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Attachment and ADHD in Relation to Adolescents Academic Self-Concept and General Self-Esteem

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ABSTRACT

Previous studies have identified ADHD and insecure attachments as co-occurring factors that negatively predict an individual's self-concept. The extant literature has not considered how co-occurring ADHD behaviors and specific attachment characteristics (such as emotional availability) as dimensional constructs may relate to the academic self-concept and general self-esteem. This study aimed to determine how co-occurring, dimensional models of ADHD behaviors and attachment characteristics relate to the academic self-concept and general self-esteem of upper secondary school students in England. ADHD behaviors and attachment characteristics were regressed onto the academic self-concept and general self-esteem of students, with interactions tested using latent-interaction structural equation modeling (LI-SEM). Results showed that ADHD behaviors and attachment characteristics negatively predicted general self-esteem in an additive fashion. However, only ADHD behaviors and emotional availability were found to additively predict the academic self-concept. No interactions between ADHD behaviors and attachment characteristics reached statistical significance. It was concluded that the co-occurrence of attachment characteristics and ADHD behaviors were likely to lead to more frequent negative feedback than in cases of single manifestation, due to the greater frequency of academically contrary behavior which would account for the negative additive effect exhibited.

Introduction

Attention deficit hyperactivity disorder (ADHD) and attachment styles are heavily related constructs (Storebø et al., 2016) that have historically been considered to be categorical in nature. Indeed, ADHD is typically considered as 'present' or 'absent' due to a number of genetic and environmental factors (Aksoy, 2018; Tarver et al., 2014) and further categorized as a certain diagnostic type (McLennan, 2016). However, categorical models of ADHD fail to appropriately recognize the breadth of ways in which ADHD may manifest. Research has suggested that the 'symptoms' of ADHD do not present as a qualitative differentiation in functioning, only a quantitative one (Coghill & Sonuga-Barke, 2012) where the behaviors which characterize ADHD are only different because they are extreme manifestation (Frazier et al., 2007; Marcus & Barry, 2011).

Similarly, attachment has been considered to be one of a number of 'styles,' despite classic attachment types failing to appropriately capture the range of attachment behaviors individuals may demonstrate (Fraley & Spieker, 2003a). Indeed, Fraley and Spieker (2003a) suggested that a categorical model of attachment is insufficient and that attachment styles are instead comprised of a series of dimensional constructs including seeking/avoidant strategies, angry/resistant strategies, and perceived security (Fraley & Spieker, 2003b).

Due to the relatedness of both ADHD and attachment to self-perception, both have often been researched with the self-concept, this is because ADHD and attachment manifest as behaviors or actions in an individual which draws feedback from others. This feedback informs the self-concept of an individual (Kawamoto, 2020; Marcum & Pond, 2018; Paulus et al., 2018; Perifanou, 2020). ADHD and attachment

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have specifically been related to the academic and general facets of the overall self-concept, which is a multidimensional, hierarchical, descriptive and evaluative encompassing our perceptions of ourselves and our abilities (Marsh & Shavelson, 1985; West & Fish, 1973). The multidimensional and hierarchical components of the self-concept refer to the structure of the construct with the overall self-concept of the individual sitting at the apex and being stable over time, although it is comprised of lower-order factors that are domain specific such as the social self-concept or Mathematics self-concept as two examples (Marsh et al., 1988).

ADHD behaviors,¹ such as inattention, hyperactivity, and impulsivity negatively correlate with both the academic and general self-concept (Marcum & Pond, 2018; Perifanou, 2020). In addition, attachment has been demonstrated to predict the self-concept both positively and negatively dependent upon the attachment experience received (Kawamoto, 2020; Paulus et al., 2018).

Despite previous studies demonstrating the related need between ADHD behaviors, attachment and the self-concept (e.g., Kawamoto, 2020; Marcum & Pond, 2018), they have focused on ADHD and attachment as categorical constructs (such as specific attachment styles or present/absent) and independently despite their co-occurrence and dimensionality.

The co-occurrence of ADHD behaviors and maladaptive attachment characteristics (such as latent feelings of anger/distress or insecurity) has been suggested by Dealy et al. (2019) to occur due to the presence of ADHD behaviors impairing attachment formation. It has been suggested that executive functioning and social cognition problems that arise from ADHD behaviors account for the difficulty in attachment formation. As both ADHD behaviors and maladaptive attachment characteristics have been suggested in previous studies (see Paulus et al., 2018; Wu, 2009) to be independently associated with a negative self-concept, the co-occurrence between ADHD behaviors and certain attachment characteristics could potentially be associated with a worse self-concept than in cases of independent manifestation. This could be due to greater/more frequent experienced problems in incidences of co-occurrence (Mychailyszyn et al., 2010) which amounts to more adverse feedback and a worse impact on the self-concept.

There is a need to explore whether the co-occurrence of maladaptive attachment characteristics and ADHD behaviors lead to a worse outcome on the academic self-concept and general self-esteem than in the case of singular manifestations. This is because the self-concept can have far-reaching implications, being directly related to an individual's mental health and their academic functioning (Suldo et al., 2011), with better academic functioning improving an individual's overall life chances (Aisa et al., 2019; Arsani et al., 2020). Therefore, the present study will explore how specific attachment characteristics and ADHD behaviors relate to the academic and general self-concept in a sample of sixth-form college/upper secondary school students (Boden et al., 2008; Kansky et al., 2016).

The self-concept and its implications

The self-concept is defined as our perception of ourselves including our abilities, skills, appearance, and acceptance (West & Fish, 1973). The self-concept is a multifaceted, hierarchical, structure that is both descriptive and evaluative with overall self-concept/self-esteem at the apex (Marsh & Shavelson, 1985). The overall self-concept is comprised of non-academic and academic sub-facets which are then comprised of more specific elements.

The self-concept is informed by and constructed from feedback which can include praise/sanctions from teachers and parents, grades/test scores, and other information such as perceptions of peer competency and social comparison (see Bouchey & Harter, 2005; Buhs, 2005; Cole et al., 1997; Marsh, 1986; Marsh & Hau, 2004; Marsh & Yeung, 2001). In past research, the academic and general self-concept has been linked to mental health (Marsh et al., 2004) and academic functioning (Suldo et al., 2011). For example, subject-specific facets of self-concept were found to significantly predict subject-specific grades and general aspirations (Bodkin-Andrews et al., 2010; Marsh, 1986, 1990; Marsh et al., 1988) while the general self-concept predicts school performance (Pullmann & Allik, 2008).

¹ADHD behaviors represent the 'symptoms' of ADHD, which are inattention, hyperactivity and impulsivity but do not assume that a diagnosis is present, rather a normal distribution of these behaviors in a population with the assumption that these behaviors are present as a dimensional construct.

The relations between ADHD and the self-concept

Although research has demonstrated that ADHD behaviors are associated with a worse general self-concept (Marcum & Pond, 2018; Perifanou, 2020), there is little research that has outlined that ADHD behaviors specifically relate adversely to the academic self-concept. Only one study (Scholtens et al., 2013) has suggested a link between ADHD behaviors and academic self-concept demonstrating that ADHD symptoms negatively predict academic achievement both concurrently and longitudinally. Despite little past research on ADHD behaviors and the academic self-concept, there is substantial research showing that ADHD behaviors adversely relate to academic functioning and performance (Kent et al., 2011; Krasner, 2019; Wood et al., 2019) which is influential in the formation of the academic self-concept.

Relations between attachment and the self-concept

Attachment is also linked to the self-concept (see Kawamoto, 2020; Paulus et al., 2018) through two simultaneous and complementary pathways, whereby attachment to parents predicts academic achievement, motivation, capability, functioning, attention, participation (Duchesne & Larose, 2007) and adjustment, grade point average, attitude toward academia, and scholastic skills (Larose et al., 2005). Whereas attachment to teachers is linked to adaptive in-school functioning (such as motivation and positive behaviors in class) and subjective wellbeing (Bergin & Bergin, 2009). However, past research has focused on specific attachment styles in relation to the self-concept rather than a dimensional model of attachment. Despite these limitations, it is possible to infer how dimensional models of attachment characteristics may relate to academic self-concept by exploring the relations between how attachment styles and academic functioning. However, this requires two assumptions, firstly that the ‘classic’ attachment styles found in Ainsworth and Bell (1970) research can be interpreted dimensionally. Secondly, that academic functioning can be considered to be linked to the academic self-concept. Fortunately, both of these assumptions hold. Fraley and Spieker (2003a, 2003b) suggested that the classic attachment styles suggested by Ainsworth and Bell (1970) could be considered dimensionally and research has demonstrated that academic functioning is linked to the academic self-concept due to feedback mechanisms (see Marsh & Craven, 2006; Marsh & O’Mara, 2008).

Why should ADHD and attachment be considered in tandem in their relation to the self-concept?

Both ADHD behaviors and maladaptive attachment characteristics are associated with worse academic and general functioning (for example, Kent et al., 2011; Krasner, 2019; Wood et al., 2019) and in some research, worse academic and general self-concept in students (Marcum & Pond, 2018; Paulus et al., 2018; Scholtens et al., 2013). However, much of this previous research has focused on ADHD and attachment independently of the self-concept. This fails to acknowledge the relatedness between them (e.g., Finzi-Dottan et al., 2006; Storebø et al., 2016) which could potentially result in drawing incorrect conclusions about the relation ADHD or attachment may have to the self-concept due to untested co-occurring ADHD/attachment for example (Rutter, 1997).

The presence of ADHD behaviors disrupts attachment formation due to executive functioning deficits influencing self-regulation problems which impact areas such as understanding/reading parental cues (Dealy et al., 2019). As ADHD behaviors are thought to disrupt attachment formation, these must occur before attachment begins. Indeed, there is strong evidence of a genetic basis to ADHD (Aksoy, 2018) and the presence of ADHD behaviors in early childhood (Larsson et al., 2006) which could impact attachment formation. The attachment and ADHD relations have been suggested to be most likely bidirectional whereby ADHD genes predispose a child to act negatively, and parent’s responses maintain or even exacerbate the behavior further (Tarver et al., 2014).

Past research has suggested that the co-occurrence of maladaptive attachments and ADHD behaviors is linked to worse outcomes than in cases of maladaptive attachment or ADHD alone (Mychailyszyn et al., 2010). However, it is not known whether the greater deficit experienced in incidences of ADHD behavior and maladaptive attachment co-occurrence also extends to greater problems with the academic self-concept and general self-esteem. Co-occurring ADHD behaviors and maladaptive attachments could result in

a worse relation to the academic self-concept and general self-esteem through either one of two mechanisms.

Firstly, it could be possible that ADHD behaviors and attachment characteristics are summative whereby maladaptive attachment characteristics and ADHD behaviors cumulate to a worse experienced deficit and therefore academic and general self-concept, perhaps due to greater manifesting problems leading to more negative feedback to the self-concept. Secondly, co-occurring ADHD behaviors and attachment characteristics could result in a worse relation to the academic self-concept and general self-esteem through an interactive/moderation effect as suggested in the work of Scharf et al. (2014). Therefore, secure (or insecure) attachment characteristics could moderate the relation between ADHD behaviors and the self-concept possibly by changing how feedback from others is interpreted or even relayed for example.

In the absence of definitive theorizing, both interactive and summative effects of ADHD and attachment in relation to the self-concept will be explored in the present study.

Aims of the study

- (1) How are attachment characteristics and ADHD behaviors related to the academic self-concept and general self-esteem of adolescents?
- (2) Is there an additive or summative effect evident in the relations between attachment characteristics and ADHD behaviors in relation to an individual's academic self-concept and general self-esteem?

Hypothesis 1: Attachment characteristics will be positively correlated with the academic self-concept and general self-esteem.

Hypothesis 2: ADHD behaviors will be negatively correlated with the academic self-concept and general self-esteem.

Method

Sample

There were 564 participants (male $n = 118$, female $n = 439$, missing $n = 7$) included in the study. Participants were upper secondary students aged between 16 and 19 years of age ($M = 17.00$, $SD = .60$) from five sixth-form colleges² in England and were of varying ethnicity (white ethnicity $n = 393$, Asian ethnicity $n = 110$, black $n = 26$, other $n = 29$, missing $n = 6$). All participants studied at least one social science (philosophy, psychology or sociology). Sixth-form colleges are academically focused education providers in the UK, they focus on offering A Level qualifications and are a typical route of progression for those students leaving secondary school.

There were 207 cases of missing data (33%) in the entire data set including data missing from the demographic variables. The missing data were primarily localized to the general self-esteem questions (percentage of missing data from the items in this section of the questionnaire ranges from 1.2% to 2.8%) In the questionnaire administered to participants, this was the last page on a double-sided two-sheet questionnaire. Therefore, it is likely the reason for mostly GSE items being missed was due to participants not turning over the page. Little's test could not confirm that the data were missing completely at random, so the data was assumed to be missing at random ($\chi^2 = 1688.87$, $p < .001$, $df = 1423$) and handled through full information maximum likelihood (FIML) estimation in MPlus v.8 (Muthén & Muthén, 2020).

²A tier of academic track upper secondary education.

Instruments

The revised adolescent attachment questionnaire

The RAAQ (Bodfield et al., 2020) is a 12-item, three-factor instrument originally designed by West et al. (1998) designed to measure latent feelings of anger and distress (angry-distress), the perceived availability of the attachment figure (availability) and the extent to which the adolescents acknowledge the attachment figure as an independent person (goal-corrected partnership). Internal consistency of the data gathered from the RAAQ in the present study demonstrated reasonable to good internal consistency (angry-distress: Cronbach's $\alpha = .63$, McDonald's $\omega = .68$; availability: Cronbach's $\alpha = .83$, McDonald's $\omega = .83$; goal-corrected partnership: Cronbach's $\alpha = .75$, McDonald's $\omega = .75$)

The data collected from the RAAQ in previous research has demonstrated moderate to good internal consistency in multiple studies ranging from its original conception by West et al. (1998) [Cronbach's $\alpha = .62-.80$] to the later revision by Bodfield et al. (2020 [Cronbach's $\alpha = .70-.83$]) and a comparative study conducted by Sochos and Lokshum (2017) between two attachment questionnaires in Nepali adolescents (Cronbach's $\alpha = .49-.86$).

The self-description questionnaire 3. The academic self-concept and general self-esteem subscales of the SDQ3 (Marsh & O'Neill, 1984) were found to be two-factor higher-order structures. The academic self-concept subscale was comprised of affective and cognitive factors whereas the general self-esteem subscale was comprised of positive and negative factors. The academic self-concept subscale was comprised of 10 items and the general self-esteem subscale was comprised of 12 items. Data collected from each subscale was found to demonstrate excellent internal consistency of both the academic self-concept and general self-esteem subscales according to the Cronbach's α scores (Cronbach's $\alpha = .87$ and $.93$). However, McDonald's ω H scores were less than desirable for both the academic self-concept and general self-esteem subscales (McDonald's ω H = $.60$ and $.63$), therefore, any parameters using the higher-order factor are likely to be underestimated.

The SDQ3 (Marsh & O'Neill, 1984) has been substantially validated during its conception with the instrument demonstrating reasonable psychometric properties, including reasonable factor loadings between items and their corresponding factors (academic self-concept $> .44$, general self-esteem $> .55$), low correlation between factors (median $r = .09$) and the same findings holding for a second round of confirmatory factor analyses carried out by Marsh and O'Neill (1984) at the time of the construction of the instrument.

The adult ADHD self-report scale

The ASRS (Kessler et al., 2005) was adapted before use in the measurement of ADHD behaviors in the project with items reframed to an educational context to be suitable for use in an adolescent population. Furthermore, the instrument was reduced from 18 items to six, with only Section A utilized, these six items were found to load successfully on one factor. Data gathered using the adapted six-item ASRS (Kessler et al., 2005) in this project was found to demonstrate reasonable internal consistency (Cronbach's $\alpha = .62$, McDonald's $\omega = .64$).

The ASRS (Kessler et al., 2005) has demonstrated significant test-retest reliability, $r = 0.58-0.77$ (Kessler et al., 2007), sensitivity ($r = 1.0$) and specificity ($r = .71$ [Hines et al., 2012]) in detecting true positive and negative scores.

Procedure

Ethical approval for this research project was provided by an institutional research ethics committee. Representatives identified from the sixth-form colleges identified for use in the project were contacted via telephone or e-mail to introduce the project and gauge interest in participation. Following the declaration of interest, information sheets and consent forms were forwarded to the contact at the institution to sign and return before taking part in the project.

The sixth-form colleges acted as an intermediary to students to explain the research project and procedure. Identified participants were supplied with a participant information sheet and consent in advance of the project taking place.

The questionnaire delivered comprised of the RAAQ (Bodfield et al., 2020), the academic self-concept and general self-esteem subscales of the SDQ3 (Marsh & O'Neill, 1984) and the adapted version of the ASRS (Kessler et al., 2005). Questionnaires were completed during term time and in participating classes.

Analyses

Measurement model

Mplus v.8 (Muthén & Muthén, 2020) software was used for the confirmatory factor analysis and latent interaction structural equation modeling. In the confirmatory factor analysis, the posited factor models of attachment characteristics, ADHD behavior, academic self-concept and general self-esteem were all tested before the exploration of the role of attachment characteristics and ADHD behavior in influencing academic self-concept and general self-esteem.

Covariates were included in the measurement model with covariates binary scored gender (male = 0, female = 1 [individuals who did not select a gender were treated as missing data]) and heritage transformed into specific variables which were also binary scored (absent/false = 0, present/true = 1). Correlations between predictor and outcome variables were established from the constructed measurement model.

To determine the suitability of the fit between the model and data root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), tucker lewis index (TLI) were all compared against the cutoff values suggested by Hu and Bentler (1999): RMSEA < .06, SRMR < .08, CFI > .95 and TLI > .95.

Latent interaction structural equation modeling

Following the creation of the measurement model to test the theoretical factor structures of attachment characteristics, ADHD behaviors and both the academic self-concept and general self-esteem two further models were constructed. Model 1 explored how the predictor variables regressed onto the outcome variables without an interaction variable present. Model 2 explored the same relationships with the inclusion of an interaction variable between each attachment characteristic and ADHD behaviors.

Gender, age and ethnicity (black, Asian, other) were included as covariates in both Model 1 and 2. Other heritages captured all heritages that were not listed or did not have a large enough sample size to be a category.

Both Model 1 and Model 2 were also compared competitively to determine which offered the best fit between model and data and which had a significant advantage over the other. Akaike information criterion (AIC), Bayesian information criterion (BIC), R^2 and D scores were used to determine this.

Results

Descriptive statistics

The descriptive statistics of the predictor (attachment characteristics and ADHD behaviors) and outcome variables (academic self-concept and general self-esteem) are reported in Table 1, including mean scores, standard deviation and skewness.

Table 1. Descriptive statistics for ADHD behaviors, angry-distress, availability, goal-corrected partnership, academic self-concept and general self-esteem.

	Range	Mean	SD	Skewness	Kurtosis
ADHD	5–50	14.83	3.05	0.02	0.12
Angry-Distress	3–20	9.45	3.02	0.54	0.05
Availability	4–20	8.75	3.51	0.80	0.23
Goal-Corrected Partnership	4–20	8.23	2.60	0.95	1.74
Academic Self-Concept	10–80	51.25	11.17	−0.35	0.05
General Self-Esteem	4–96	60.03	17.09	−0.25	−0.30

Measurement model

The confirmatory factor analysis confirmed the three-factor model of attachment originally suggested by West et al. (1998) and confirmed the findings of other research exploring the AAQ's three-factor structure (Bodfield et al., 2020; Sochos & Lokshum, 2017). Model fit indices for the measurement model incorporating the factor structures of the RAAQ (Bodfield et al., 2020) and the academic self-concept and general self-esteem subscales of the SDQ3 (Marsh & O'Neill, 1984) demonstrate a reasonable fit between model and data ($\chi^2 = 1097.787$, $p < .001$, $df = 502$, RMSEA = .04, SRMR = .06, CFI/TLI $\geq .93$).

However, as referenced in the instruments section of the method, both the academic self-concept and general self-esteem models failed to match the original one-factor model suggested by Marsh and O'Neill (1984). The best fit between data and model found in the current research were two higher-order models in which the academic self-concept and general self-esteem were comprised of two separate factors. The general self-esteem subscale was comprised of distinct positive and negative factors which then loaded onto general self-esteem as a singular entity (RMSEA = .05, SRMR = .04, CFI = .96, TLI = .95). The academic self-concept subscale was comprised of distinct cognitive and affective elements which loaded onto academic self-concept as a singular entity (RMSEA = .04, SRMR = .03, CFI = .96, TLI = .95).

The structural model of the ASRS (Kessler et al., 2005) was found to be a one-factor correlated variance model demonstrating an excellent fit between model and data (RMSEA = .02, SRMR = .01, CFI = .99, TLI = .98).

Factor loadings for the items in the RAAQ (Bodfield et al., 2020), ASRS (Kessler et al., 2005) and the academic self-concept and general self-esteem subscales of the SDQ3 (Marsh & O'Neill, 1984) are reported in the Supplementary Materials (Tables S1–S4). Factor loadings were generally good, of concern was the low loading of the sixth item in the one-factor model of the ASRS which was subsequently removed before further analysis.

There were no issues with the factor loadings of the items in the academic self-concept and general self-esteem subscales of the SDQ3 (Marsh & O'Neill, 1984).

Correlations

The correlations explored are reported in Table 2. All attachment characteristics (angry-distress, goal-corrected partnership and availability) were found to be positively correlated with each other ($r \geq .48$, $p < .001$). The reverse-scoring of the availability and goal-corrected partnership factors means that higher scores were equal to lower perceptions of the attachment figures emotional availability and a worse perception of the relationship between the adolescent and attachment figure. Furthermore, ADHD behaviors were found to be positively correlated with all of the attachment characteristics. Both the general self-esteem and academic self-concept were negatively correlated with all of the predictor variables ($r \geq -.18$, $p < .001$). The academic self-concept and general self-esteem were positively correlated with each other ($r = .28$, $p < .001$).

Table 2. Latent bivariate correlations among ADHD behaviors, attachment characteristics and academic self-concept and general self-esteem.

	1.	2.	3.	4.	6.	7.
ADHD	–					
Angry-Distress	.36***	–				
Availability (Reverse)	.38***	.83***	–			
Goal-Corrected Partnership (Reversed)	.30***	.48***	.60***	–		
Academic Self-Concept	–.57***	–.25***	–.27***	–.18***	–	
General Self-Esteem	–.43***	–.35***	–.35***	–.21***	.28***	–
Gender	.01	.02	–.05	–.20***	<–.001	–.16***
Age	<.001	.01	–.03	–.02	.04	.06
Heritage						
Asian	–.01	.09*	.15**	–.08	–.04	.16***
Black	–.07	–.01	<.001	–.09	<.001	.11**
Other	.01	–.03	.04	–.01	.07	.03

*. $p < .05$ ** $p < .01$. *** $p < .001$.

All of the predictor variables (the attachment characteristics and ADHD behaviors) were found to be negatively correlated with both the academic self-concept and general self-esteem.

Latent interaction structural equation model

After the establishment of the factor structures of each variable in the current research, regressions and interactions were tested between the variables through the creation of a structural equation model. The model created was then differentiated into two models, one with and one without an interaction variable, to ascertain if ADHD behaviors and attachment characteristics interacted in relation to the academic self-concept and general self-esteem. Model 1 did not include an interaction variable and Model 2 included an interaction variable.

The goodness of fit statistics for all Model 1 combinations can be found in the Supplementary Materials (Table S5) with all models presenting a reasonable to good fit between model and data when compared with Hu and Bentler (1999) cutoff criteria. To aid in model selection, the relative fit indices of both Model 1 and Model 2 were consulted; the relative fit indices are displayed in the Supplementary Materials (Table S6). Model 1 presented a more parsimonious model in all cases with the reported AIC and aBIC scores being smaller for Model 1 than Model 2 in all cases. According to Burnham and Anderson (2002), AIC scores ≤ 2 provide evidence that a model is as good as the best fitting model with the lower AIC score, a change between AIC scores must be > 2 to indicate an advantage. Both the D and R^2 scores also supported the acceptance of Model 1 in all cases.

Results from the latent interaction structural equation model analysis conducted can be seen in Tables 3–5 with both interaction and non-interaction models compared. Attachment characteristics were combined with ADHD behaviors to determine if there was an interaction effect in their relation with academic self-concept and general self-esteem. There were no significant interactions found for any of the combinations of predictor and dependent variables tested.

ADHD x angry-distress

Table 3 demonstrates that both ADHD ($\beta = -.457, p < .001$) and angry-distress ($\beta = -.258, p < .001$) were significant negative predictors of general self-esteem, however, only ADHD was a significant negative predictor of academic self-concept ($\beta = -.384, p < .001$).

Gender ($\beta = -.164, p < .001$) and Asian ethnicity ($\beta = .160, p < .01$) were significant covariates of general self-esteem with no covariates found to significantly predict academic self-concept in this model.

Table 3. Model 1 and 2 standardized coefficients for the moderating role of ADHD and anger distress on academic self concept and general self-esteem.

	Model 1 (No Interaction) Standardized Coefficients		Model 2 (Interaction) Standardized Coefficients	
	β	SE	β	SE
General Self-Esteem:				
ADHD	-.457***	.051	-.455***	.052
Angry-Distress	-.258***	.050	-.257***	.050
ADHD x Angry-Distress	—	—	-.011	.050
Demographic Covariates:				
Gender	-.164***	.042	-.163***	.042
Age	.071	.044	.071	.044
Asian	.160**	.048	.162**	.048
Black	.071	.048	.073	.048
Other	.053	.039	.052	.039
Academic Self-Concept:				
ADHD	-.384***	.103	-.512***	.050
Angry-Distress	-.083	.060	-.098	.059
ADHD x Angry-Distress	—	—	.072	.066
Demographic Covariates:				
Gender	<.001	.043	.006	.042
Age	.054	.046	.058	.043
Asian	-.032	.042	-.046	.041
Black	-.008	.053	-.034	.049
Other	.075	.039	.067	.036

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4. Model 1 and 2 Standardized coefficients for the moderating role of ADHD and availability on academic self-concept and general self-esteem.

	Model 1 (No Interaction) Standardized Coefficients		Model 2 (Interaction) Standardized Coefficients	
	β	SE	β	SE
General Self-Esteem:				
ADHD	-.421***	.052	-.419***	.058
Availability	-.312***	.050	-.313***	.050
ADHD x Availability	—	—	.009	.062
Demographic Covariates:				
Gender	-.190***	.042	-.189***	.041
Age	.056	.045	.055	.044
Asian	.190***	.046	.191***	.046
Black	.081	.049	.082	.048
Other	.077*	.038	.076*	.038
Academic Self-Concept:				
ADHD	-.355**	.115	-.487***	.052
Availability	-.119*	.058	-.131*	.055
ADHD x Availability	—	—	.073	.060
Demographic Covariates:				
Gender	-.010	.043	<.001	.042
Age	.047	.047	.044	.043
Asian	-.021	.042	-.031	.042
Black	-.004	.052	-.030	.047
Other	.084*	.040	.076*	.036

* $p < .05$. ** $p < .01$. *** $p < .001$.**Table 5.** Model 1 and 2 Standardized coefficients for the moderating role of ADHD and goal corrected partnership on academic self-concept and general self-esteem.

	Model 1 (No Interaction) Standardized Coefficients		Model 2 (Interaction) Standardized Coefficients	
	β	SE	β	SE
General Self-Esteem:				
ADHD	-.506***	.051	-.501***	.062
Goal Corrected Partnership	-.148**	.053	-.148**	.055
ADHD x Goal Corrected Partnership	—	—	.006	.061
Demographic Covariates:				
Gender	-.200***	.043	-.198***	.043
Age	.069	.046	.069	.046
Asian	.125*	.051	.128*	.051
Black	.055	.050	.055	.050
Other	.065	.039	.065	.039
Academic Self-Concept:				
ADHD	-.399***	.096	-.461***	.056
Goal Corrected Partnership	-.073	.064	-.109	.063
ADHD x Goal Corrected Partnership	—	—	.097	.063
Demographic Covariates:				
Gender	-.014	.045	-.015	.044
Age	.053	.046	.051	.043
Asian	-.045	.044	-.059	.042
Black	-.016	.051	-.050	.047
Other	.078*	.038	.069	.035

* $p < .05$. ** $p < .01$. *** $p < .001$.

ADHD x availability

Table 4 demonstrates that both ADHD and availability were significant predictors of both academic self-concept (ADHD: $\beta = -.355$, $p < .01$, availability: $\beta = -.119$, $p < .05$) and general self-esteem (ADHD: $\beta = -.421$, $p < .001$, availability: $\beta = -.312$, $p < .001$).

Of all the academic self-concept models tested this was the only model to find an additive effect of both predictors on academic self-concept.

Gender ($\beta = -.190$, $p < .001$), Asian ($\beta = .190$, $p < .001$) and other heritages ($\beta = .077$, $p < .05$) were all significant covariates of general self-esteem. Other heritages was also found to be a significant covariate of academic self-concept ($\beta = .084$, $p < .05$).

ADHD x goal-corrected partnership

Finally, Table 5 reports that both ADHD ($\beta = -.506, p < .001$) and goal-corrected partnership ($\beta = -.148, p < .01$) were found to be significant predictors of general self-esteem with an additive element evident. However, only ADHD behaviors were found to be a significant negative predictor of academic self-concept ($\beta = -.399, p < .001$).

Both gender ($\beta = -.200, p < .001$) and age ($\beta = .125, p < .05$) were significant covariates of general self-esteem, while only other heritages was a significant covariate of academic self-concept ($\beta = .078, p < .05$).

Discussion

This research sought to explore how dimensional models of ADHD behaviors and attachment characteristics related to both the academic self-concept and general self-esteem of adolescents. Past research has focused heavily on categorical models of ADHD and attachment in relation to the self-concept and has failed to explore the concepts in tandem despite co-occurrence (see Nishikawa et al., 2010). It was hypothesized by the researcher that ADHD behaviors and attachment characteristics would be correlated with and predictive of students self-concept and that ADHD behaviors and attachment characteristics would either have an interactive or additive effect in relation to the self-concept.

The findings of this research have demonstrated that attachment characteristics and ADHD behaviors are predictive of general self-esteem and academic self-concept. However, there is no evidence of an interaction between attachment characteristics and ADHD behaviors in relation to the self-concept rather an additive effect.

The demonstrated additive effect evident in which ADHD behaviors and attachment characteristics relate to the general self-esteem (and the academic self-concept in one case, as demonstrated in Table 4) could be explained by the co-occurrence of ADHD behaviors and maladaptive attachment characteristics leading to a greater experienced deficit. Indeed, more presenting problems increase the chance of receiving more negative feedback for the different problems manifesting.

This could be because positively intended interventions by teachers for student behaviors are interpreted as negative feedback. It is currently stipulated in the Teacher Standards (Department for Education, 2013) and Initial Teacher Training Core Content Framework (Department for Education, 2019) that teachers must adapt their teaching to the needs of the students in the class. Students with more problems or difficulties would require more adaptation and support, however, adaptation and support may be viewed negatively by the student and therefore negatively effect the self-concept (Bodfield et al., 2023).

The significance of the findings of this research suggests that dependent upon the behaviors individuals demonstrate/may be predisposed to show, they are at greater risk of having a worse self-concept in certain areas, such as academia. As the self-concept directs later behavior such as school engagement and test practice (Marsh & Craven, 2006), it is of the upmost importance that students have as positive a self-concept as possible. Therefore, this presents a clear rationale for better support of students with maladaptive attachment characteristics and ADHD behaviors in order to limit negative feedback to their self-concept formation.

Limitations and suggestions for future studies

Regardless of the original contribution to knowledge that this research has provided, there are some limitations. Limitations to be considered include the relatively low internal consistency for the angry-distress scale of the RAAQ (Bodfield et al., 2020). As referenced previously, this has been a consistent issue in the use of the instrument (see Bodfield et al., 2020; Sochos & Lokshum, 2017; West et al., 1998). However, the reported Cronbach's α score found in the research by Bodfield et al. (2020) which revised the original measure was much higher than the Cronbach's α scores found in the present study, the original research by West et al. (1998) and research by Sochos and Lokshum (2017). The changes in the reported internal consistency of data gathered from the AAQ (West et al., 1998) between projects highlight a need for further clarification of the psychometric properties of the AAQ (West et al., 1998) and the later revision (Bodfield et al., 2020).

In addition to issues with the internal consistency of data gathered from the angry-distress subscale of the RAAQ (Bodfield et al., 2020), analysis of the ASRS (Kessler et al., 2005) was also shown to demonstrate low internal consistency, a finding which was also evident in earlier research. Kessler et al. (2007) defended the low scores of internal consistency as expected due to the two-dimensional nature of the symptomatology, despite them being strongly correlated and mostly captured in a one-factor model (a finding which has been supported in this research project). In addition to this, Kessler et al. (2007) elaborated that the questions in the ASRS were selected to choose the least redundant set of behaviors to maximize the predictive capability of the instrument. This led to an optimization of inconsistency in items in the instrument which would explain the low scores of internal consistency gained from the data. Despite these issues, the ASRS is a suitable instrument for the screening of ADHD (Kessler et al., 2005, 2007) and therefore was the most suitable instrument to be used in this research.

A final limitation worth acknowledgment is the significant number of female participants in the study sample. While this does mean that men are not proportionally represented within the sample, the sample is reflective of the state of enrollment in social sciences in the UK which tends to have a predominantly female cohort. Despite this being a property of the sample and reflective of the wider educational context, it does have some implications as ADHD behaviors have been suggested to manifest differently in women than men (Arnett et al., 2015) which could have influenced how students responded to the ADHD component of the questionnaire.

It would also be beneficial for later research to explore the role of teacher responses to student behaviors in the classroom, particularly in the case of students with co-occurring atypical or problematic behavior. As the earlier referenced work by Marsh (1986) and others, the self-concept is informed by feedback from our behaviors and performance for example.

Conclusion

In conclusion, this research has expanded existing understanding further to clarify that ADHD behaviors and attachment characteristics in a sample of adolescents are negatively associated with both general self-esteem and academic self-concept, including demonstrating a negative predictive effect on these facets of the self-concept (please see the results for a full breakdown of relations found, although all correlations were significant, $p < .001$, and regressions indicated significant predictions, $\beta -.119-.457$, $p < .01-.001$). This suggests that a diagnosis of ADHD or specific, categorical attachment style is not needed to experience a deficit in self-concept, rather only demonstration of the behaviors associated with ADHD or certain attachment characteristics. Furthermore, this research has highlighted that feelings of anger and distress and a low-quality relationship with the attachment figure are not predictors of academic self-concept but are negatively associated with it and are negative predictors of general self-esteem. Of the attachment, characteristics explored only the perceived emotional availability of the attachment figure was a predictor of both the general and academic self-concept.

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