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Does ADHD Strengthen the Relationship
Between Depression/Anxiety and Avoidance?

by

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Honors Thesis

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Psychology Department

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Abstract

Objective: Attention-Deficit/Hyperactivity Disorder (ADHD) is a diagnosis often comorbid with depression and anxiety-related disorders. Research is also indicative of a relationship between ADHD, depression, anxiety, and avoidance-related behaviors. I hypothesize that the relationship between ADHD and avoidance will be moderated by symptoms of depression and anxiety in neuro-typical college students that have not received a clinical mental health diagnosis. **Method:** 101 college students at the University of Richmond attended a baseline visit with a research assistant and completed baseline scale measures for symptoms of ADHD, depression, generalized anxiety, and avoidance. I used multiple regression and Hayes' PROCESS program to analyze the relationships between these four variables and identify the presence or absence of moderation. **Results:** The four variables ADHD, depression, anxiety, and avoidance were significantly correlated with each other, but ADHD did not act as a statistically significant moderator. To further probe this relationship, I conducted a mediation analysis with ADHD as the independent variable, avoidance as the dependent variable, and depression/anxiety as mediators and did find a statistically significant mediating effect. **Conclusion:** These findings indicate that ADHD symptoms and depression/anxiety symptoms are not independent contributors to avoidant-related behaviors, which can have clinical significance for practitioners with clients suffering from one or multiple of these mental health diagnoses.

Do ADHD Symptoms Strengthen the Relationship Between Depression/Anxiety and Avoidance?

There is a vast amount of research documenting and exploring the relationship and comorbidity between depression and anxiety in the field of psychology. The Netherlands Study of Depression and Anxiety found that 75% of individuals diagnosed with a depressive disorder also suffered from comorbid anxiety, highlighting the prevalence of the comorbidity between these two mental disorders (Lamers et al., 2011). Scholars commonly attribute this relationship to the interplay of overlapping symptoms between depression and anxiety (Groen et al., 2020). One overlapping behavioral outcome in those suffering from depression, anxiety, or both is avoidance. Avoidance is a maladaptive form of coping that can manifest in different thoughts or behaviors, but it generally involves an individual avoiding stress and adversity whenever possible.

Compared to control groups when completing tasks that measure personal approach and avoidance goals/plans, adolescents with high depression generate fewer approach goals and more avoidance plans, and adolescents with high anxiety generate more avoidance goals and more avoidance plans (Dickson & MacLeod, 2004). There is also a growing amount of research being done examining the relationship and comorbidity between ADHD symptoms and depression/anxiety symptoms. The National Comorbidity Survey Replication is a nationally representative survey that assesses a wide variety of DSM disorders, and researchers analyzing the data collected on adults with ADHD found comorbidity with depression to be over 18% (compared to under 8% for respondents without an ADHD diagnosis) and comorbidity with anxiety disorders to be around 47% (compared to under 20% for respondents without an ADHD diagnosis) (Kessler et al., 2006). Other studies have shown that between 15% and 35% of

children diagnosed with ADHD also manifest significant anxiety, and up to 25% of adults clinically referred for ADHD treatment also presented with major depressive disorder (Chao et al., 2008).

A common assumption about ADHD is that it mainly affects children and is a developmental disorder. In individuals diagnosed with ADHD in childhood, these symptoms often persist into later life and co-occur with depression and anxiety, negatively impacting quality of life in adulthood. In truth, ADHD is a common “behavior disorder that affects millions of children, adolescents, and adults” (pg. 51, Roberts et al., 2015). It is primarily characterized by the symptoms of inattention (such as making careless mistakes in schoolwork, at work, or during other activities), hyperactivity (such as fidgeting often or talking excessively), and impulsivity (such as often interrupting or intruding on others) for at least six months in the DSM-V. There are also subtypes of an ADHD diagnosis for people who primarily experience symptoms in the cluster of inattention, the cluster of hyperactive-impulsive, or both clusters. The prevalence of ADHD in children seems to be around 5-7%, and prevalence in adults ranges from about 3-5% of the general population (Roberts et al., 2015). Specifically for adults, an ADHD diagnosis often encompasses executive functioning impairments such as poor time management and reduced self-motivation (Solanto, 2015). Lastly, adults diagnosed with ADHD report significantly higher rates of health concerns across a variety of domains such as social relationships, emotional health, and substance use compared to clinical and community populations (Barkley, 2015).

Yang and colleagues (2013) found that some of these negative quality of life outcomes in adulthood for participants with ADHD were mediated by the presence of depression and anxiety symptoms, and the negative correlations disappear when controlling for these mental disorders,

explaining this relationship and providing insight into interventions and treatment plans that can offset adverse life quality experiences in individuals with ADHD. Nankoo and colleagues (2018) also found that individual scores on an ADHD rating scale explained unique variance in self-reported levels of depression, stress, and anxiety, and that struggling with ADHD symptoms may induce depressive tendencies and chronic unhappiness, fostering the development of negative self-image and contributing to symptoms of depression and stress in situations of adversity. There are also reports identifying a positive relationship between symptoms of stress, anxiety, and depression with scores on an ADHD index (Alexander & Harrison, 2011).

Overall, findings indicate that ADHD could serve as a risk factor for the development of depression and anxiety-related disorders, and this relationship could be explained by avoidance-related symptoms. A study conducted by Oddo and colleagues (2016) found that adults diagnosed with ADHD that have a more extensive treatment history were more likely to be resilient to the development of depressive disorders. And for individuals who reported less behaviors of cognitive-behavioral avoidance in diagnostic interviews and clinician-administered symptom rating scales, this same pattern of increased resilience was observed.

This current analysis investigates the relationship between depression/anxiety and avoidance using ADHD symptoms as a moderator. Researchers Knouse and colleagues (2013) found that ADHD symptom severity is correlated with depressive symptoms, but this relationship is mediated by behavioral avoidance. Knouse and Mitchell (2015) also noted that patients with ADHD exhibit overly positive automatic thoughts (OPATS) and set overly optimistic goals that conflict with therapeutic behavioral strategies like active coping; this phenomenon was coined positively valenced cognitive avoidance, and it allows patients to

escape from negative emotions associated with the development of depression risk factors typically seen in individuals suffering from ADHD as discussed earlier.

After reviewing prior literature, I hypothesize that ADHD will positively moderate, or strengthen, the positive relationships between depression/anxiety and avoidance. For this analysis, 101 participants completed baseline scale measures of symptoms of ADHD, depression, generalized anxiety, and avoidant-related behaviors. The scale scores were analyzed in SPSS, primarily using Andrew Hayes' PROCESS program to test for moderation.

Method

Participants

Data collection took place during the spring semester of 2021 and continued until 102 participants with both baseline and follow up visit data was obtained. However, one participant was excluded from the analyses due to only completing one EMA survey, culminating in $n = 101$ participants.

Table I. Sample Demographics.

<i>N</i>	101
Age (SD)	19.70 (1.15)
Gender (%)	
Male	23 (22.8)
Female	74 (73.3)
Non-Binary	1 (1.0)
Missing	3 (3.0)

Race (%)	
White/Caucasian	62 (61.4)
Black/African American	12 (11.9)
Asian	22 (21.8)
Pacific Islander	1 (1.0)
Native American	0 (0)
Other	10 (9.9)
Ethnicity (%)	
Hispanic	14 (13.9)
Non-Hispanic	87 (86.1)
Sexual Orientation (%)	
Asexual	6 (5.9)
Bisexual	10 (9.9)
Gay/Lesbian	3 (3.0)
Heterosexual/Straight	78 (77.2)
Pansexual	3 (3.0)
Queer	2 (2.0)
Prefer Not to Answer	2 (2.0)
First-Gen College Student (%)	
Yes	18 (17.8)
No	71 (70.3)
Missing*	12 (11.9)
Work for Pay (%)	
Yes	62 (61.4)
No	27 (26.7)
Missing*	12 (11.9)

Note. Participants were able to check more than one race and sexual orientation category. *Some entries for these variables were missing because they were added shortly after data collection began.

Measures

Barkley Adult ADHD Rating Scale IV (BAARS-IV; Barkley, 2011). The BAARS-IV is an 18 item self-report scale designed to measure ADHD symptoms. It has 4 subscales with 4-9 items each: Inattention, Hyperactivity, Impulsivity, and Sluggish Cognitive Tempo. Participants are asked to report the frequency in which they have experienced behaviors related to these

ADHD symptom subscales in the past 6 months and respond on a 4-point scale ranging from 1 (never or rarely) to 4 (very often). Evidence of the reliability and validity for BAARS comes from a sample of 1,249 adults (test-retest reliability of 0.75 at 2-3 weeks and internal consistency of 0.91). In the current sample, internal consistency for the total scale (items 1-18) was similarly good ($\alpha = 0.85$). Items 1-18 were used for measuring total ADHD symptoms, items 1-9 were used for measuring inattention items specifically, and items 10-18 were used for measuring impulsive/hyperactive symptoms.

Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a self-report assessment of symptoms of depression. Participants are tasked with reporting how often they experienced depressed thoughts and feelings in the past week. Examples of these depressed thoughts and feelings items include statements such as: “my sleep was restless” or “I could not get ‘going,’” and responses range from 0 (rarely or none of the time; under 1 day) to 3 (most or all of the time; 3-4 days). Internal consistency of CES-D was very good in this study ($\alpha = 0.91$). All 20 CES-D items were used to measure total depressive symptoms.

General Anxiety Disorder-7 (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006). The GAD-7 is used to assess participant symptoms of generalized anxiety in the past two weeks and how intrusive these symptoms are. The scale includes items like “feeling nervous, anxious, or on edge” and “trouble relaxing,” with participant responses ranging from 0 (not at all sure) to 3 (nearly every day) when asked how often they have been bothered by these symptoms. Internal consistency for the GAD-7 scale was $\alpha = 0.84$. All 7 GAD-7 items were used in this study to measure total anxiety symptoms.

Cognitive-Behavioral Avoidance Scale (CBAS; Ottenbreit & Dobson, 2004). The CBAS is used to measure symptoms of both cognitive and behavioral avoidance, and participants completing the CBAS rate the validity of 21 statements such as “I avoid attending social activities” on a scale of 1 (not at all true) to 5 (extremely true). For this study, internal consistency for the CBAS was solid ($\alpha = 0.87$). All 21 items on the CBAS were used to measure total avoidance symptoms.

Recruitment and Screening

Participants in this study were current University of Richmond undergraduate students aged 18 and older that lived on campus and owned a smartphone. They were recruited via online flyers, email advertisements, and social media postings.

Procedure

Participants completed a baseline visit (up to one hour) with a research assistant via Zoom, completed six days of EMA data collection, and a follow up visit one week after the baseline visit. Participants received three survey text messages per day - one each between 10AM and 2PM, 2PM and 6PM, and 6PM and 10PM. Surveys were sent a minimum of two hours apart and participants had two hours to respond to each survey prompt, at which point the survey link became inactive. A reminder was sent 30 minutes after the initial messages. Participants received a \$20 Amazon Gift Code for completing the baseline and follow up visits and an additional \$0.50 for each EMA survey completed for up to \$29.00 total payment. Participants who completed more than 75% of the surveys were also entered into a raffle to win one of two \$100 Amazon Gift Cards at the completion of the study. For this study, only the baseline data and one variable from the post data were analyzed.

Plan of Analysis

To test the moderator effect, I performed a multiple regression analysis with the data in SPSS using the PROCESS program, Model 1 (Hayes, 2022). The analyzed variables were BAARS (ADHD Symptoms), CES-D (Depression), GAD-7 (Anxiety), and CBAS (Avoidance). All of these analyses were pre-registered on Open Science Framework ([OSF](#)) *a priori*. I also performed an exploratory analysis to see if there was a short term longitudinal effect when using the independent variables (depression/anxiety) and moderator variable (ADHD) from the baseline visit and the dependent variable (avoidance) from the follow-up visit one week later. This analysis was exploratory because this study was not designed with a longitudinal analysis in mind given the 1-week time frame between baseline and follow-up visits. Finally, I conducted exploratory mediation analyses (PROCESS Model 4; not specified in pre-registration) following the same procedure as the moderation analyses, substituting ADHD as the independent variable due to prior research indications of ADHD as a risk factor for depression and anxiety-related disorder development as seen by Kessler and colleagues (2006) along with Yang and colleagues' (2013) previous work analyzing the relationship of ADHD and lower quality of life also mediated by depression and anxiety.

Results

Correlations between the four study variables of ADHD symptoms, depression symptoms, general anxiety symptoms, and avoidance measures indicate a significant relationship between all four variables within the 101 participant sample. All of these relationships are significant at $p = 0.01$ in a one-tailed analysis, and they are as follows: ADHD/depression = 0.53, ADHD/anxiety = 0.47, ADHD/avoidance = 0.36, depression/anxiety = 0.75, depression/avoidance = 0.56, and anxiety/avoidance = 0.49. The descriptive statistics of the

average scale scores can be viewed in Table 1, and the relationship values can be viewed in Table 2.

Table 1. Descriptive Statistics

	Mean	Std. Deviation
Average ADHD Scale Score	1.91	0.48
Average Depression Scale Score	1.98	0.57
Average Anxiety Scale Score	2.08	0.64
Average Avoidance Scale Score	2.07	0.61

Table 2. Correlation Matrix

	BAARS	CES-D	GAD-7	CBAS
BAARS	1			
CES-D	0.53*	1		
GAD-7	0.47*	0.75*	1	
CBAS	0.36*	0.56*	0.49*	1

Note: * indicates significance at the 0.01 level (1-tailed)

ADHD as a Moderator

The data indicate that, despite a significant relationship between all four study variables, ADHD symptoms do not significantly moderate the relationship between depression/anxiety symptoms and avoidance. However, there is a significant main effect relationship between symptoms of depression ($0.56, p < 0.001$) and avoidance along with symptoms of anxiety ($0.40, p < 0.001$) and avoidance. In this analysis, there was no significant main effect between ADHD symptoms and avoidance. All values can be viewed in Table 3.

Table 3. Results of Moderation Analysis Predicting Avoidance

	b	p
DEP	0.56	<0.001
ADHD	0.12	0.34
DEP*ADHD	-0.23	0.25
ANX	0.40	<0.001
ADHD	0.20	0.11
ANX*ADHD	-0.09	0.65

Exploratory Mediation Analysis

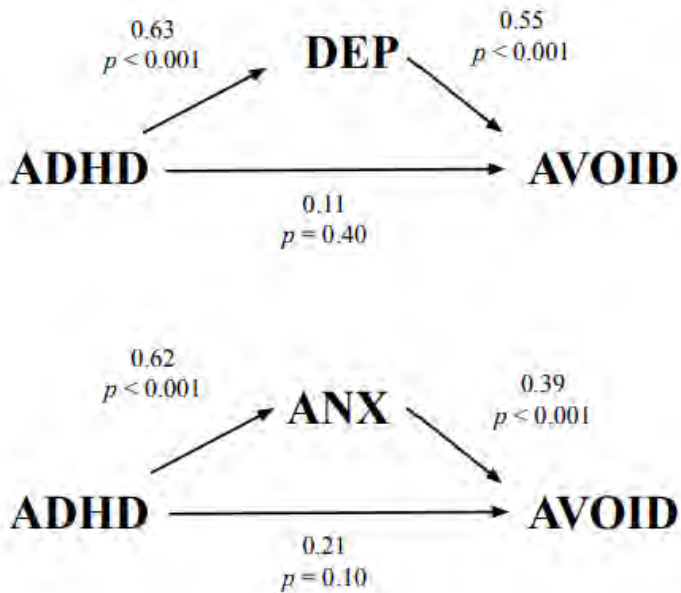
Because ADHD did not serve as a significant moderator for the relationships between depression/anxiety and avoidance, I conducted an exploratory mediation analysis to probe the actual relationship between these four variables indicated by their correlations (Table 2). From this, I found that the relationship between ADHD and avoidance is significantly mediated by both symptoms of depression and anxiety. The indirect effect of depression as a mediator was significant [95% confidence interval = 0.21 - 0.53], and the indirect effect of anxiety as a mediator was also significant [95% confidence interval = 0.13 - 0.41]. All direct effect values can be viewed in Table 4 and the mediation can be viewed in Figure 1.

Table 4. Results of Mediation Analysis Predicting Avoidance

	b	p
ADHD → AVOID (DEP)	0.11	0.40
ADHD → DEP	0.63	<0.001
DEP → AVOID	0.55	<0.001
ADHD → AVOID (ANX)	0.21	0.10

ADHD → ANX	0.62	<0.001
ANX → AVOID	0.39	<0.001

Figure 1. Mediations of Depression/Anxiety on ADHD and Avoidance Relationship



Short Term Longitudinal Effect Analysis

For this short term longitudinal analysis, all of the previous tests were conducted while substituting in the avoidance variable from participant post visits instead of the baseline visit while controlling for avoidance at time 1. Once again, ADHD symptoms did not significantly moderate the relationship between depression/anxiety symptoms and avoidance one week later. The significant main effect relationships between symptoms of depression and avoidance along with symptoms of anxiety and avoidance were not replicated when controlling for baseline avoidance. These values can be viewed in Table 5. Results from the mediation analyses were interesting, with the indirect effect of depression as a mediator not significant [95% confidence

interval = -0.03 - 0.15], but the indirect effect of anxiety as a mediator was significant [95% confidence interval = 0.01 - 0.16] when controlling for baseline avoidance. These specific values can be viewed in Table 6.

Table 5. Results of Short Term Longitudinal Moderation Analysis on Avoidance

	b	p
DEP	0.09	0.75
ADHD	0.01	0.98
DEP*ADHD	0.02	0.90
ANX	0.05	0.86
ADHD	-0.08	0.78
ANX*ADHD	0.06	0.67

Note: Analyses controlled for Time 1 avoidance.

Table 6. Results of Short Term Longitudinal Mediation Analysis on Avoidance

	b	p
ADHD → AVOID (DEP)	0.05	0.60
ADHD → DEP	0.45	<0.001
DEP → AVOID	0.13	0.12
ADHD → AVOID (ANX)	0.04	0.68
ADHD → ANX	0.45	<0.001
ANX → AVOID	0.16	0.02

Note: Analyses controlled for Time 1 avoidance.

Discussion

Based on the findings of the current study along with previous literature, ADHD symptoms and depression/anxiety symptoms are not independent contributors to avoidant-related behaviors. Instead, ADHD symptoms and depression/anxiety symptoms overlap in their

association with avoidance in that individuals presenting with higher ADHD symptom severity are more likely to report experiencing symptoms of avoidance, and this relationship may be accounted for by symptoms of depression/anxiety.

Despite significant correlations between all four study variables, ADHD did not act as a statistically significant moderator for the relationships between depression/anxiety and avoidance. Because prior literature indicates that depression and anxiety may also serve as mediators for the relationship between ADHD and other similar outcomes, I decided to further probe the nature of the relationship between these variables and run exploratory mediation analyses with ADHD as the independent variable and avoidance as the outcome variable. These results did indicate that depression/anxiety do significantly mediate the relationship between ADHD and avoidance. In the case of anxiety as a mediator, there is also evidence of a possible longitudinal relationship that should be replicated in subsequent studies. These findings are in accordance with other mediation studies like Yang et al. (2013) and Knouse and colleagues (2013).

Thinking of the clinical significance of these findings, I believe studies further analyzing the relationships between these 4 variables can help practitioners better identify and understand what symptoms their adult clients may be experiencing when reporting feelings of depression or anxiety, especially when said clients are also diagnosed with ADHD. This can allow clinicians to develop more accurate treatment plans that take into account comorbid symptoms of depression, anxiety, or avoidance their clients have. For developmental and clinical psychologists working with children, research in this area can also serve to assist in the formulation of intervention and prevention strategies that can reduce rates of depression and anxiety by targeting noticed patterns of avoidance, especially in children and adolescents with ADHD.

There are two key limitations to the current study that future research in this area can account for. The first is that this mediation analysis is cross-sectional, so it is difficult/impossible to determine which of the variables (ADHD, depression/anxiety, or avoidance) is causal in the relationship. A replication of this study could seek to perform an even more in-depth longitudinal study, potentially even recruiting participants prior to the onset or diagnosis of these aforementioned mental health disorders. Another limitation is that the participants of this study were not screened for mental health diagnoses in an attempt to create a generalizable and neurotypical sample. Future studies could seek to recruit participants that have received one or multiple relevant diagnoses (ADHD, MDD, GAD, etc.) to portray a more accurate depiction of clinical levels of these disorders, their symptoms, and their relationships.

Overall, this study found that a statistically significant relationship exists between symptoms of ADHD, depression, anxiety and avoidance. And for individuals with ADHD (or the presence of many ADHD symptoms), patterns and behaviors of avoidance are a likely outcome due to experiencing symptoms of depression and anxiety. This is important because studies like Ottenbreit et al. (2014) have found that patterns of avoidance are significantly more prevalent in groups with clinical diagnoses of depression and anxiety-related disorders than nonclinical groups. These patterns of avoidance are associated with many consequential outcomes of both depression and anxiety that creates a negative feedback loop: experiences of depression and anxiety increase the likelihood of endorsing avoidance-related behaviors, which in turn increase symptoms of depression and anxiety. Further research into this domain can help end the cycle for people suffering from depression and anxiety.

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