


Overprotective Parenting Mediates the Relationship Between Early Childhood ADHD and Anxiety Symptoms: Evidence From a Cross-Sectional and Longitudinal Study

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Abstract

Attention Deficit/Hyperactivity Disorder (ADHD) is often comorbid with anxiety disorders in children. Both ADHD and anxiety in childhood has been linked to overprotective parenting styles. In the current study we examine a model wherein early ADHD symptoms predict overprotective parenting, which in turn predicts anxiety symptoms later in childhood. In Study 1 we utilize cross-sectional data in 102 child/parent dyads between the ages of 5 and 7 years old and Study 2 extends these findings by examining this same mediation model longitudinally in 376 child/parent dyads who were assessed when children were 3, 6, and 9 years old. Results from both studies supported a mediation model wherein the relationship between child ADHD symptoms and child anxiety symptoms was mediated by parental overprotection. This is the first study, to our knowledge, to examine overprotective parenting as a mechanism underlying the heterotypic continuity or sequential comorbidity of ADHD to anxiety symptoms. (*J. of Att. Dis.* XXXX; XX(X) XX-XX)

Keywords

comorbid anxiety, ADHD, parenting

Introduction

In children, Attention Deficit/Hyperactivity Disorder (ADHD) is often accompanied by anxiety disorders. Approximately 25% to 50% of children with ADHD will also meet criteria for an anxiety disorder (Jensen et al., 1997). Conversely, among children with anxiety disorders, up to 30% will also meet criteria for ADHD (Tannock, 2000, 2009). ADHD with comorbid anxiety appears to be associated with greater impairment in working memory, more school and social difficulties, more stressful life events, increased separations and divorces in families, and lower child self-esteem, relative to ADHD alone (Biederman, 1991; Jensen et al., 1993; Piffner & McBurnett, 2006; Tannock, 2000, 2009; Tannock et al., 1995). Despite this, the mechanisms that link ADHD and anxiety disorders remain poorly understood (see review: Jarrett & Ollendick, 2008; Schatz & Rostain, 2006).

Longitudinal work, assessing multiple time points across development, suggests that ADHD and anxiety display heterotypic continuity (or sequential co-morbidity; Wichstrøm et al., 2013; Wichstrøm et al., 2017)—however, see Baldwin and Dadds (2008). These studies suggest that ADHD symptoms early in life may lead to increases in anxiety symptoms

in childhood and adolescence. For example, in a large study ($N=1,042$) of children aged 4 to 10 years, prospective reciprocal relations amongst symptoms and diagnoses were analyzed using a dynamic panel model within a structural equation framework (Wichstrøm et al., 2017). Results suggested that ADHD symptoms predicted increases in anxiety later in development. The authors interpreted these findings as suggesting that ADHD likely has a causal impact on the development of anxiety, and not the other way around. Adjusting for trait-like characteristics, such as executive functioning, did not explain the relationship between ADHD and anxiety. The authors suggested that other variables, such as interpersonal factors, should be examined as potential mechanisms.

One factor that has been linked to both ADHD and anxiety symptoms in children is parenting style. While some of the

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variance in comorbid ADHD and anxiety appears to be genetic, the majority of evidence has suggested that these disorders are transmitted independently (Biederman, 1991; Braaten et al., 2003; Michelini et al., 2015). Indeed, overprotective parenting may be associated with both ADHD and anxiety in children (Chorpita & Barlow, 1998). Overprotection may teach children that the world is unsafe and unpredictable, and that they are unable to effectively cope or find safety. Additionally, overprotective parents tend to restrict activities, thus blocking mastery and the opportunity for children to learn the true extent of harm or consequences associated with specific behaviors. Indeed, previous work has found a link between overprotective parenting styles and anxiety in children (Deault, 2010; Dumas et al., 1995; Gere et al., 2012; McLeod et al., 2007, 2011; Moore et al., 2004; Wood et al., 2003).

Similarly, overprotective parenting has been observed amongst parents of children with ADHD (Gau & Chang, 2013; Rothbaum & Weisz, 1994). It is possible that parents of children with ADHD regard their children as partially incompetent due to their ADHD symptoms (e.g., impaired ability to follow directions) and thus develop an overcontrolling parenting style to accommodate these difficulties. For example, parents of children with ADHD report feeling less self-efficacy in their ability to help their children, and tend to use more coercive and punitive interactions regarding children's achievement (Rogers et al., 2009a, 2009b; Sibley et al., 2016). And, importantly, parents of children with comorbid ADHD and anxiety are also characterized by increased overprotectiveness (Deault, 2010; Gere et al., 2012; Pfiffner & McBurnett, 2006). Moreover, family CBT for child anxiety (which often targets overprotective parenting styles) appears to be particularly helpful for children with both ADHD and anxiety, further supporting the link between overprotective parenting and child anxiety and ADHD (Gould et al., 2018; Jarrett & Ollendick, 2012; Maric et al., 2018).

While previous work has suggested that ADHD and anxiety display heterotypic continuity or sequential comorbidity such that early ADHD symptoms lead to an increase in anxiety symptoms later in development (Wichstrøm et al., 2013, 2017); and a separate line of work has suggested that overprotective parenting styles relate to both ADHD and anxiety (Gere et al., 2012; Pfiffner & McBurnett, 2006), no previous study has investigated parenting as a potential mechanism for the development of this comorbidity. For example, children with early attentional difficulties may evoke overprotective parenting early in life (Rothbaum & Weisz, 1994). Parents may observe that these children cannot control their own behavior or follow directions, and thereby develop a protective or controlling parenting style to accommodate or mitigate these tendencies. In turn, overprotective parenting may lead to increased vulnerability for anxiety in children—perhaps by encouraging avoidance, a diminished sense of self-efficacy, or by communicating to

the child that the world is dangerous (McLeod et al., 2007, 2011; Wood et al., 2003). Thus, children's early ADHD symptoms may evoke an environmental context (overprotective parenting) that increases vulnerability for the development of a comorbid anxiety disorder.

In the current study, we explore this possibility by examining parenting in relationship to ADHD and anxiety in two separate studies. In Study 1, we examine the relationships between ADHD symptoms, anxiety symptoms, and parenting styles in 102 children between the ages of 5 and 7 years old. Study 1 utilizes cross-sectional data to examine a mediation model wherein the relationship between ADHD symptoms and anxiety symptoms is mediated by overprotective parenting. Study 2 extends these findings by examining these same relationships longitudinally, across three assessments. In a sample of 376 children, ADHD and anxiety symptoms were measured when children were approximately 3 years old. When children were approximately 6 years old, parenting style was assessed, and then 3 years later, when children were approximately 9 years old, anxiety symptoms were assessed again. We examine a mediation model wherein the relationship between age 3 ADHD symptoms and age 9 anxiety symptoms is mediated by overprotective parenting. We hypothesized that ADHD symptoms early in life would predict overprotective parenting, and this, in turn, would lead to an increase in anxiety symptoms in children.

Method

Participants

Study 1 included 102 children between the ages of 5 and 7 years old and a parent, who were recruited from the XXX community. Families were recruited by events in the community and fliers that were distributed to local businesses, libraries, and schools. A total of 50 male and 52 female children participated in the study. Most parents were female (88%). The average age of the child was 5.75 years-old, $SD = .77$. Overall, 10% of the sample identified as Hispanic or Latino; 8% as Asian, 21% as Black, 65% as White, and 5% as Other. Overall, 3% of families reported an annual income of less than \$10,000, 10% reported an annual income between \$10,000 and \$25,000, 10% reported an annual income between \$25,000 and \$40,000, 76% reported an annual income above \$75,000. This study was approved by the XXX Institutional Review Board and completed with consent of parents and assent of children.

Study 2 included 376 children and a biological parent who were assessed at three time points. Children were assessed when they were approximately 3, 6, and 9 years old. Participants were recruited through a commercial mailing list in the community of XXX. A total of 173 female, and 203 male, children participated in the study. Most

participating parents were female (92%). The average age of the child at the initial assessment was 3.66, $SD=0.27$, at the second assessment it was 6.12, $SD=0.41$, and at the third assessment it was 9.21, $SD=0.42$. Most children were Caucasian (95%). The mean score on the Hollingshead was 45.03, with a range of 13 to 66. This study was approved by the XXX Institutional Review Board and completed with consent of parents and assent of children.

It should be noted that data from Study 2 were drawn from a larger, NIMH-funded, longitudinal study. In the current study, we utilized a complete case approach analysis wherein participants were included only if they had no missing data for the variables of interest. Participants with missing data did not differ from the included participants on any main study variable (self-report measures: CBCL, PDSQ, SCARED; and interview data: the PAPA), all $ps > .05$.

Child Behavior Checklist

The Child Behavioral Checklist (CBCL; Achenbach & Edelbrock, 1981) was administered to parents in Study 1 to assess anxiety and ADHD symptoms in children. The CBCL is a parent-report measure of symptoms in children between 6 and 18 years old. A total of 120 items are scored on a 3 point scale (0=not true, 1=somewhat or sometimes true, 2=very true or often true) based on the past 6 months. The CBCL provides scores for broad symptom scales (e.g., internalizing and externalizing problems), as well as DSM-oriented scales that index more specific symptom domains. In the current study, we utilize the CBCL DSM anxiety problems scale and the CBCL DSM ADHD problems scales. We utilize the CBCL scales in Study 1 to examine cross-sectional relationships between ADHD and anxiety symptoms in children. Reliability and validity of the DSM-oriented scales are good (Achenbach et al., 2003). Internal reliability (Cronbach's alpha) was acceptable for all scales utilized on the CBCL, Study 1: DSM anxiety problems scale, $\alpha=.67$, DSM ADHD problems scale, $\alpha=.83$.

Parenting Styles and Dimensions Questionnaire

The Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson et al., 2001) is a 32-item self-report measure of parenting styles. Response options range from 1 (never) to 5 (always), and measures three global parenting styles: authoritative, authoritarian, permissive, and includes a fourth scale for over-protective parenting that was added later. Authoritative parenting (high control and warmth) is directive, rational, and issue-oriented. Authoritarian parents (high control, low warmth) are inflexible and believe that their child should adhere to their rules without question. Permissive parents (low control, high warmth) are non-punitive, accepting, and adopt a laissez-faire approach to parenting. Overprotective parenting

is characterized by increased parental control, concerns regarding their child's potential failure at tasks and new activities, and concerns that their child will elicit disapproval from others. Higher scores indicate more endorsement of that parenting style. We utilize the PSDQ for both Study 1 and Study 2. In Study 2, the PSDQ was administered at the second assessment, when children were approximately 6 years old. Internal reliability (Cronbach's alpha) was acceptable for all scales on the PSDQ, Study 1: Authoritative, $\alpha=.80$; Authoritarian, $\alpha=.74$; Permissive, $\alpha=.60$; Overprotective, $\alpha=.75$; Study 2: Authoritative, $\alpha=.84$; Authoritarian, $\alpha=.74$; Permissive, $\alpha=.74$; Overprotective, $\alpha=.70$.

Preschool Age Psychiatric Assessment

The Preschool Age Psychiatric Assessment (PAPA), Version 1.4 (Egger et al., 1999) was administered in Study 2 when children were approximately 3 years old. The PAPA is a clinical interview completed with parents regarding their child. Symptom scores were created for ADHD and anxiety symptoms by summing symptom items. The interview focuses on the 3 months prior to the interview. The interview has been shown to have good psychometric properties (Egger et al., 2006). Interviews were conducted by M.A. level psychologists over the telephone. More detailed information on the PAPA has been reported elsewhere (Bufferd et al., 2012). Interrater reliability for the ADHD and anxiety scales were acceptable (both scales = .99, $N=21$).

Screen for Child Anxiety Related Emotional Disorders

The Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1997) was administered to the parent in Study 2, at the third assessment when children were approximately 9 years old. Parents reported on their children's anxiety symptoms, including panic, generalized anxiety, separation anxiety, social phobia, and school phobia symptoms. The SCARED consists of 38 items which participant answers on a 0 (not true or hardly ever true) to 2 (true or often true) scale. Internal reliability (Cronbach's alpha) was acceptable for the SCARED, $\alpha=.90$.

Statistical Analyses

All statistical analyses were conducted using SPSS (Version 17.0) General Linear Model Software. The Pearson correlation coefficient (r) was used to examine correlations between the main study variables. To test mediation models wherein the direct path from ADHD symptoms to anxiety symptoms is mediated by overprotective parenting, we utilized a nonparametric bootstrapping approach (MacKinnon et al., 2004). This approach has been shown to be more statistically powerful than other tests of mediation (MacKinnon

Table 1. Bivariate Correlations Between PSDQ Parenting Scales and CBCL Child DSM Symptom Scales.

	1.	2.	3.	4.	5.
1. PSDQ. Authoritative parenting	—				
2. PSDQ. Authoritarian parenting	-.22*	—			
3. PSDQ. Permissive parenting	.03	.38**	—		
4. PSDQ. Overprotective parenting	.16	.38**	.35**	—	
5. CBCL. DSM anxiety problems	.11	.04	.23*	.47**	—
6. CBCL. DSM ADHD problems	-.01	.15	.15	.28**	.40**

* $p < .05$. ** $p < .00$.

et al., 2002). We used an SPSS macro (Preacher & Hayes, 2004), which provides a bootstrap estimate of the indirect effect between the independent and dependent variables, an estimated standard error, and 95% confidence intervals for the population value of the indirect effect. When confidence intervals for the indirect effect do not include zero, this indicates a significant indirect effect at the $p < .05$ level. Direct and indirect effects were tested using 5,000 bootstrap samples.

Results

Study 1

In study 1, we examined the cross-sectional relationships between ADHD symptoms, anxiety symptoms, and parenting in a sample of 102 children between the ages of 5 and 7 years old. To measure child ADHD and anxiety symptoms, we utilized the parent-report on the CBCL DSM scales. The average scores on the CBCL DSM ADHD and anxiety problems scales were 10.25 ($SD=3.14$, $range=6-21$) and 7.49 ($SD=1.74$, $range=5-14$), respectively. Neither the ADHD nor anxiety problems scales were related to child age, $ps > .10$. The ADHD problems did not differ by gender, $F(1, 101)=3.24$, $p=.08$. And, the anxiety problems scale did not differ by gender, $F(1, 101)=2.40$, $p=.12$.

To measure parenting styles, we utilized parent reports on the PSDQ, focusing on the Overprotection scale. The average score on the Overprotection scale was 10.51, $SD=3.62$, $range=4-23$. The average scores on the other PSDQ scales were: Authoritative: $M=61.26$ ($SD=6.70$, $range=37-74$); Authoritarian: $M=18.70$ ($SD=4.18$, $range=4-29$); and Permissive: $M=10.16$ ($SD=2.75$, $range=5-19$). None of the PSDQ parenting scales were related to child age, $ps > .10$. Authoritarian, Permissive, and Overprotective parenting did not differ by child gender, $ps > .10$. However, Authoritative parenting was increased in boys compared to girls, at a trend level, $F(1, 101)=3.95$, $p=.05$.

We examined bivariate correlations between the PSDQ parenting scales and the CBCL ADHD and anxiety problems scales. As can be seen in Table 1, ADHD and anxiety symptoms were moderately correlated, $r(100)=.40$, $p < .01$. Additionally, Permissive parenting was correlated with

child anxiety symptoms, $r(100)=.23$, $p < .05$. Importantly, Overprotective parenting was correlated with both child ADHD symptoms, $r(100)=.28$, $p < .01$ and anxiety symptoms, $r(100)=.47$, $p < .01$.

Next, we conducted a mediation model to test our hypothesis that the relationship between child ADHD symptoms and child anxiety symptoms would be mediated by Overprotective parenting. Results suggested that the overall model was significant, $F(1, 100)=8.22$, $p < .01$. The path from CBCL child ADHD problems to PSDQ Overprotective parenting was significant, $coeff=.32$, $t=2.87$, $p < .01$, 95% CI [.09 to .54]. Additionally, the path from PSDQ Overprotective parenting to CBCL child anxiety problems was significant, $coeff=.18$, $t=4.40$, $p < .001$, 95% CI [.10 to .27], as well as the direct path from CBCL child ADHD problems to CBCL child anxiety problems, $coeff=.16$, $t=3.37$, $p < .001$, 95% CI [.07 to .26]. Furthermore, the results supported mediation—the indirect path from CBCL child ADHD problems to CBCL child anxiety problems via PSDQ Overprotective parenting was significant, $effect=.06$, 95% CI [.02 to .12], % on indirect effect=36%.

We also examined alternative models wherein the other PSDQ parenting scales mediated the relationship between ADHD and anxiety symptoms (Figure 1). Neither Authoritarian, $effect=-.00$, 95% CI [-.02 to .02], Authoritative, $effect=-.00$, 95% CI [-.03 to .01], or Permissive parenting, $effect=.01$, 95% CI [-.00 to .04], significantly mediated the association between child ADHD and anxiety symptoms. Additionally, we examined an alternative model wherein we CBCL anxiety problems was the independent variable and CBCL ADHD problems was the dependent variable, with PSDQ Overprotective parenting as the mediator. The indirect effect for mediation was not significant, $effect=.09$, 95% CI [-.07 to .30].

Overall, results from Study 1 suggest that children characterized by increased ADHD symptoms are also characterized by increased anxiety symptoms. Moreover, Overprotective parenting mediated this relationship, such that the indirect path from child ADHD symptoms to Overprotective parenting to child Anxiety symptoms was significant. None of the models for the other parenting dimensions reached significance, suggesting that this effect may be specific to Overprotective parenting.

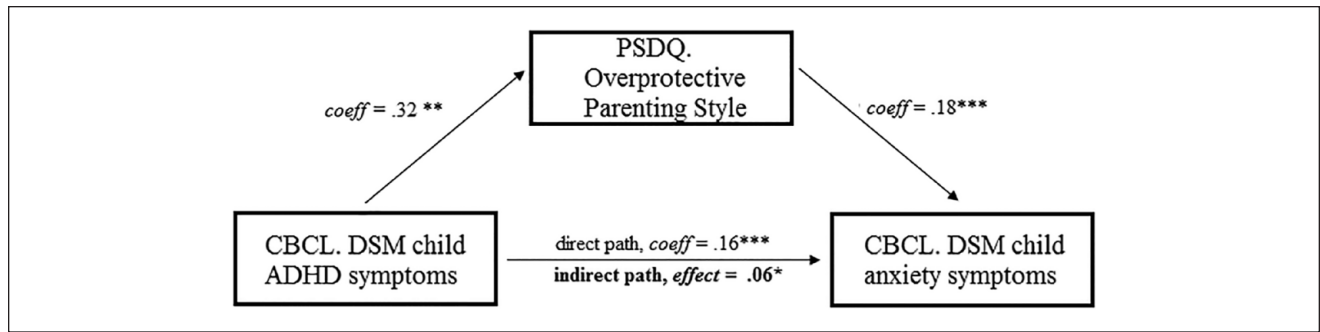


Figure 1. Mediation model wherein the pathway from child ADHD symptoms to child anxiety symptoms is mediated by overprotective parenting style in Study 1.

Table 2. Bivariate Correlations Between PSDQ Parenting Scales and Child Anxiety and ADHD Symptoms.

	1.	2.	3.	4.	5.	6.
1. PSDQ. Authoritative parenting. Age 6.	—					
2. PSDQ. Authoritarian parenting. Age 6.	-.29**	—				
3. PSDQ. Permissive parenting. Age 6.	-.17**	.42**	—			
4. PSDQ. Overprotective parenting. Age 6.	-.00	.26**	.36**	—		
5. Child anxiety symptoms. PAPA. Age 3.	-.03	.12*	.10*	.19**	—	
6. Child ADHD symptoms. PAPA. Age 3.	-.00	.14**	.17**	.09 [†]	.16**	—
7. Child anxiety symptoms. SCARED. Age 9.	-.00	.04	.06	.14**	.35**	.10*

* $p < .05$. ** $p < .00$.

Study 2

In Study 2, we examined the longitudinal relationships between ADHD symptoms, anxiety symptoms, and parenting in a sample of 376 children assessed at three time-points (when children were approximately 3, 6, and 9 years old). To measure baseline child ADHD and anxiety symptom at the age 3 assessments, we utilized summed symptoms scales from the PAPA diagnostic interview. The average score on the ADHD symptoms scale was 4.08 ($SD=6.29$, $range=5-41$); the average score on the anxiety symptoms scale was 6.86 ($SD=6.42$, $range=0-37$). Neither the anxiety nor the ADHD symptoms scales were associated with child age, $ps > .10$. Not surprisingly, boys had higher scores on the ADHD symptoms scale than girls, $F(1, 375)= 6.92$, $p < .01$. The anxiety symptoms scale did not differ by gender, $F(1, 375)=1.89$, $p=.17$. For the age 9 assessment, we utilized parents’ reports of total child anxiety symptoms on the SCARED. The average score on the SCARED was 8.09 ($SD=8.23$, $range=0-55$). Scores on the SCARED were higher in older children, $r(358) = -.10$, $p < .05$, and in girls, $F(1, 375)=4.81$, $p < .05$.

To measure parenting styles, we utilized parents’ reports on the PSDQ at the age 6 assessment, focusing on the Overprotection scale. The average score on the Overprotection scale was 10.21 ($SD=3.31$, $range=5-22$). The average scores on the other scales from the PSDQ were: Authoritative: $M=60.83$ ($SD=6.83$, $range=40-75$); Authoritarian: $M=19.70$

($SD=4.12$, $range=12-35$); and Permissive: $M=10.20$ ($SD=2.99$, $range=5-22$). None of the PSDQ parenting scales were related to child age, $ps > .10$. Authoritative, Authoritarian, Permissive, and Overprotective parenting did not differ by child gender, $ps > .10$.

We examined bivariate correlations between all the PSDQ parenting scales and child ADHD (age 3) and anxiety (age 3 and 9 assessments) symptoms. As can be seen in Table 2, PSDQ Authoritarian parenting was associated with child ADHD and anxiety symptoms at age 3, $r(368) = .14$, $p < .01$ and $r(368)= .12$, $p < .05$, respectively. Child ADHD and anxiety symptoms at age 3 were associated with PSDQ Permissive parenting at age 6, $r(368)=.17$, $p < .01$, and $r(368)=.10$, $p < .05$, respectively. Importantly, PSDQ Overprotective parenting was associated with child anxiety at both the age 3 and age 9 assessments, $r(368)= .19$, $p < .01$, and $r(368)=.14$, $p < .01$, as well as with age 3 child ADHD symptoms at a trend level, $r(368)= .09$, $p < .07$. Both child anxiety symptoms and child ADHD symptoms at the age 3 assessment predicted child anxiety symptoms at the age 9 assessment, $r(368)= .35$, $p < .10$, and $r(368)= .10$, $p < .05$, respectively.

Next, we conducted a mediation model to test our hypothesis that the longitudinal relationship between early child ADHD symptoms (age 3 years-old) and later child anxiety symptoms (age 9 years-old) would be mediated by Overprotective parenting (age 6 years-old; Figure 2). The overall model was significant, $F(2,367)=5.21$, $p < .01$. The

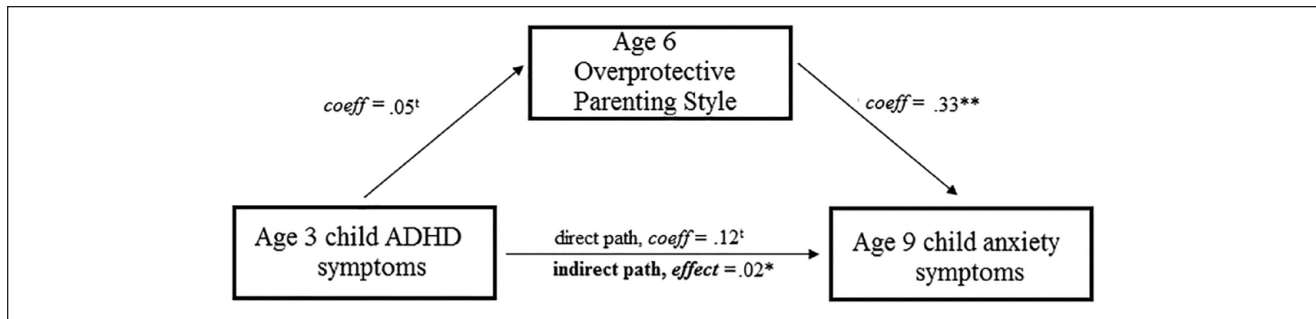


Figure 2. Mediation model wherein the pathway from child ADHD symptoms to child anxiety symptoms is mediated by overprotective parenting style in Study 2.

path from age 3 child ADHD symptoms to age 6 PSDQ Overprotective parenting approached significance, $coeff=.05$, $t=1.70$, $p<.07$, 95% CI $[-.10$ to $.10]$. The path from age 6 PSDQ Overprotective parenting to age 9 child anxiety symptoms was significant, $coeff=.33$, $t=2.56$, $p<.01$, 95% CI $[.08$ to $.58]$. In addition, the direct path from age 3 child ADHD symptoms to age 9 child anxiety symptoms exhibited a trend towards significance, $coeff=.12$, $t=.174$, $p<.07$, 95% CI $[-.02$ to $.25]$. Finally, supporting mediation, the indirect path from age 3 child ADHD problems to age 9 child anxiety problems via age 6 PSDQ Overprotective parenting was significant, $effect=.02$, 95% CI $[.02$ to $.04]$, % on indirect effect = 17%.

We examined this same mediation model adjusting for age 3 child anxiety symptoms (i.e., by adding age 3 child anxiety symptoms as a covariate to the model described above). In this model, age 3 child anxiety symptoms significantly predicted age 9 child anxiety symptoms, $coeff=.41$, $t=6.33$, $p<.001$, 95% CI $[.30$ to $.51]$. Importantly, the indirect path from age 3 child ADHD problems to age 9 child anxiety problems via age 6 PSDQ Overprotective parenting remained significant, $effect=.01$, 95% CI $[.01$ to $.03]$.

Finally, we examined alternative models wherein the other PSDQ parenting scales mediated the relationship between age 3 child ADHD symptoms and age 9 child anxiety symptoms. Neither Authoritarian, $effect=-.00$, 95% CI $[-.01$ to $.01]$, Authoritative, $effect=.01$, 95% CI $[-.01$ to $.03]$, nor Permissive parenting, $effect=.01$, 95% CI $[-.01$ to $.05]$, significantly mediated the relationship between age 3 child ADHD symptoms and age 9 child anxiety symptoms.

Discussion

Results from Study 1 and Study 2 supported mediation models wherein the relationship between child ADHD symptoms and child anxiety symptoms was mediated by parental overprotection. This pattern of results was found in cross-sectional data amongst 5 to 7 year old children (Study 1) and in longitudinal data wherein children and parents were assessed three times between the ages of 3 and 9

(Study 2). This is the first study, to our knowledge, to examine overprotective parenting as a mechanism underlying the heterotypic continuity or sequential comorbidity of ADHD to anxiety symptoms. The results are consistent with the possibility that ADHD symptoms in early childhood elicit overprotective parenting, which in turn, leads to increased anxiety symptoms in later childhood.

Previous work in longitudinal samples suggests that ADHD symptoms predict increases in anxiety across childhood, but not the other way around (Wichstrøm et al., 2013, 2017). Moreover, this causal relationship was hypothesized to occur due to interpersonal factors. In a separate line of work, both ADHD and anxiety have been linked to overprotective parenting styles (Chorpita & Barlow, 1998; Deault, 2010; Gere et al., 2012). In the current study, we examined whether parenting may be a mediating mechanism underlying the sequential comorbidity between ADHD and anxiety. We hypothesized that young children with inattentive or hyperactive symptoms may evoke a parenting style focused on control and protection. Parents may attempt to accommodate or mitigate what they view as their child's deficits (i.e., being unable to listen or follow directions, forgetfulness, being unable to complete tasks). This protective parenting style may encourage avoidance in children or communicate to the child that they are not effective in navigating situations independently—which may, in turn, instill or increase anxiety in the child. Results from the two samples examined in the current study were consistent with this hypothesis.

Previous work has examined models wherein early childhood psychopathology elicits environmental contexts that further exacerbate symptoms (Klein et al., 2016; Kopala-Sibley et al., 2017; Sameroff, 2000; Scaramella et al., 2008). For example, irritability in infants is associated with decreased maternal responsiveness, which is in turn, associated with longitudinal increases in child irritability (van den Bloom & Hoeksma, 1994). While these models have focused on bidirectional processes, no model to our knowledge has examined whether early manifestations of psychopathology elicit environmental contexts that increase

vulnerability for a *different disorder*, that is, heterotypic continuity or sequential co-morbidity. From this perspective, it is through understanding *dynamic causal processes that unfold across development* that we will begin to understand the complex and heterogeneous manifestations of psychopathology.

Masten and Cicchetti (2010) define developmental cascades as: “the cumulative consequences for development of the many interactions and transactions occurring in developing systems that result in spreading effects across levels, among domains at the same level, and across different systems or generations.” They go on to state that developmental cascades may offer explanations for observed comorbidities. While they do not mention heterotypic continuity specifically, the current model, wherein early symptoms of one disorder elicit a caregiving environment that puts children at risk for a different disorder (i.e., heterotypic continuity) may be considered a type of developmental cascade. Masten and Cicchetti (2010) suggest that the most convincing evidence of a cascade effect will be based on experiments with random assignment to interventions designed to alter a specific element in a cascade sequence. Applying this to the current findings, a study wherein a parenting intervention focusing on reducing overprotection is administered to families with a child with ADHD symptoms would be an ideal approach to testing this cascade model. If children in the intervention condition exhibit lower levels of anxiety than children in a control condition, we can conclude that overprotective parenting plays a causal role in the development of comorbid ADHD and anxiety in children. Future studies should explore this possibility.

In addition to examining overprotective parenting, we also examined other parenting styles as potential mediators between ADHD and anxiety symptoms. Results suggested that neither authoritarian, authoritative, nor permissive parenting were significant mediators—suggesting that it was specifically overprotective parenting that explains this pattern of heterotypic continuity. While other parenting styles have been linked to both these disorders, it appears that overprotective parenting may be the most important parenting style underlying this comorbidity.

In the current study, we focus on parenting styles as potential mediators of the relationship between childhood ADHD and anxiety. However, there are a number of other factors that may also contribute to this association. For example, another factor may be genetically-linked risk (Biederman, 1991; Braaten et al., 2003; Michelini et al., 2015). In line with this, it is possible that ADHD and anxiety share alterations in neural functioning that lead to comorbidity between them. Other potential mediating factors include poor social competency, problematic peer and sibling relationships, poor academic performance, and a low sense of self-efficacy. Future studies should examine these possibilities, in addition to parenting styles.

There are a number of limitations to the current study. For example, we utilized parent-report measures of parenting style and child symptoms. Future work should examine whether these results are replicable using other methods for assessing parenting (e.g., observational measures) and child reports of symptoms. It should also be noted that parents may be better informants for child externalizing problems versus child internalizing problem. Therefore the current results must be interpreted with caution. Also, in the current study, we utilized a complete case approach analysis wherein participants were included only if they had no missing data for the variables of interest. Although subjects who were missing data did not differ on any main variables from subjects who were not missing data, we cannot be certain that data were missing completely at random. It should be noted that if complete cases are systematically different from incomplete cases, the analyses may lead to biased results. Relatedly, participants from both studies were drawn from the community via mailings, fliers, and events. Therefore, we have no information regarding families that chose not to participate in our studies (i.e., families in the community who did not enroll). Another limitation to Study 2 is the administration of clinical interviews over the phone instead of in-person (although it should be noted that previous work suggests that there are no differences between in-person and phone interviews with parents about their children’s psychopathology; Lyneham & Rapee, 2005). It should also be acknowledged that while we did find significant results in the current study, the magnitude of the effects were small. Additionally, while a strength of the study is its focus on early childhood using both cross-sectional and longitudinal data, it will be important to continue to examine these processes into later childhood and adolescence.

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