



Attachment Anxiety Moderates the Association Between ADHD and Psychological Distress

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Abstract

This study aims at examining the possible moderating role of attachment style in the association between ADHD and psychological distress, namely, anxiety and depression symptoms. Study included ninety nine participants: Sixty adults with ADHD diagnosis and thirty nine adults without ADHD or other neurological and/or psychiatric disorders. All participants completed the Patient Health Questionnaire (PHQ-9), State-Trait Anxiety (STAI) questionnaires, Emotion in Close Relationships (ECR-R) questionnaire and Adult ADHD Self-Report Scale–Version 1.1 (ASRS-v1.1). Adults with ADHD had greater symptoms of depression ($p < .001$) and anxiety ($p < .001$) than adults without ADHD. Process analysis yielded that attachment anxiety moderated the association between ADHD, anxiety and depression, therefore only adults with ADHD that had moderate to high attachment anxiety exhibited higher levels of depression ($p < .01$) and anxiety ($p < .001$). No moderating effect was observed for attachment avoidance. Moreover, we did not find correlations between ADHD, anxiety and depression when secure attachment was the moderator; indicating that secure attachment could serve as a “protective factor” against psychological distress among ADHD individuals. Among anxiously attached adults, ADHD was associated with higher levels psychological distress. These findings highlight the important role of attachment style in mental health of adults with ADHD.

Keywords Attachment style · adult ADHD · Anxiety · Depression

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Introduction

Recent studies have shown that Attention deficit/Hyperactivity Disorder (ADHD) symptoms are associated with high levels of anxiety [21, 30, 47, 55]. Similarly, ADHD was shown to be correlated with negative mood and depression (e.g., [13, 24, 32, 47]). One common explanation for the high prevalence of anxiety and depression in individuals with ADHD is related to the social implications of living with ADHD. Specifically, attention difficulties and other ADHD symptoms may lead to a chronic sensation of failure, frustration, disappointment, defeat and low self-esteem [47, 48, 55], while repeated life experiences of frustration can lead to negative self-beliefs [58], making anxiety and depression frequent. However, few studies on adults have investigated these associations while taking into account individual differences in psychological traits and interpersonal relationships. The current study examined the role of attachment style in predicting anxiety and depression symptoms among adults with ADHD.

Attention Deficit/Hyperactivity Disorder

ADHD is a neurodevelopmental disorder characterized by three major characteristics: inattention, impulsivity and/or hyperactivity [3, 23]. ADHD is increasingly recognized as a heterogeneous disorder with a complex etiology implicating multiple causal pathways which include genetic and psychosocial risk factors [45].

ADHD symptoms often persist into adulthood which have been related to environmental factors [17, 23], psychological and family factors, psychosocial adversity, parental psychopathology, marital discord [11, 56, 57], as well as psychological traits such as attachment style [34, 49, 54].

Attachment Style

Attachment theory is based on the notion of an innate psychobiological behavioral system. Children develop a close relationship with one major caretaker figure, which persists into adulthood and defines the ways in which individuals create emotional bonds with significant others (attachment figures) for protection, comfort and emotional support [14, 15, 44, 61].

In the optimal scenario, individuals build a stable sense of acceptance through interactions with their attachment figure (positive working model of self) and feel secure, because an attachment figure serves as a *safe haven* and as a secure base (i.e., is available and attentive in time of need) [14, 15, 44].

By contrast, when attachment needs are not met, individuals may develop a sense of attachment insecurity that results in the development of negative working models. These working models tend to persevere and effect a person's future close relationships [20, 31, 44].

Individual differences in attachment styles are commonly viewed as two parallel continuous dimensions: attachment anxiety and attachment avoidance [16, 50]. In this sense, *secure attachment* is located in a region where both anxiety and avoidance are low. This region is defined by a sense of attachment security, comfort, closeness, happiness and

eagerness to explore the surroundings [20, 31, 35, 44]. *Anxious attachment* defines the region in which anxiety is high and avoidance is low. This region indicates the extent to which a person worries and is afraid that attachment figures will not be available in times of need. By contrast, *avoidant attachment* defines the region in which avoidance is high and anxiety is low, indicating the extent to which a person mistrusts attachment figures and strives to keep him/herself independent and at an emotional distance from others. Unlike anxious and avoidant attachment, secure attachment may be considered a “protective factor” against future disorders such as anxiety and depression [1, 49, 54].

Attachment, Anxiety and Depression

Individuals with different attachment styles differ in their tendency to develop anxiety and depression. Studies have repeatedly shown that attachment anxiety and attachment avoidance are related to the onset of depression and anxiety (e.g., [41, 63, 64]). Insecurely-attached individuals have more anxiety symptoms [5, 21, 30, 47]), and higher negative mood or depression [22, 24, 32, 47] than securely-attached individuals. Attachment anxiety was reported to explain 72% of the variance in depression, and individuals with high levels of attachment anxiety were shown to have greater tendencies to develop negative expectations about the self or internal working models [21, 65].

In a meta-analysis examining the associations between insecure attachment and child and adolescent anxiety [21], attachment was moderately associated with anxiety, thus suggesting that anxiously-attached individuals were at a higher risk of developing anxiety than avoidant-attached individuals [6]. Similarly, Weems [62] found that insecure attachment, especially individuals classified as preoccupied and fearful, had significantly higher anxiety sensitivity scores than securely attached individuals in both high school and college participants [62].

Further support comes from studies examining the association between attachment style and depression. A less secure attachment style was found to be associated with greater severity of depression [4]. Insecure attachment strategies were also associated with increased reports of depressive symptoms among teens [36]. Studies that have explored the effects of insecure attachment suggest that insecure attachment increases vulnerability to higher anxiety symptoms (e.g., [5, 21, 62] and depressive symptoms [64, 65].

Attachment and ADHD

An increasing number of studies have investigated the relationships between attachment style and ADHD [30, 34, 49]. The crucial role of regulating physiology in both mechanisms has been argued to underlie the associations between insecure attachment (avoidance and anxiety) and ADHD symptoms [49]. A few studies have reported a higher prevalence of insecure attachment styles among children with ADHD [37, 54].

Since attachment theory can be viewed as an affect-regulation theory [43], it has been suggested that insecurely attached individuals, who have difficulties in self-regulation, may encounter difficulties controlling their impulses in various contexts throughout their lives [8]. Barkley [7] posited that ADHD is associated with a very specific impairment in executive functioning that is responsible for a set of interpersonal difficulties causing impaired

inhibition and emotional self-regulation. This has prompted the supposition that insecurely attached individuals can have characteristics resembling those of ADHD, including impaired strategies for coping with interpersonal stressors and difficulties in emotional and behavioral regulation such as impulse control, self-calming, persistence and patience, as well as social difficulties [34, 49]. These characteristics may negatively affect their interpersonal relationships and social skills [49], and tend to make them more susceptible to difficulties in emotional and behavioral regulation [34]. These problems also negatively affect their intimate relationships [10, 18, 46]. This governed the rationale in the current study to investigate the moderating role of insecure attachment style in associations between ADHD and anxiety on the one hand, and ADHD and depression on the other.

Previous findings suggest that individuals with ADHD tend to be at a higher risk for anxiety [30, 47, 55], mood disorders and depression [12, 13, 22, 24, 32, 47]. However, far less is known about the effects of insecure attachment on these associations.

The current study

The goal of the present study was to examine the relationships between ADHD, anxiety and depression in an Israeli sample, and to determine whether individual differences in attachment style would moderate this relationship. Specifically, we hypothesized that ADHD would be related to higher levels of depression and anxiety in participants with anxious and avoidant attachment styles, but not in participants with a secure attachment style.

Method

Participants

The sample was comprised of two groups of Israeli native Hebrew speakers. The test group was comprised of 60 adults (25 males and 35 females; education $M=13.32$, $SD=1.58$) with a confirmed ADHD diagnosis aged 18–59 ($M=26.85$, $SD=7.23$). The control group was comprised of 39 adults (17 males and 22 females; education $M=14.55$, $SD=2.24$) with no ADHD diagnosis or other neurological and/or psychiatric disorders, aged 19–72 ($M=36.49$, $SD=16.49$). Participants were recruited via ads posted on social networks and on campus. Eligible participants in the ADHD group had a valid diagnosis from a certified diagnostic institution. Nine participants were excluded during the analysis data stage because of missing data that could not be imputed later (participants were not available). Written consent was obtained from all subjects. Ethical approval for this study was obtained from the Institutional Ethics Committee.

Measures

All questionnaires were administered in a randomized order across participants, in order to avoid systematic effects of fatigue, cognitive/emotional arousal, etc.

Demographic Questionnaire

Personal and demographic information including age, gender and years of education was collected by self-report at the beginning of the study.

Patient Health Questionnaire 9 (PHQ-9)

A self-report depression assessment instrument providing both diagnostic criteria and a scale for rating the severity of depression symptoms. This scale is composed of nine questions based on the nine symptoms listed in the DSM–IV Criteria for Major Depressive Episodes (MDE) [52]. Items are rated on a 4-point Likert scale ranging from 0 *not at all* to 3 *nearly every day*. The sum of the nine questions yields the total severity score and can range from 0 to 27; higher scores indicate greater levels of depression. The internal consistency of the PHQ-9 has been shown to be high. A study involving two different patient populations reported Cronbach alphas of 0.86 and 0.89 [39]. Additionally, test–retest reliability had a high correlation at 0.84. The Hebrew version was developed by Glasser et al. [29]. The current study found the PHQ-9 to be highly reliable (Cronbach’s α = 0.84, Means and SDs are presented in Table 1).

State-Trait Anxiety Questionnaire (STAI)

A commonly used self-report measure of two distinct aspects of anxiety: state anxiety and trait anxiety [51]. Individuals are asked to respond to 20 statements on each subscale by indicating how accurately the statement applies to them. State anxiety items include: “I am tense; I am worried” and “I feel calm; I feel secure”. Trait anxiety items include: “I worry too much over something that really doesn’t matter” and “I am content; I am a steady person”. All items are rated on a 4-point Likert scale ranging from 1 almost never to 4 almost always. Scores range from 20–80 points on each of the scales, with higher scores indicating greater anxiety. Internal consistency coefficients for the scale have ranged from 0.86 to 0.95. This questionnaire was translated and adapted to Hebrew by Teichman and Melineck (1979), who found the

Table 1 Demographics and study variables for the ADHD and control groups

	ADHD (n = 55)		Control (n = 35)		Group difference
Gender (male, n [%])	25	(45.5%)	16	(45.7%)	$\chi^2(1) = 0.001$
Age (M [SD])	27.58	(7.11)	32.77	(12.84)	$t(47.43) = 2.19^*$
Education (years, M [SD])	13.44	(1.60)	14.26	(2.18)	$t(87) = 2.06^*$
ASRS (M [SD])	11.71	(4.04)	6.18	(3.91)	$t(87) = -6.35^{***}$
Attachment avoidance (M [SD])	3.12	(0.98)	3.02	(1.11)	$t(69) = -0.38$
Attachment anxiety (M [SD])	3.08	(1.16)	2.74	(0.84)	$t(85) = -1.44$
Trait anxiety (M [SD])	38.60	(11.66)	28.90	(6.28)	$t(77.78) = -4.85^{***}$
State anxiety (M [SD])	36.10	(11.88)	28.09	(6.27)	$t(80.51) = -4.03^{***}$
Depression symptoms (M [SD])	7.18	(4.86)	2.53	(3.95)	$t(80.46) = -4.92^{***}$

ASRS-A = adult ADHD self-report scale

* $p < 0.05$, *** $p < 0.001$

translated version to be highly reliable (Cronbach's $\alpha = 0.91$). The current study found the state-anxiety to be highly reliable (Cronbach's $\alpha = 0.94$), as well as the trait-anxiety scale (Cronbach's $\alpha = 0.93$). (Means and SDs are presented in Table 1).

Attachment Questionnaire

The Hebrew version of the 36-item Experiences in Close Relationships-Revised (ECR-R) scale was used to assess individual differences in attachment style [16, 28]. The ECR-R assess two dimensions of attachment security: anxiety and avoidance. The ECR-R has two 18 question subscales labeled "model of self" and "model of others" respectively. Items are rated on a Likert scale from 1 to 7, where 1 indicates *strongly disagree* and 7 indicates *strongly agree*. Higher scores in the "model of self" indicate more anxiety about rejection by others and feelings of personal unworthiness, whereas higher scores in the "model of others" indicate more interpersonal distrust and avoidance of closeness. In the current sample the Cronbach alphas for attachment anxiety and avoidance were 0.85 and 0.90' respectively (Means and SDs are presented in Table 1).

Adult ADHD Self-Report Scale–Version 1.1 (ASRS-v1.1)

In order to confirm ADHD as the discriminator between the test and control groups, participants completed the Adult ADHD Self-Report Scale (ASRS; [33]). The ASRS is a well-established self-report rating scale for assessing ADHD symptoms among individuals who are 18 years or older. The ASRS is composed of 18 items that are based directly on the diagnostic criteria of the DSM-IV ADHD diagnosis [2]. Each item requires respondents to rate how frequently a particular symptom of ADHD occurred over the past six months on a five-point Likert scale ranging from 0 *never* to 4 *very often*. The final score can range from 0 to 72, with higher scores indicating increased risk of ADHD. A sample item is "How often do you have problems remembering appointments or obligations". The ASRS scale is divided into sections (A and B). Part A consists of six questions and can be used alone as a short screening scale called the ASRS Screener (ASRS-S). This part is considered to be the most predictive of symptoms highly consistent with ADHD in adults (the total sum ranges from 0 to 24). The present study used the short version of the ASRS (Part A; ASRS-S). The ASRS has been translated into 50 languages and has been validated using the National Comorbidity Survey cohort and a representative sample from health plan members. Test–retest reliability is 0.58–0.77, and the internal consistency reliability of the continuous ASRS screener is 0.63–0.72 [13]. It has a sensitivity of 84% and a specificity of 66% [59]. The Hebrew version of the ASRS [38] was approved by the World Health Organization and has a high internal consistency (Cronbach's $\alpha = 0.89$). The current study found the ASRS-S to be highly reliable (Cronbach's $\alpha = 0.84$). (Means and SDs are presented in Table 1).

Experimental Procedure

The current study is a part of a broader research program conducted at The Neuropsychological Lab at Academic College of Tel Aviv-Jaffa. Prior to arrival, participants underwent a phone interview which included a screening questionnaire to verify that they met the inclusion criteria (participants with ADHD needed a valid ADHD diagnosis in order to participate), and excluding those

with history of developmental, medical, neurological or psychiatric disorders (other than ADHD). All eligible participants were scheduled for a 90-min, one-on-one single session. Individuals who reported to be clinically diagnosed with ADHD were asked for a copy of their clinical report for diagnostic verification. They were also asked not to take any medication on the day of the assessment.

Prior to the assessment, written informed consent was obtained from all participants. Subsequently, participants were given a brief explanation about the procedure, and then were asked to complete several cognitive tests and questionnaires. At the end of the procedure, those participants who were students received an academic credit.

Results

Descriptive Statistics

Table 1 presents the descriptive statistics for the two groups. ADHD group participants were younger and less educated than the control group participants. ADHD symptom scores were significantly higher among ADHD participants than the controls, confirming the group division. In order to examine whether age or education acted as intervening variables, the correlations between these variables and the dependent variables, namely, anxiety and depression measures, were calculated. None of the correlations reached significance.

Attachment scores did not differ between groups. As hypothesized, anxiety (both state and trait) and depression levels were higher among participants with ADHD as compared to controls.

Relationships Between Study Variables

As shown in Table 2, attachment avoidance scores and anxiety scores were negatively correlated. Avoidance was not related to any of the other variables. By contrast, attachment anxiety, trait and state anxiety and depression were all positively correlated.

Moderation Models

Moderation models were tested using Process command, model 1. Six models were tested, one for each of the dependent variables (trait anxiety, state anxiety and depression) and moderators (attachment avoidance and anxiety). The variables were mean centered prior to

Table 2 Pearson correlations between variables

	1	2	3	4
1. Avoidant attachment	-			
2. Anxious attachment	-0.35**	-		
3. Trait anxiety	0.03	0.56***	-	
4. State anxiety	0.12	0.46***	0.82***	-
5. Depression	0.04	0.35**	0.68***	0.60***

** $p < 0.01$, *** $p < 0.001$

Table 3 Effects of ADHD×Attachment interactions on depression and anxiety

<i>Avoidance moderation</i>								
Trait anxiety			State anxiety			Depression		
B (SE)	T	ΔR^2	B (SE)	t	ΔR^2	B (SE)	t	ΔR^2
-0.53 (2.48)	-0.22	0.00	0.02 (2.44)	0.01	0.00	0.35 (1.09)	0.32	0.00
<i>Anxiety moderation</i>								
Trait anxiety			State anxiety			Depression		
B (SE)	T	ΔR^2	B (SE)	t	ΔR^2	B (SE)	t	ΔR^2
5.39 (2.09)	2.58**	0.05**	6.48 (2.22)	2.92***	0.07***	2.83 (1.05)	2.68**	0.06**

** $p < 0.01$, *** $p < 0.001$

the analysis. The interaction effects are presented in Table 3. Attachment anxiety, but not attachment avoidance, moderated the relationship between ADHD, anxiety and depression. The conditional effects of ADHD on the dependent variables, at three levels of attachment anxiety, are presented in Table 4. As hypothesized, ADHD was related to higher levels of anxiety and depression in participants with high and moderate levels of attachment anxiety, but not in participants with low levels of attachment anxiety (more secure). The effects are presented in Fig. 1.

Discussion

The goal of the current study was to examine the role of insecure attachment style in the associations between ADHD, depression and anxiety. Whereas many studies have identified an association between ADHD and anxiety (e.g., Austin et al.; [62] and ADHD and depression (e.g. [24, 32, 47]), none have explored the moderating effects of attachment style on these associations.

In line with previous studies and consistent with our hypothesis, our findings indicate that adults with ADHD had significantly higher levels of depressive symptoms and higher levels of trait-anxiety and state-anxiety than the controls. However, unlike previous studies [37, 54], the findings here indicated that the attachment style of participants with ADHD did not differ from that of the controls.

We hypothesized that higher levels of insecure (anxious and avoidant) attachment would be associated with greater anxiety and depressive symptoms in participants with ADHD compared to the control group. We found evidence for this hypothesis in anxiously-attached individuals, but not in avoidant-attached individuals. Specifically, attachment

Table 4 ADHD effects on anxiety and depression, at three levels of attachment anxiety

Attachment anxiety	Trait anxiety		State anxiety		Depression	
	B (SE)	T	B (SE)	T	B (SE)	t
Low (M-1SD)	3.35 (2.68)	1.25	1.10 (2.92)	0.38	1.66 (1.35)	1.24
Moderate (M)	8.93 (1.90)	4.71***	8.03 (2.04)	3.93***	4.57 (0.96)	4.77***
High (M+1SD)	14.51 (3.05)	4.75***	14.96 (3.33)	4.49***	7.47 (1.54)	4.86***

*** $p < 0.001$

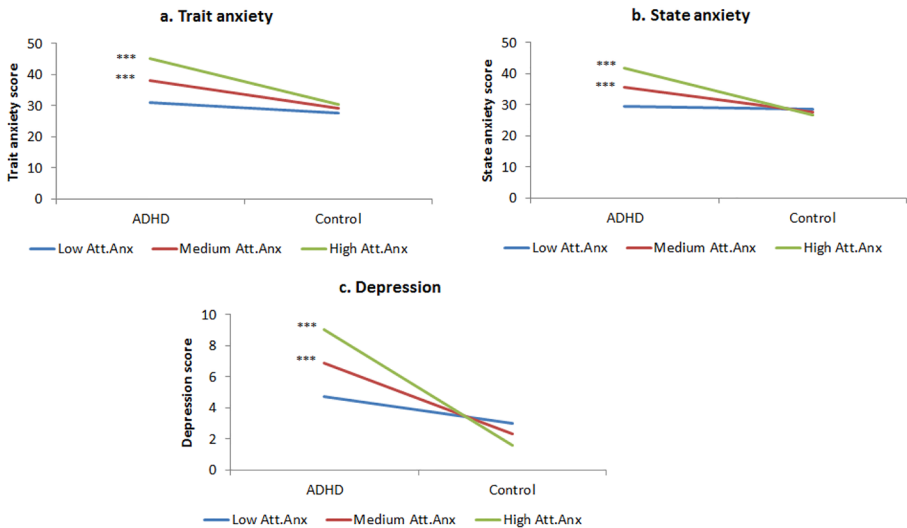


Fig. 1 Attachment anxiety moderated the relationship between ADHD and trait anxiety, state anxiety and depression. $***p < .001$. Att.Anx = Attachment anxiety

anxiety moderated the associations between ADHD and depression and anxiety symptoms, in that depressive and anxiety symptoms were only greater in ADHD adults with moderate and high attachment anxiety.

Our results are consistent with previous research reporting that adults with ADHD are at higher risk for anxiety and depressive disorders, especially anxiously-attached individuals who have difficulty regulating their emotions [25], tending to experience more stress and anxiety [48, 55]. One explanation for this effect is that the combination of attachment anxiety, which is characterized by amplified responses to threat and danger [9, 26], with symptoms of ADHD such as impairment in coping with interpersonal stressors [49], make the individuals more susceptible to experiencing anxiety and, in the case of a lack of the fulfillment of their emotional needs, to depression.

This explanation is in line with findings suggesting that anxiously-attached individuals tend to engage in hyperactivating and ineffective strategies to seek greater proximity and attract attention in time of need [20, 19, 44]. These ineffective strategies keep them constantly vigilant to purported threat-related cues of unavailability, in turn, they intensify distress [20, 44] and exaggerate expressions of anxiety to increase and maintain proximity with others [21]. Anxiously-attached individuals usually tend to show lower levels of self-regulation, ego-control and ego-resiliency, and are more vulnerable to developing anxiety disorders later on [53, 60]. Taken together, anxiety may thus be a reinforcing factor specifically for anxiously-attached individuals who have ADHD, because it exposes them to frequent negative situations (i.e., they use anxiety to create excessive internal control instead of avoiding conflict situations due to their impulsiveness).

Interestingly, we did not find a correlation between avoidant attachment, anxiety and depression, or that attachment avoidance moderated the association between ADHD, anxiety and depression. These results are consistent with other results which show that avoidant-attached individuals are at less risk for developing anxiety and general psychopathology than anxiously-attached individuals [6, 21]. One possible explanation is that avoidant individuals express their perceived unworthiness and difficulty in eliciting proximity when distressed by avoiding attending to potentially threatening information [27]. Thus, they do

not show distress and minimize attachment as a way to deal with the negative reactions of the rejecting other. Avoidant-attached individuals may have given up relying on others, and hence are more likely to rely on themselves to meet their basic psychological needs to manage their distress [65]. As a result of their mistrust in their attachment figure's ability to alleviate their distress, they tend to engage in "deactivating strategies" designed to "shut down" the attachment system to deny their needs (Cassidy & Kobak, 1988; [44]. They deny anger and rely on ineffective problem solving (Collins & Feeney, 2000, [19, 20], Mikulincer & Shaver, 2007, 2008), and are more likely to be unaware of their psychological needs because they have learned that these needs are part of what makes them unlovable [65]. It has been suggested that these "deactivating strategies" are related to externalizing and not internalizing behaviors [21].

With respect to anxiety and depressive symptoms, avoidant and secure adult ADHD individuals seem to function better than anxiously-attached individuals. Attachment security may serve as a "protective factor" against anxiety and depression by engaging in the *primary* attachment strategy of *proximity seeking* [42], which increases the use of effective emotional regulation strategies in time of need [20, 28, 35], Mikulincer & Shaver, 2007, 2008). This strategy aims at decreasing stress and anxiety and includes optimistic beliefs about others' trustworthiness and goodwill as well as sense of self-efficacy, and the ability to acknowledge and express distress [20, 44]. Attachment security was found to have a positive effect on certain areas of competency which are difficult for children with ADHD. For example, attachment security in early childhood was reported to be associated with cognitive impulse control and task orientation [34]. A recent study reported that attachment provides a comprehensive yet parsimonious foundation for psychotherapy research, and can enhance treatments, help personalize care and account for the process of psychotherapeutic change [40]. This suggests that investing efforts in longitudinal research could provide invaluable insights into the role of secure attachment as a psychotherapeutic moderator of ADHD-anxiety and ADHD-depression and in general.

To the best of our knowledge, the present study is the first to consider insecure attachment style as a moderator of the association between ADHD-anxiety and ADHD-depression. Importantly, these findings pinpoint the possible role of adults' secure attachment as a "protective factor" against future disorders. In the current sample, securely attached adults did not show higher anxiety and depressive symptoms, even when they were diagnosed as having ADHD.

Limitations and Future Directions

This study is novel in its focus on attachment style as a moderator of the associations between ADHD, depression and anxiety in adults. There are, however, certain limitations to this study that can serve as directions for future exploration. First, the present study was limited by its small sample size and unequal group numbers, as well as in terms of the age differences between the groups. Although we did not find significant effects with respect to these variables, they could still be a potential source of bias. Future research should examine potential age effects in the association between ADHD, attachment style, anxiety and depression. Our small number of avoidant-attached ADHD participants, compared to the anxiously-attached ADHD participants, may also have been responsible for the lack of findings for this group.

Second, the present study was limited to self-report measures and was therefore subject to demand characteristics. Future studies would benefit from the inclusion of clinical

interviews to assess psychopathology symptoms (i.e. anxiety and depression) to eliminate possible self-report bias. Moreover, the present findings were collected at one point in time and did not indicate causality. Future studies should examine the longevity of the role of attachment styles and their effects on anxiety and depressive symptoms in adults with ADHD to facilitate validation and generalization of the findings.

It is important to note that the current study focused on attachment as a moderator of the anxiety and depressive effects of ADHD. Future studies could consider other important variables which may moderate this association such as coping style, self-esteem, self-efficacy etc.

Overall, the current study explored the association between ADHD, individual differences in attachment styles, and anxiety and depressive symptoms. The findings highlight significant group differences between adults with and without ADHD on anxiety and depression measures, suggesting that anxiously-attached adults with ADHD have higher levels of anxiety and depressive symptoms than avoidant-attached adults, secure-attached adults and adults without ADHD.

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Data Availability The data that support the findings of this study are available from the corresponding author, [O.E], upon reasonable request.

Declarations

Conflicts of Interest None

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