to be diagnosed with an internalizing disorder and have low self-esteem (Blasé, Gilbert, Anastopoulos, Costello, Hoyle & Swartzwelder, 2008). Major depressive disorder is the most commonly diagnosed comorbid psychiatric disorder with ADHD; anxiety is the second most common (Fischer et al., 2007). Regardless of the ADHD subtype an adult has, internalizing disorders are equally likely (Nelson & Gregg, 2012). According to the National Comorbidity Survey Replication (NCS-R), an epidemiological survey that evaluation American adults with ADHD for comorbid disorders, 38.3% of adults with ADHD also have a mood disorder (Adler et al., 2008; Kessler et al., 2006). Among adults with

ADHD, up to 87% will be diagnosed with another psychiatric disorder in their lifetime. Of those ADHD adults, about 30% of them will be diagnosed with two or more comorbid disorders (Adler et al., 2008; Biederman et al., 1993; Fischer et al, 2007).

Overall, adults with ADHD experience greater levels of difficulty with emotional regulation, emotional lability, and emotional impulsivity (American Psychiatric Association, 2013; Mitchell, Robertson, Anastopolous, Nelson-Gray & Kollins, 2012; Skirrow & Asherson, 2013). Yet, in a 2014 study, Jacob et al., were able to find sex differences among the adult ADHD population. The researchers collected data on 452 females and 458 males with ADHD who were given the Structured Clinical Interview for DSM-IV, the NEO, and the Tridimensional Personality Questionnaire (Jacob et al., 2014). Females demonstrated higher levels of neuroticism, harm avoidance, and reward dependence, as well as borderline, histrionic, and dependent personality features than men (Jacob et al., 2014). This is consistent with the findings of Quinn and Waite who respectively found that women with ADHD are more likely to be diagnosed with internalizing disorders such as depression and anxiety (Quinn, 2005; Waite, 2007). Jacob et al. also noted that men with ADHD are more likely to exhibit antisocial, narcissistic, and paranoid traits than women (Jacob et al., 2014). Similarly, men with ADHD are also more likely to develop oppositional defiant disorder and be diagnosed with other externalizing disorders (Quinn, 2005; Waite, 2007). Similar sex differences can be found in the general population (Hartung & Widiger, 1998; Roades, 2000).

The genetic and environmental shared risk factors between ADHD, ODD, and CD have been widely observed and documented (Dick et al., 2005; Martin, Levy, Pieka, & Hay, 2006; Nadder, Rutter, Silberg, Maes, & Eaves, 2002; Silberg et al., 1996). Comorbidity rates for ADHD and ODD reach 60% in childhood (APA, 2013; Biederman, 2005; Maughan, Rowe,

Messer, Goodman, & Meltzer, 2004) and up to 27% for CD (APA, 2013; Biderman et al., 2002; Larson, 2011). Yet, the developmental pathway from a childhood ADHD diagnosis to adult delinquency remains vague. Researchers have identified many possible pathways including but not limited to: modeling of violent behavior in the household, low parental intelligence, poor parent-child connection, poor academic achievement, difficulty reading, and school truancy (Deault, 2009; Hinshaw, Carte, Sami, Treuting, & Zupan, 2002; Retz & Rösler, 2009; Vaughn et al., 2011).

Researchers and clinicians alike have noted the profound social difficulties that plague children with both ADHD and ODD (Polier, Vloet, & Herpertz-Dahlmann, 2012). Children with comorbid diagnoses experience more problems with parents, teachers, and peers, than children with only of the disorders (Bagwell, Molina, Pelham, & Hoza, 2001; Faraone, Biederman, & Monteaux, 2000; Gresham et al., 2001). A longitudinal study by Murray-Close and colleagues focusing on children with ADHD determined that children who have ADHD and poor social skills often experience peer rejection. And, over time, peer rejection in early childhood can lead to positive illusory biases about their social abilities, aggressive behaviors and antisocial tendencies later in life (2010).

Moreover, emotion regulation deficits were confirmed in a 2015 study on 627 college students from a Southeastern university. Participants who reported less ability to emotionally regulate were also more likely to experience suicidal ideation. In addition, college students with ADHD who experience depressive symptomatology and decreased ability to set goals are at a greater risk of suicidal ideation (Van Eck, Ballard, Hart, Newcomer, Musci & Flory, 2015). In a 2005 study, researchers administered the Rosenberg Self-Esteem Scale to 21 college students diagnosed with ADHD, and 20 college students without an ADHD diagnosis. When groups were

compared, students with ADHD reported lower levels of self-esteem and upon further analysis, researchers determined that self-esteem partially mediated the relationship between ADHD and difficulty adjusting to college (Shaw-Zirt, Popali-Lehane, Chaplin & Bergman, 2005).

For adults with ADHD, they may choose to describe their internal experience as feeling highly distractible, having cognitive agitation, racing thoughts, or an inability to relax (Milberger, Biederman, Faraone, Murphy, Tsuang & Ming, 1995; Searight, Burke & Rottnek, 2000). Moreover, one of the most common internalizing symptoms adults with ADHD is anxiety (Barkley, 2004). In fact, rates of generalized anxiety disorder in the adult ADHD population can reach 53% (Moss et al., 2007). Moreover, college students with ADHD have more anxiety than their non-ADHD peers experiencing worries about life in general ($p < .00$, Cohen's $d = 1.14$) and panic attacks ($p < .00$, Cohen's $d = .61$) (Prevatt, Dehili, Taylor & Marshall, 2015). In this 2015 study, researchers surveyed 473 college students, 204 of whom were diagnosed with ADHD. They determined that individuals with inattentive and hyperactive/impulsive symptomatology were equally predictive of anxiety ($p > .05$). Furthermore, the college population with anxiety and ADHD are marked by concerns about grades/academics in general ($p < .00$, Cohen's $d = 1.14$), and studying/taking tests ($p < .00$, Cohen's $d = .68$) (Prevatt, Dehili, Taylor & Marshall, 2015).

Substance abuse, along with poor affect regulation, are other common conditions for adults with ADHD (Biederman, 2004). Impulsivity is a likely risk factor for addictive behavior (Murphy & Barkley, 1996). Estimates indicate that up to 15% of the adult ADHD population will develop a substance use disorder (Adler et al., 2008; Kessler et al., 2006). Difficulties with drugs and alcohol are also likely to exacerbate the tendency for adults with ADHD to engage in risky behaviors (Murphy & Barkley, 1996). In a 2012 study, participants with ADHD were

evaluated by researchers to determine their risky sexual behaviors. Female college students with ADHD were more likely to participate in unprotected sex than their male and female peers without ADHD and their male peers with ADHD (Huggins, Rooney & Chronis-Tuscano, 2012). According to this same study on 92 undergraduate students, males with ADHD were also more likely to have more unfamiliar sexual partners than their non-ADHD counterparts (Huggins, Rooney & Chronis-Tuscano, 2012).

Furthermore, core symptoms of ADHD, such as inattention and impulsivity, can lead to more conflict in interpersonal relationships. Men who have more severe ADHD symptoms are also more likely to use aggressive tactics, such as shoving or throwing objects at their partner (Theriault & Holmberg, 2001). Verbal impulsivity (i.e., vocal outbursts, talking over someone else and not waiting for the other person to finish speaking before responding) was another predictor of negative relationship outcomes for individuals with ADHD (Theriault & Holmberg).

Personality Assessment Inventory (PAI)

The Personality Assessment Inventory is a self-report measure designed to assess clinical syndromes, personality traits, and psychopathological symptoms (Morey, 1991). The PAI is comprised of 344 4-point Likert-scale items (ranging from 0-false to 3-very true) that are then divided into 22 subscales of four types: validity scales, clinical scales, treatment consideration scales, and interpersonal scales. Four factors of general psychological distress within the PAI are: narcissism, exploitation of others, impulsivity, and social functioning (Deisinger, 1995; Morey, 1991).

Since the PAI's inception, several researchers have attempted to create supplemental indicators (McCredie & Morey, 2018). Some new indicators were so effective and useful that they were added to the second edition of the *Personality Assessment Inventory Professional*

Manual (Morey, 2007). The majority of the supplemental indicators created have focused on response distortion. Accurate measurement of response distortion, or the tendency for participants or clients responding to the PAI to present themselves more or less favorably than they truly are, is essential for evaluating the validity of existing scales and subscales (McCredie & Morey, 2018).

In 2018, McCredie and Morey identified six response distortion indices that did not yet have normative information nor cross validation and attempted to provide such data using archival PAI datasets. Three indices of response distortion detected feigning in the negative direction: Negative Distortion Scale (NDS), Multiscale Feigning Index (MFI), and Hong Malingering Index (Hong & Kim, 2001; Gaines, Giles & Morgan, 2012; Mogge, LePage, Bell & Ragatz, 2010). Two indices measured positive response distortion: Positive Distortion Scale (PDS), and Hong Defensiveness Index (Hong & Kim, 2001; Mogge & LePage, 2017). The sixth response distortion index, Hong Randomness Index, measured random or lackadaisical responding (Hong & Kim, 2001).

Additional supplemental indicators of the PAI have also been created for diagnostic and treatment-related considerations (McCredie & Morey, 2018; Morey, 2007). The Inattention Index (INATTN) identifies ADHD symptomatology (Watson & Liljequist, 2015). The Neuro-item Sum is used to detect neurological differences (Keiski, 2007). Sinclair et al. created the Level of Care Index (LOCI) to differentiate patients who need either inpatient our outpatient treatment (Sinclair et al., 2013). The Chronic Suicide Risk Indicator (S_Chron) was created to differentiate clients who have attempted suicide on multiple occasions and those who have not attempted or only attempted once (Sinclair et al., 2016). Antonius et al., created two scales that assessed the risk of danger an informant is to others, The Reactive Aggression Scale and

Instrumental Aggression Scale (Antonius et al., 2013). Finally, the Violence and Aggression Risk Index (VARI), identifies those who have a history of violence (Roche, Sinclair, Denckla, Chung, Stein & Blais, 2017).

Community normative, clinical, malingering, and positive impression samples were utilized to identify T-scores necessary for clinical cut-off of all 12 indices identified by McCredie and Morey. Receiver operating characteristics (ROC) were utilized to determine the overall diagnostic accuracy of each index by calculating the area under the ROC curve. (McCredie & Morey, 2018). The researchers concluded that supportive indices can significantly discriminate between groups beyond existing PAI scales, and prove useful. The researchers were also sure to note, however, that the validity of clinical cut-off T-scores is dependent on the appropriateness of the new scale for the sample of informants. Moreover, the supplemental scale overlap with existing PAI scales and subscales, that are more thoroughly evaluated and have no overlap, limits the construct validity of each new scale (McCredie & Morey, 2018).

PAI and ADHD

Many PAI items reflect some of the characteristics of individuals with ADHD, including: restlessness, irritability, impulsivity, risk taking, alcohol usage, and illegal activities. When these characteristics are endorsed, existing PAI scale scores can become elevated (Morey, 1991). However, the PAI does not have an existing scale or subscale that specifically assesses ADHD symptomatology.

The research on the connection between the PAI and ADHD is limited. Yet, as previously identified in various dissertations and theses, and one peer-reviewed article, some scales are more likely to be elevated for individuals with ADHD (Calmenson, 2017; DeLong, 2008; Douget, 2000; Pancner, 2006; Walker, 2013; Watson & Liljequist, 2015).

PAI and ADHD Assessment

A 2008 unpublished dissertation by DeLong included a comparison of PAI elevations across ADHD subtypes. The author utilized archival data from a university counseling center to create four groups: ADHD – Inattentive type (ADHD-I), ADHD – Combined type (ADHD-C), ADHD – Not otherwise specified (ADHD-NOS), and a clinical control group (DeLong, 2008). Group members' diagnosis was purely based on the diagnosis given in the file. When all ADHD groups were combined, the ADHD and control group significantly differed across scales. Significant differences between ADHD subtypes were also found (DeLong, 2008). Despite the initial four groups created for the study, only the ADHD-I and ADHD-C groups were included in subsequent analyses. A significant MANOVA indicated that the two groups were significantly different. Large differences were observed on the Mania, Antisocial features, and Aggression PAI scales. Moderate differences were observed on the Anxiety, Depression, Paranoia, Borderline Features, and Suicide PAI scales. The discriminate prediction equation created from the observed elevated scales correctly determined group membership 61.5% of the time (DeLong, 2008).

Walker completed an unpublished exploratory dissertation in 2013. The author hypothesized that ADHD and non-ADHD groups would significantly differ on several scales of the PAI (Walker, 2013). A one-tailed ANOVA yielded significant mean differences on the Mania (MAN), Drugs (DRG), and Warmth (WRM) scales, and Depression – Cognitive (DEP-C), Mania – Activity Level (MAN-A), Mania – Irritability (MAN-I), Schizophrenia – Thought Disorder (SCZ-T), and Borderline – Self-Harm (BOR-S) subscales. Walker utilized archival data from a university counseling center and ADHD diagnosis was based on a short assessment battery that included the T.O.V.A., self-report measures, and a clinical interview (Walker, 2013).

In a 2006 unpublished dissertation, data was collected from an outpatient clinic that performed full-battery assessments as part of treatment. The DSM ADHD Symptom Checklist (DSM-CL), Woodcock-Johnson III Test of Achievement (WJ-III), The Test of Variables of Attention (T.O.V.A.) and the PAI were all included in the battery. Subjects ($N = 52$) who experienced some degree of impairment from their ADHD symptomatology were identified and utilized for the study (Pancner, 2006). After forming a comparison group (Non-ADHD, $N = 30$), the researcher evaluated PAI scale scores with a two-tailed *t*-test with an established significance level of $p < .05$. The ANX-C and DEP-C subscales were found to be the most consistent with ADHD, but did not discriminate groups efficiently on their own. However, the authors also determined that a cut-off T-score > 73 on the SCZ-T subscale effectively discriminates between ADHD and non-ADHD groups 69% of the time (Pancner, 2006).

In 2015, Watson and Liljequist published the only study that created an ADHD scale for the PAI. The researchers collected data from a university affiliated outpatient community mental health clinic. Participants (N = 199) completed the PAI and the CAARS-S-R:L. ADHD diagnosis was based on previously given diagnoses from the clinic and were confirmed by elevated T-scores on the CAARS-S-R:L (Watson & Liljequist, 2015). First, the CAARS-H index was used as the dependent variable and PAI scales and subscales were used as the independent variable for a stepwise regression, $p < .10$. High scores on Somatic Complaints – Somatization (SOM-S), Anxiety – Related Disorders – Traumatic Stress (ARD-T), Mania – Activity (MAN-A), and Schizophrenia – Thought Disorder (SCZ-T) scales and low scores on Positive Impression Management (PIM), and Treatment Rejection (RXR) scales accounted for 39% of the variance in CAARS score A discriminant function analysis determined that the proposed combination of six scales correctly classified 76.09% of the sample (Watson & Liljequist, 2015).

The researchers also utilized a MANOVA to examine group differences between those with and without ADHD. The Antisocial features – Stimulus Seeking (ANT-S), Borderline Features – Self-Harm (BOR-S), Schizophrenia – Thought Disorder (SCZ-T), Mania – Grandiosity (MAN-G), Mania – Activity Level (MAN-A), and Anxiety – Cognitive Features (ANX-C) were identified as subscales that significantly differed across groups (Watson & Liljequist, 2015). Those diagnosed with ADHD scored significantly higher on those scales, yet, the composite scale only correctly identified those with ADHD from those who do not have the disorder 41.3% of the time (Watson & Liljequist, 2015).

PAI and ADHD Scale Correlations

In order of appearance in the PAI manual, all of the identified scales and subscales with positive and significant correlations with ADHD are as follows:

Anxiety (ANX)

The Anxiety Scale (ANX) typically measures the level to which stress and tension is expressed (Morey, 1991). The Anxiety – Cognitive (ANX-C) and Anxiety – Physiological (ANX-P) subscales may measure some ADHD symptomatology. High ANX-C scores indicate possible rumination, racing thoughts, and vigilance that can lead to difficulty with concentration and attention. ANX-P measures the physiological expression of anxiety, i.e. racing heart, sweaty palms, a feeling of muscle tension, or a want to run (Morey, 1991). According to DeLong, the average ANX T-score for adults with ADHD was 61.56 (*SD* = 11.982) (2009). Stewart and Liljequist noted a positive correlation between the ANX scale and the CAARS (2015). Watson and Liljequist found the ANX-C subscale to have discriminatory ability between college students diagnosed with ADHD and community members without the diagnosis (2015).

Depression (DEP)

The Depression (DEP) scale measures common symptomatology found within the disorder. The Depression – Cognitive (DEP-C) assesses an individual's level of helplessness, self-worth, powerlessness, and self-esteem. Higher scores indicate lower levels of adequacy. Additionally, as scores become more elevated, concentration problems and indecisiveness can become problematic (Morey, 1991). The DEP scale T-scores positively correlate with the CAARS and can discriminate between adults with and without ADHD (DeLong, 2009; Stewart & Liljequist, 2015).

Mania (MAN)

The Mania scale assesses various features of mania and hypomania, i.e. "…elevated mood, expansiveness, grandiosity, heightened activity levels, irritability, and impatience" (Morey, 1991). Higher scores on the Mania – Activity (MAN-A) subscale indicate pressured, disorganized, or fleeting thoughts or behaviors. Higher scores on the Mania – Irritability (MAN-I) gauges an individual's difficulty with patience and accepting/tolerating frustrations (Morey, 1991). MAN, MAN-A, and MAN-Grandiositiy (MAN-G) T-scores adequately discriminate between adults with and without ADHD. MAN-A also correlates positively with the CAARS (Watson & Liljequist, 2015).

Schizophrenia (SCZ)

The Schizophrenia scale measures the many diverse elements of the disorder (Morey, 1991). The Schizophrenia – Thought Disorder (SCZ-T) subscale assesses the level of inefficiency, confusion, and perplexity of thought an individual can experience. Elevations on this scale can also allude to an individual's difficulty with concentration or decision-making

processes (Morey, 1991). SCZ-T T-scores discriminate between adults with and without ADHD and correlate with the CAARS (Pancner, 2006; Walker, 2014; Watson & Liljequist, 2015).

Borderline Features (BOR)

The Borderline Features scale of the PAI identifies various aspects of the personality disorder (Morey, 1991). Although the combined subscales are highly typical for individuals with the disorder, apart, the subscales can be useful in identifying other disorders. High Borderline – Affective Instability (BOR-A) subscale scores indicate possible difficulty with anger control and mood swings. High Borderline – Identity Problems (BOR-I) subscale scores can correlate with boredom, uncertainty about major life issues, lack of fulfillment, or difficulty with developing/maintaining a sense of purpose. The Borderline – Negative Relationships (BOR-N) subscale assesses the tendency of the individual to have chaotic or unstable relationships. The Borderline – Self-Harm (BOR-S) subscale measures the level of disregard for consequences when making potentially harmful choices. High scores tend to correlate with impulsivity and recklessness (Morey, 1991). The BOR and BOR-S T-scores of individuals with ADHD are significantly higher than the T-scores of those without ADHD (DeLong, 2009; Watson & Liljequist, 2015).

Antisocial Features (ANT)

The Antisocial Features scale measures the elements of adventuresome, egocentricity, and lack of empathy characteristic of the personality disorder (Morey, 1991). The Antisocial Behavior (ANT-A) subscale identifies past difficulties with authority, mischievous behavior, and a struggle to adhere to social contracts. The Stimulus – Seeking (ANT-S) subscale assesses an individual's tendency to desire novelty, stimulation, or risk. High scores correlate with an increased tendency to disregard long-term commitments or conventions, and act impulsively

(Morey, 1991). DeLong (2009) and Watson and Liljequist (2015) determined that the ANT Scale and ANT-S subscale T-scores can discriminate between adults with and without ADHD.

Alcohol Problems (ALC)

The Alcohol Problems scale indicates potential problems, misuse, and poor consequences stemming from abuse of alcohol when T-scores are above 60 (Morey, 1991).

Drug Problems (DRG)

T-scores above 60 for the Drug Problems scale indicate possible drug related issues (Morey, 1991).

Aggression (AGG)

The Aggression scale assesses various modalities of anger and hostility. The Aggressive – Attitude (AGG-A) subscale assesses an individual's tendency to become easily frustrated or irritated. High scores can correlate with difficulty controlling anger, and accepting criticism (Morey, 1991).

Stress (STR)

The Stress scale is a broad measure of overall life stressors that can be contributing to an individual's difficulties. The items in the scale are broad and designed to evaluate a range of possible challenging circumstances (Morey, 1991).

Despite these possible correlations and potential for capturing much ADHD symptomatology, there is limited research on PAI applicability or efficacy for the treatment or assessment of the adult ADHD population. After a through literature search, only four published research articles were found that included both the PAI and individuals with possible or previously diagnosed ADHD. Moreover, all four studies were only published within the last two

to three years (Aita, Sofko, Hill, Musso & Boettcher, 2017; Musso, Hill, Barker, Pella & Gouvier, 2016; Smith, Cox, Mowle & Edens, 2017; Watson & Liljequist, 2015).

PAI ADHD Feign Detection

The majority of published articles that include the PAI in ADHD diagnosis aim to detect feigning of symptomatology (Aita, Sofko, Hill, Musso & Boettcher, 2017; Musso, Hill, Barker, Pella & Gouvier, 2016; Smith, Cox, Mowle & Edens, 2017). Aita et al., created a scale level algorithm with a binary logistic regression function to differentiate college students with ADHD and those who were incentivized to feign ADHD. The Positive Impression (PIM), Schizophrenia – Thought Disorder (SCZ-T), Antisocial Features – Stimulus Seeking (ANT-S), and Depression – Cognitive (DEP-C) were included in the new scale, the scale-level Feigned Adult ADHD index (FAA) (Aita, Sofko, Hill, Musso & Boettcher, 2017). The scale-level FAA was also compared to the Malingering Index (MAL), Rogers Discriminant Function index (RDF), the Multiscale Feigning Index (MFI), and the Negative Distortion Scale (NDS) to ensure that the scale-level FAA had better specificity to those who are feigning ADHD, from those who are feigning other psychological disorders (Aita, Sofko, Hill, Musso & Boettcher, 2017).

Aita et al. also created an item-level FAA in a similar way to the scale-level FAA. The feigned ADHD group was not only compared to those who were truly diagnosed with ADHD, but also to those who were genuinely diagnosed with other disorders, too (Aita Sofko, Hill, Musso & Boettcher, 2017). The researchers used a forward entry multiple regression to determine PAI items that should be retained due to their ability to discriminate the ADHD feigners from those with other true diagnoses. Another binary logistic regression was used to create the item-level FAA from this data (Aita Sofko, Hill, Musso & Boettcher, 2017). Both the scale-level FAA and item-level FAA were found to successfully detect those who may have

attempted to feign ADHD with low false positive rates (7.7% and 2.7%, respectively) (Aita Sofko, Hill, Musso & Boettcher, 2017). Despite good psychometric properties noted by Aita and colleagues, stepwise regression models often fit the original sample well and perform poorly when replicated on another group. This can happen because items chosen for the final multiple regression are based solely on level of significance; items that fit poorly theoretically can be statistically highly correlated by chance (Smith, 2018).

Musso and colleagues also attempted to detect feigned ADHD among the college population. Researchers did so by collecting PAI data on eight different groups (N = 238) including a control, those with ADHD, a learning disorder, another mental health disorder, and those who were either told to feign ADHD or give very little effort to answering (Musso, Hill, Barker, Pella & Gouvier, 2016). To compare differences between the feigned ADHD group and all other groups on PAI clinical and validity scales, a MANCOVA was utilized. And to determine if the feigned ADHD group differed from the clinical groups, an ANCOVA was utilized. The researchers concluded that individuals who are asked to feign ADHD are easily able to pass existing PAI validity scales. More than 75% of the feigned ADHD group were able to do so without PAI validity scale detection (Musso, Hill, Barker, Pella & Gouvier, 2016).

Smith and colleagues completed a very similar study to Musso's, yielding similar results. However, they had only three groups: true ADHD, feigned ADHD, and control (Smith, Cox, Mowle & Edens, 2017). The feigned ADHD group was again successful in escaping detection from the traditional PAI validity scales. The researchers recommended lower cut-off scores for when practitioners are attempting to diagnose ADHD with the use of the PAI (Smith, Cox, Mowle & Edens, 2017).

APPENDIX B

EMAIL AND INSTRUCTIONS SENT TO EXPERTS

Dear Dr. XXX,

My name is Nina Calmenson and I am a fifth-year doctoral student in the Counseling Psychology program at the University of North Texas. I am currently working on my dissertation entitled "Creating a New Subscale for the Personality Assessment Inventory (PAI) for College Students with Attention-Deficit/Hyperactivity Disorder (ADHD)." This study seeks to develop and test rationally-determined pool of items within a standard administration of the PAI that discriminates adults with ADHD from adults without ADHD, which we will label as PAI-ADHD.

(If there is a reference: XXX referred me to you because of your expertise in the field of ADHD, ADHD assessment, etc.) (No reference: I am reaching out to you because of the expertise you have demonstrated in ADHD and assessment through your xxx publication or work or something else specific to them). The first step in creating the PAI-ADHD is reaching out to experts like you to obtain your opinions on the likelihood (measured with a 5-point Likert-scale ranging from 0 = Unlikely to 4 = Likely) that a particular PAI item would be endorsed by a college student with ADHD (more specific instructions are provided within the survey). The scales and subscales chosen for your evaluation and potential inclusion in our scale were chosen based on previous studies that researched the correlation between the PAI scales or items and ADHD symptoms or diagnosis. There are currently 110 items. From your endorsements and that of other experts, I will be able to further narrow the selected items that should be included in the PAI-ADHD subscale and begin to evaluate the reliability and validity of the new subscale.

I would so appreciate your participation in this portion of my dissertation. This survey should only take you about 15 minutes to complete. Your responses will be instrumental in creating the PAI-ADHD. Of course, participation is entirely voluntary and you may withdraw at

any time. For those who choose to complete the survey, there will be an option to fill out a separate form with your name, title, and affiliation so I can include you in the acknowledgments section of my dissertation and any subsequent publications. If you are willing to participate, please click on the following link for the survey in Qualtrics:

https://unt.az1.qualtrics.com/jfe/form/SV_2h7k84bkpA1POUR

If you have any questions about this study or would like more information, please contact me or the principal investigator/my faculty advisor, Dr. Patricia L. Kaminski (Patricia.Kaminski@unt.edu or 940-390-5159).

Sincerely,

Nina Calmenson, M.S.

Listed below are the 110 PAI items that were chosen based on previous studies that researched the correlation between the PAI and ADHD. Read each item and determine based on your clinical or research experiences, how likely a college student with ADHD would be to positively endorse that item.

When evaluating each item for the likeliness that a college student with ADHD would endorse the item, please only choose "4 = Likely" if you believe that the item would discriminate between adults with and without ADHD 80 to 90% of the time. Moreover, please give special consideration to items that relate closely to an internalized sense of restlessness and place less emphasis on externalized restlessness.

Indicate your response for each item by choosing the number that corresponds to your choice. Use the following scale: 0 = Unlikely or 0 to 10% discriminative ability; 1 = 20 to 30%; 2 = 40 to 50%; 3 = 60 to 70%; 4 = Likely or 80 to 90% discriminative ability.

APPENDIX C

TABLE OF SIGNIFICANT PAI SCALES AND SUBSCALES IN THE ADHD POPULATION

	Authors (Year)						
	DeLong (2008)	**DeLong (2008)**	**Pancner (2006)**	**Walker (2014)**	**Watson & Liljequist (2015)**	**Watson & Liljequist (2015)**	**Stewart & Liljequist (2015)**
Type of Publication	Dissertation Part 1	Dissertation Part 2	Dissertation	Dissertation	Peer Reviewed Journal Part 1	Peer Reviewed Journal Part 2	Peer Reviewed Journal
Sample	College Students	College Students	Clients at a private practice	College students	College students and community members	College students and community members	Clients of a community mental health clinic
N	182	182	82	200	199	199	113
	Method						
PAI Scales and Subscales	Discriminate between groups	Mean differences	Discriminate between groups	Mean differences	Correlation with CAARS	Discriminate between groups	Correlation with CAAARS
Positive Impression (PIM)					x		
Somatic Complaints (SOM)							
Somatization (SOM-S/8)					x		
Anxiety (ANX)		x					x
Cognitive (ANX-C/8)						x	
Anxiety Related Disorders (ARD)							
Traumatic Stress (ARD-T/8)					x		
Depression (DEP)		x					x
Cognitive (DEP-C/8)				x			
Mania (MAN)	x			x			
Activity Level (MAN-A/8)				x	x	x	

	Authors (Year)						
	DeLong (2008)	**DeLong (2008)**	**Pancner (2006)**	**Walker (2014)**	**Watson & Liljequist (2015)**	**Watson & Liljequist (2015)**	**Stewart & Liljequist (2015)**
Grandiosity (MAN-G/8)						x	
Paranoia (PAR)		x					
Schizophrenia (SCZ)							
Thought Disorder (SCZ-T/8)			x	x	x	x	
Borderline Features (BOR)		x					
Self-harm (BOR-S/6)				x		x	
Antisocial Features (ANT)	x						
Stimulus Seeking (ANT-S/8)						x	
Aggression (AGG)	x						
Suicidal		x					
Drugs				x			
Warmth				x			
Treatment Rejection					x		

APPENDIX D

IRB AND CLINIC APPROVAL LETTERS

UNT
EST. 1890

THE OFFICE OF RESEARCH INTEGRITY AND COMPLIANCE
Research and Innovation

December 16, 2019

PI: Patricia Kaminski
Study Title: Creating a New Subscale for the Personality Assessment Inventory (PAI) for College Students with Attention-Deficit/Hyperactivity Disorder (ADHD)

RE: Human Subjects Application # IRB-19-220

Dear Dr. Patricia Kaminski:

On Monday, December 2, 2019, the University of North Texas Institutional Review Board reviewed your project titled "Creating a New Subscale for the Personality Assessment Inventory (PAI) for College Students with Attention-Deficit/Hyperactivity Disorder (ADHD)." The Board agrees that the risks inherent in this research have been appropriately minimized, and the potential benefits to the subjects outweigh those risks. **Federal policy 45 CFR 46.109(e) stipulates that IRB approval is for one year only. Approval date for this study is December 2, 2019 through December 1, 2020.**

Enclosed are the consent documents with stamped IRB approval. Please copy and **use this form only** for your study subjects.

It is your responsibility according to U.S. Department of Health and Human Services regulations to submit annual and terminal progress reports to the IRB for this project. Please mark your calendar accordingly. The IRB must also review this project prior to any modifications.

Please contact Janice Magrini, Research Compliance Analyst, at 940-565-4643 if you wish to make such changes, or need additional information.

Note: Please do not reply to this email. Please direct all questions to untirb@unt.edu

Sincerely,

UNT
UNIVERSITY OF NORTH TEXAS
EST. 1890

College of Liberal Arts and Social Sciences
Psychology - Clinic

January 21, 2020

Dear Nina and Dr. Kaminski,

This letter is to inform you that the Psychology Clinic Executive Committee (PCEC) completed its review of your research project application. I am pleased to inform you that you have received approval to proceed with your research, "Creating a New Subscale for the Personality Assessment Inventory (PAI) for College Students with Attention-Deficit/Hyperactivity Disorder (ADHD)." Please coordinate all ongoing research activities through me, in order to ensure good communication with office staff. Please feel free to contact me if questions or concerns arise.

Sincerely,

Randall J. Cox, Ph.D.
Director, Psychology Clinic

1155 Union Circle #311280
Denton, Texas 76203-5017
940.565.2631
940.369.8672 fax
http://psychology.unt.edu/clinics-and-centers/psychology-clinic
www.unt.edu

APPENDIX E

IRB DATA SECURITY

Will you be gathering information from subject medical records?

✓ Yes

Explain compliance with the HIPAA privacy rule (Health Insurance Portability and Accountability Act) and disclosure of protected health information (PHI)

We will be gathering data from the UNT Psychology clinic assessment files that may possibly include medical records. The clinic staff will be providing specific files to us who meet the requirements listed before (i.e. received an ADHD or LD diagnosis, completed the PAI). To comply with HIPPA privacy rules we will not take any of the files out of the clinic and data will be collected on the secured portable hard drives that will be kept in the PI's office. Additionally, we will not be collecting any information that could possibly include any of the following: name and initials; street address, city, county, precinct, zip code, or equivalent geocodes; elements of dates (except year) directly related to an individual (date of birth, admission date, discharge date, date of death); elements of date including year for persons 90 or older; telephone and/or fax number; e-mail address; social security number; medical record or health plan identification number; account number; certificate and license number; vehicle identifier and serial number including license plate number; device identifier and serial number; web address (URL), internet IP address; biometric identifier including finger and voice print, full face photographic image and comparable image; other unique identifying number, characteristic, or code.

No

Section 5- Data Security

Is the study:

Anonymous

Justify

Every effort to maintain participant confidentiality will be utilized. Participants recruited from SONA for the No Diagnosis group will not be asked for any identifying information (e.g., name, social security number, email address, etc.). The archival data that we collect from the UNT Psychology Clinic files to make up the ADHD and LD groups also will not include any identifying information.

✓ Confidential

Justify

Every effort to maintain participant confidentiality will be utilized. Participants recruited from SONA for the No Diagnosis group will not be asked for any identifying information (e.g., name, social security number, email address, etc.). The archival data that we collect from the UNT Psychology Clinic files to make up the ADHD and LD groups also will not include any identifying information.

For the NoDiagnosis group, data will be downloaded and the survey will be deleted. Data will be coded and stored on a password-protected computer in the PI's office (Terrill Hall Rm. 374). Only the PI and the Department Chair have keys to this office. The Department Chair will not have access to the computer passwords or data. The PI may grant future graduate students in the lab access to the data for the purposes of data analysis and manuscript preparation.

None/Neither

Will personally identifiable information (PII) be collected/used?

Yes

✓ No

Justify

No personally identifiable information (e.g., name, social security number, email address, etc.) will be collected in the SONA survey. Additionally, survey responses cannot be tracked back to any one participant in particular.

Data collection for the ADHD and LD groups from the UNT Psychology Clinic files will include PII. However, none of the PII will be utilized. Moreover, the file information will not be maintained in any files connected with the project, and information utilized from those files cannot be tracked back to any identifying information from participants.

Who will have access to the data?

Will any data collected from the study be made available as open access? For example, some funders and journals request that data be housed (kept, stored) at an approved site (e.g., clinicaltrials.gov), accessible to the public.

Only personnel listed as part of this study and other members of the Scientia Conquisitor Lab, who work with Dr. Patricia Kaminski, will have
access to the data set. Secondary data being utilized will be de-identified prior to receipt of that data. All access will be supervised by the PI, Dr. Patricia Kaminski. No PII will be retained.

How will the raw data be kept protected and secure?

How will it be coded or identified?

Participants will be identified only by a code given by the researchers. Participant ID codes will be generated in the order that the data is received and will only be based on the order of completion on SONA. Therefore, the first participant for data received from SONA will be 90001, the second will be 90002, the tenth 90010, etc. Data that is received from the UNT Psychology clinic will utilize the clinic ID numbers that are randomly generated for each client. All data will be downloaded to SPSS and stored on

a secure, password protected computer in a locked lab and a back-up flash drive kept in a locked drawer in the PI's campus office. Codes for the participants will be stored separately from any other data collected to ensure their identity and survey responses remain confidential.

What will become of the data at the end of the study?

All collected data is required to be kept on the UNT campus in the PI's office for a period of three years past the end of the study.

The data will be stored on the same password-protected computer in a locked room in the PI's lab office for at least three years past the end of the study.

APPENDIX F

IRB INFORMED CONSENT

UNIVERSITY OF NORTH TEXAS

Informed Consent for Studies with Adults

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits and risks of the study and how it will be conducted.

TITLE OF STUDY: Creating a New Subscale for the Personality Assessment Inventory (PAI) on College Students with Attention-Deficit/Hyperactivity Disorder (ADHD)

RESEARCH TEAM: Scientia Conquisitor Lab, University of North Texas (UNT) Department of Psychology

Supervising Investigator: Patricia L. Kaminski, Ph.D. (Patricia.Kaminski@unt.edu; 940-565-2650)

Student Investigator: Nina Calmenson, M.S. (NinaCalmenson@my.unt.edu)

You are being asked to participate in a research study. Taking part in this study is voluntary. The investigators will explain the study to you and will any answer any questions you might have. It is your choice whether or not you take part in this study. If you agree to participate and then choose to withdraw from the study, that is your right, and your decision will not be held against you.

You are being asked to take part in a study to create a new-subscale of an existing personality measure to detect and rule-out ADHD.

Your participation in this research study involves answering questions via an online, confidential survey, which we anticipate will take approximately 120 minutes. More details will be provided in the next section.

You might want to participate in this study if you would like to contribute to the creation of a new sub-scale that could streamline the ADHD assessment process. We hope to use the results of this study to better inform mental health assessment and treatment efforts for college students. You might not want to participate in this study if you become overwhelmed or upset when reflecting on your mental health.

You may choose to participate in this research study if you are over the age of 18.
The reasonable forseeable risks or discomforts to you if you choose to take part include risks associated with a person's everyday use of the Internet, as well as potential discomfort as a result of the questions asked in this survey. The possible benefit of taking part in this study is contribution to research on ADHD assessment. You will not receive compensation for participation.

DETAILED INFORMATION ABOUT THIS RESEARCH STUDY: The following is more detailed information about this study, in addition to the information listed above.

PURPOSE OF THE STUDY: You are being asked to participate in a research study that hopes to create a new sub-scale within an existing personality measure, the Personality Assessment Inventory (PAI). Attention-deficit/hyperactivity disorder (ADHD) is a complex psychiatric disorder that is difficult, expensive, and time consuming to assess in adults because many of the symptoms of ADHD overlap with numerous other psychiatric disorders. It is important to create new and valid ways of ruling-in or ruling-out ADHD among the adult population so mental health professionals can better assess and eventually treat. The information provided in this study will help to validate this important new measure.

It is important to note that we will be unable to provide you with a diagnosis from your completion of this study. The provision of accurate psychological diagnoses require meeting in person and a full clinical interview. We value the anonymity of all of our participants; therefore, we take multiple precautions to ensure that participant responses are only attached to a randomized ID number and we do not collect any identifying information. If you are interested in obtaining more information about a potential diagnosis of ADHD, or any other psychological diagnosis for yourself, the UNT Psychology Clinic Staff will be able to speak with you over the phone at (940) 565-2631 about potential options. During that phone call, please feel free to list the scales and inventories you completed for this study and explain why you became concerned. For more information about the UNT Psychology Clinic please see the Possible Risks/Discomforts section of this informed consent.

STUDY PROCEDURES AND TIME COMMITMENT: You will be asked to answer questions about your psychological health and your daily functioning. For example, rating scales that include statements such as, I feel the future is hopeless and that things cannot improve; I am dissatisfied or bored with everything; I am always on the go, as if driven by a motor; and, I have trouble keeping my attention focused when working. We anticipate that the survey will take about 120 minutes of your time.

POSSIBLE BENEFITS: This study is expected to allow us to potential create and validate a new sub-scale for the PAI that could detect and rule-out ADHD in adults. The indirect benefit of your participation may be your contribution to the knowledge base of assessing ADHD in adults.

POSSIBLE RISKS/DISCOMFORTS: The potential risks involved in this online study are similar to risks associated with a person's everyday use of the Internet. It is possible, however, that you may experience some discomfort as a result of the questions asked in this survey. If you experience excessive discomfort, you may choose to stop answering questions at any time without penalty by simply exiting the survey.

If your distress is severe and you need immediate assistance, call the campus police at (940) 565-3000, or call 911 or go to your nearest emergency room. The UNT Psychology Clinic is also available for crisis calls and walk-ins. Their phone number is (940) 565-2631 and is located on campus at 1611 W. Mulberry St., #171, Denton, Texas, 76201. Their hours of operation are Monday-Thursday, 8:00am-8:00pm, and on Fridays from 8:00am-5:00pm. Additionally, you

may also speak with a mental health professional 24 hours a day, 7 days a week, by calling the Crisis Hotline at (940) 387-5555. Another helpful resource includes the National Suicide Prevention Lifeline (1-800-273-8255) or their Online Chat at https://suicidepreventionlifeline.org/chat/.

If your need for mental health services is not urgent, you may contact a mental health provider at the UNT Counseling and Testing Center located in Chestnut Hall at (940) 565-2741 or http://studentaffairs.unt.edu/counseling-and-testing-services. The hours of operation for this center are Monday-Friday 8:00am-5:00pm. The UNT Psychology Clinic is also available for mental health support, weekly psychotherapy, and assessment.

If none of these resources meet your needs, you may also contact the doctoral student researcher, Nina Calmenson at (972) 358-5682 or ninacalmenson@my.unt.edu and she will assist you in accessing appropriate services.The researchers have tried to prevent any problem that could happen because of this research, but the study may involve risks to the subject that are currently unforeseeable. You may contact the researchers if there is a problem, and they will do their best to help you. However, the University of North Texas does not provide medical services or financial assistance for problems that might occur as a result of taking part in this research.

COMPENSATION: There is no monetary compensation for your participation in this study. However, if you are eligible to receive extra credit points for your participation, and if permitted by your instructor, you may receive four SONA Credits upon completion of this study. If your instructor is providing extra credit to subjects of this study, there will also be a non-research alternative available that is equal to the time and effort of the study for those subjects who do not wish to participate.

CONFIDENTIALITY: Confidentiality will be maintained to the degree possible given the technology and practices used by the online survey company. Your participation in this online survey involves risks to confidentiality similar to a person's every day use of the internet. A number of steps will be taken to minimize the risk of loss of confidentiality. The survey will include no identifying information. A code, rather than your name, will be used by the researchers. Only the principal investigator and research assistants will have access to the data. The data collected will not be shared with any individuals or agencies, and will only be used for research or educational purposes. The confidentiality of your individual information will be maintained in any publications or presentations regarding this study.

CONTACT INFORMATION FOR QUESTIONS ABOUT THE STUDY: If you have any questions about the study, you may contact Nina Calmenson at NinaCalmenson@my.unt.edu, or Patricia L. Kaminski at Patricia.Kaminski@unt.edu or 940-565-2650.

REVIEW FOR THE PROTECTION OF PARTICIPANTS: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-4643 or untirb@unt.edu with any questions regarding the rights of research subjects.

CONSENT:

By clicking the "I Accept" Button below, you are agreeing that:

- The investigators have explained the study to you and you have had an opportunity to contact the researchers to ask any questions you may have. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as a research participant and you voluntarily consent to participate in this study.

Please print this consent form for your records.

If you agree to participate in this study, please click the "I Accept" button below. If you choose not to participate, please click the "Reset" button and close your browser.

I accept, proceed to survey

APPENDIX G

STUDY COMPLETION FORM

Study Completion Form – Print for Your Records

Thank you for completing the survey!

TITLE OF STUDY: Creating a New Subscale for the Personality Assessment Inventory (PAI) on College Students with Attention-Deficit/Hyperactivity Disorder (ADHD)

PURPOSE OF THE STUDY: You are being asked to participate in a research study that hopes to create a new sub-scale within an existing personality measure, the Personality Assessment Inventory (PAI). Attention-deficit/hyperactivity disorder (ADHD) is a complex psychiatric disorder that is difficult, expensive, and time consuming to assess in adults because many of the symptoms of ADHD overlap with numerous other psychiatric disorders. It is important to create new and valid ways of ruling-in or ruling-out ADHD among the adult population so mental health professionals can better assess and eventually treat. The information provided in this study will help to validate this important new measure.
Following completion of the study, any publications using data collected as part of this survey will be made available on our website: https://psychology.unt.edu/sclab. If you would like to learn more about other research investigating individuals with ADHD, the following resources may be of interest:

https://www.nimh.nih.gov/health/publications/attention-deficit-hyperactivity-disorder-adhd-the-basics/index.shtml

https://chadd.org/

https://www.additudemag.com/

PSYCHOLOGICAL SUPPORT: The researchers have tried to prevent any problems that could happen because of this research, but the study may involve risks to you that are currently unforeseeable. If your distress is severe and you need immediate assistance:

- Call the campus police at (940) 565-3000.
- Call 911.
- Go to your nearest emergency room.

The UNT Psychology Clinic is also available for crisis calls and walk-ins:

- Call the UNT Psychology clinic at (940) 565-263.

They are located on campus at 1611 W. Mulberry St., #171, Denton, Texas, 76201. Their hours of operation are Monday-Thursday, 8:00am-8:00pm, and on Fridays from 8:00am-5:00pm.

Additionally, you may also speak with a mental health professional 24 hours a day, 7 days a week, by calling the Crisis Hotline.

- Call (940) 387-5555 for the hotline.

Another helpful resource includes the National Suicide Prevention Lifeline (1-800-273-8255) or their Online Chat at https://suicidepreventionlifeline.org/chat/.

If your need for mental health services is not urgent, you may contact a mental health provider at the UNT Counseling and Testing Center located in Chestnut Hall at (940) 565-2741 or http://studentaffairs.unt.edu/counseling-and-testing-services. The hours of operation for this center are Monday-Friday 8:00am-5:00pm. The UNT Psychology Clinic is also available for mental health support, weekly psychotherapy, and assessment.

Unfortunately, we are unable to provide you with a diagnosis from your completion of the Wender Utah Rating Scale for Attention Deficit Hyperactivity Disorder (WURS), Connors Adult ADHD Rating Scale (CAARS), Personality Assessment Inventory (PAI), and Beck's Depression Inventory (BDI) during this survey. The provision of accurate psychological diagnoses require meeting in person and a full clinical interview. We value the anonymity of all of our participants; therefore, we take multiple precautions to ensure that participant responses are only attached to a randomized ID number and we do not collect any identifying information. If you are interested in obtaining more information about a potential diagnosis of ADHD, or any other psychological diagnosis for yourself, the UNT Psychology Clinic Staff will be able to speak with you over the phone at (940) 565-2631 about potential options. During that phone call, please feel free to list the scales and inventories you completed for this study and explain why you became concerned.

If none of these resources meet your needs, you may also contact the doctoral student researcher, Nina Calmenson at (972) 358-5682 or ninacalmenson@my.unt.edu and she will assist you in accessing appropriate services. However, the University of North Texas does not provide medical services or financial assistance for problems that might occur as a result of taking part in this research.

As mentioned at the beginning of the study, you are free to withdraw your participation in this study at any time. **If you agree to participate in this study, please click the "I Accept" button below. If you would like to withdraw your survey data from the study, please click the "Reset" button and close your browser.**

I agree, exit survey

APPENDIX H

DEMOGRAPHIC QUESTIONNAIRE

1. Age: _____ years old

2. Sex:
   a. Male
   b. Female

3. How would you classify your sexual orientation?
   a. Straight
   b. Gay/Lesbian
   c. Bi-Sexual
   d. Other (Specify: _____)

4. Current relationship status:
   a. Single/Never Married
   b. Single/In a committed relationship (6+ Months duration)
   c. Cohabitating
   d. Single/Divorced
   e. Separated
   f. Married

5. Ethnicity:
   a. Black/African-American
   b. Native American
   c. Asian/Pacific Islander
   d. White/European American
   e. Hispanic/Latino/Mexican American
   f. Bi-racial or Multi-racial (Specify:_____)
   g. Other (Specify:_____)

6. Class Rank:
   a. Freshman
   b. Sophomore
   c. Junior
   d. Senior

7. GPA: _____

8. Have you ever been diagnosed with Attention-Deficit/Hyperactivity Disorder, sometimes called ADHD, ADD, or Hyperactivity?
   a. Yes
   b. No

9. If answered "yes" to question #8, are you currently taking ADHD medication?
   a. Yes
   b. No

10. If yes, please list the medication(s) and dosage(s):

_____

_____

11. If you answered "yes" to question 8, to the best of your recollection, at what age were you diagnosed with ADHD? _____
    Who diagnosed you with ADHD? (e.g., psychologist, pediatrician, doctor, etc.)_____

12. Have you ever been diagnosed with a Learning Disability (e.g., reading disorder, dyslexia, math disorder, disorder of written expression)?
    a. Yes
    b. No

13. If you answered "yes" to question #12, to the best of your recollection, at what age were you diagnosed with a learning disability? _____
    a. Who diagnosed you with a learning disability? (e.g., counselor at school, psychologist etc.)_____
    b. What type of learning disability were you diagnosed with (e.g., reading disorder, dyslexia, math disorder, disorder of written expression)? _____

14. Have you ever repeated a grade?
    a. Yes
    b. No

15. Did you ever receive special education services at school?
    a. Yes
    b. No

16. If yes, what was your eligibility?	(1) Yes	(2) No
a. Orthopedically Impaired	☐	☐
b. Other Health Impaired	☐	☐
c. Auditorily Impaired	☐	☐
d. Visually Impaired	☐	☐
e. Deaf-Blind	☐	☐
f. Mentally Retarded	☐	☐
g. Emotionally Disturbed	☐	☐
h. Learning Disabled	☐	☐
i. Speech Impaired	☐	☐
j. Autistic	☐	☐
k. Traumatic Brain Injury	☐	☐

17. If you answered "yes" to question 15, what grade did you begin receiving special education services? _____

18. Do you currently receive accommodations with the Office of Disability Accommodations (ODA)?
    a. Yes
    b. No

19. If you answered "yes" to question #18, what do you receive accommodations for (e.g., ADHD, Learning Disability)?

_____

20. Are you currently taking any medications?
    a. Yes
    b. No

21. If yes, please list the name of the medication(s) and dosage(s).

_____

_____

22. Have you ever been diagnosed with any of the following?

	(1) Yes	(2) No	(3) Suspected
a. Generalized Anxiety	☐	☐	☐
b. Post-Traumatic Stress Disorder	☐	☐	☐
c. Social Anxiety	☐	☐	☐
d. Obsessive Compulsive Disorder	☐	☐	☐
e. Bulimia Nervosa	☐	☐	☐
f. Anorexia Nervosa	☐	☐	☐
g. Major Depressive Disorder	☐	☐	☐
h. Dysthymia	☐	☐	☐
i. Bipolar Disorder	☐	☐	☐
j. Schizophrenia	☐	☐	☐

23. If you answered "yes" to any disorder listed in question #22, how old were you when first diagnosed? _____

24. If you answered "yes" to any disorder listed in question #22, who were you diagnosed by?
    ☐School counselor/psychologist (LSSP, Ph.D.)
    ☐Other counselor/psychologist (M.S., Ph.D., Psy.D.)
    ☐Psychiatrist (M.D.)
    ☐Family physician/general practitioner (M.D.)
    ☐Other (please specify _____)

25. Has anyone in your family ever been diagnosed with any of the following?

	(1) Yes	(2) No	(3) Suspected
a. Generalized Anxiety	☐	☐	☐
b. Post Traumatic Stress Disorder	☐	☐	☐
c. Social Anxiety	☐	☐	☐

	(1) Yes	(2) No	(3) Suspected
d. Obsessive Compulsive Disorder	☐	☐	☐
e. Bulimia Nervosa	☐	☐	☐
f. Anorexia Nervosa	☐	☐	☐
g. Major Depressive Disorder	☐	☐	☐
h. Dysthymia	☐	☐	☐
i. Bipolar Disorder	☐	☐	☐
j. Schizophrenia	☐	☐	☐

26. If you answered "yes" to any disorder in question #22, please specify family members diagnosed with each disorder below

_____

_____

_____

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