



Does Child Anxiety Exacerbate or Protect Against Parent-Child Relationship Difficulties in Children with Elevated ADHD Symptoms?

Elizabeth S.M. Chan, M.A., M.S.¹, Mariafernanda Macias, B.S.¹, Michael J. Kofler, Ph.D.¹

¹Florida State University, Department of Psychology

Abstract

Pediatric ADHD is associated with parent-child relationship difficulties. However, the extent to which these relations are attributable to specific ADHD symptom clusters (i.e., inattentive vs. hyperactive/impulsive), and the extent to which child anxiety symptoms may exacerbate or protect against these difficulties, remains unclear. To address these gaps in the literature, the current study combined multi-informant measures (parent, teacher, child) with a clinically-evaluated and carefully-phenotyped sample of 188 children with and without ADHD and anxiety (ages 8–13; 63 girls). Results indicated that child-reported anxiety ($\beta=.46$) and teacher-reported inattentive ($\beta=.71$) symptoms, and their interaction ($\beta= -1.06$), along with child age and IQ ($\beta= -.14$ to $-.15$), predict the extent to which parents perceive themselves as confident and competent parents (all $p<.05$). In contrast, only comorbid oppositional-defiant disorder conferred risk for increased parent-reported relational frustration, and we were unable to detect any reliable child-level demographic, diagnostic, or behavioral predictors of parent-reported discipline practices. These findings were robust to control for child demographic characteristics, clinical diagnoses, and intellectual functioning, with sensitivity analyses highlighting the importance of assessing ADHD inattentive vs. hyperactive/impulsive symptoms separately for understanding parenting outcomes. Taken together, the current findings suggest that child ADHD and anxiety symptoms may influence specific rather than broad-based aspects of the parent-child relationship, and produce differently valenced outcomes in the presence vs. absence of the other condition. Interestingly, it appears that the combination of greater child inattention and anxiety, rather than elevations in either symptom domain independently, predict adverse parenting outcomes in terms of reduced parental confidence.

Keywords

ADHD; anxiety; parent-child relationship; parenting confidence

Corresponding Author: Michael J. Kofler, Ph.D., Florida State University | Department of Psychology, 1107 W. Call Street | Tallahassee, FL 32306-4301, Phone: (850) 645-0656, Fax: (850) 644-7739, kofler@psy.fsu.edu.

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Declarations:

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Consent: All parents and children gave informed consent/assent.

Attention-deficit/hyperactivity disorder (ADHD) is a chronic neurodevelopmental disorder characterized by clinically significant inattentive and/or hyperactive/impulsive symptoms (Nigg & Barkley, 2014). ADHD is associated with considerable impairment within the family, peer, and academic domains (Pelham et al., 2005) at an annual cost of illness of over \$100 billion in the US alone (Zhao et al., 2019). Within the family domain, children with ADHD are at high risk for parent-child relationship difficulties (Barkley et al., 1991), including higher child-specific parental stress (Miranda et al., 2007, 2015; Theule et al., 2013), ineffective/poor disciplinary practices (Ellis & Nigg, 2009; Gerdes et al., 2003; Schroeder & Kelley, 2009), and lower levels of parental confidence (Alizadeh et al., 2007; Miranda et al., 2007, 2015). Moreover, ADHD-related impairments within the parent-child relationship are associated with myriad adverse outcomes, including higher child conduct problems and aggression as well as poorer social skills and lower peer acceptance (Climie & Mitchell, 2017; Ellis & Nigg, 2009; Hurt et al., 2007; Kaiser et al., 2011). In this context, it is important to identify factors that may confer *risks* or vulnerabilities for negative parent-child relationships, or serve as *protective* factors for reducing risk and bolstering positive adaptation for families of children with ADHD (Chan et al., 2021a; Lee et al., 2016). Indeed, research suggests that children's inattentive and hyperactive/impulsive symptoms may differentially influence the parent-child relationship (Gau & Chang, 2013), and that this influence, in turn, may be significantly impacted by co-occurring child anxiety (Pffner & McBurnett, 2006). However, our understanding of the associations among children's ADHD symptom dimensions, their anxiety symptoms, and their relationship with their parents is highly limited (Jarrett & Ollendick, 2008).

ADHD Symptomatology and the Parent-Child Relationship

Interestingly, experimental/intervention studies have indicated a unidirectional relation between ADHD symptomatology and the parent-child relationship, such that medication-related decreases in children's ADHD symptoms result in a more positive parent-child relationship, even for parents who are masked to their child's medication status (e.g., Barkley & Cunningham, 1979). In contrast, the evidence linking specific ADHD symptom dimensions (i.e., inattentive vs. hyperactive/impulsive) with specific aspects of the parent-child relationship for children with ADHD is sparse (e.g., Ellis & Nigg, 2009; Theule et al., 2013), and research on parent-child relationship differences across ADHD subtypes/presentations has been mixed (e.g., Ellis & Nigg, 2009; Miranda et al., 2007; Weinberger et al., 2018). Currently, the predominance of research suggests that children's hyperactivity/impulsivity and inattentive symptoms may negatively impact *parental stress* (i.e., stress specifically stemming from perceptions of parenting demands; Deater-Deckard, 1998), *parental discipline* (i.e., the types of discipline practices used to manage their child's behavior; Arnold et al., 1997), and *parental confidence* (i.e., the extent to which a parent feels personally competent to manage their child's behaviors; Johnston & Mash, 2001; Loren et al., 2015).

Specifically, studies comparing ADHD subtypes/presentations suggest that parents of children with the predominantly hyperactive/impulsive or combined (inattentive + hyperactive/impulsive) subtypes/presentations report greater child-specific parental stress than parents of children with the predominately inattentive subtype/presentation (Miranda

et al., 2007; Weinberger et al., 2018), and it appears that inattentive symptoms do not additively contribute to parenting stress (Graziano et al., 2011; Theule et al., 2013). In regard to parental discipline, some studies indicate that families of children with the predominantly hyperactive/impulsive or combined, but not inattentive, subtypes/presentations experience greater inconsistency in parental discipline (Weinberger et al., 2018). In contrast, other studies have found no significant differences in parental discipline consistency between parents of children with the combined versus predominantly inattentive subtype/presentation, despite finding a unique association between parental inconsistent discipline and inattentive symptoms (Ellis & Nigg, 2009). As for parental confidence, some studies report lower parental confidence in parents of children with the combined subtype/presentation relative to parents of children with the predominately inattentive subtype/presentation (Miranda et al., 2007). However, other studies have failed to replicate significant differences in parental confidence between parents of children with different ADHD subtypes/presentations (Weinberger et al., 2018).

Taken together, the evidence from ADHD subtype/presentation comparison studies suggests that parental stress might be more strongly related to hyperactive/impulsive symptoms (e.g., Miranda et al., 2007; Weinberger et al., 2018), parental discipline more strongly related to inattentive symptoms (e.g., Ellis & Nigg, 2009), and parenting confidence related to both hyperactive/impulsive and inattentive symptoms (e.g., Miranda et al., 2007; Weinberger et al., 2018). Thus, previous research based primarily on ADHD subtype/presentation group comparisons suggests that different ADHD symptom clusters may be associated with difficulties in different aspects of the parent-child relationship. At the same time, the limitations of ADHD subtype/presentation comparisons are well documented (for review, see Nigg et al., 2010; Valo & Tannock, 2010), and as such relations between each ADHD symptom cluster and each dimension of the parent-child relationship remains unclear. Further research is needed to clarify this inconsistency in the literature, as well as to identify factors – such as co-occurring anxiety symptoms – that may contribute to these associations.

ADHD and Anxiety Symptoms

ADHD and anxiety frequently co-occur in children, with diagnostic comorbidity rates ranging from 10% to 40% (Nigg & Barkley, 2014). The literature regarding children with comorbid ADHD and anxiety indicates that the presence of anxiety seems to have a greater impact on ADHD symptom severity for children with ADHD than the presence of ADHD has on anxiety symptom severity for children with anxiety (e.g., Hammerness et al., 2010). For example, the co-occurrence of ADHD for children with anxiety disorders is not associated with more anxiety symptoms relative to children with anxiety only (Jarrett et al., 2016; Overgaard et al., 2016). In contrast, research on the impact of co-occurring anxiety on ADHD symptom expression suggests that anxiety may serve as both a risk and protective factor (e.g., Bowen et al., 2008; Chan et al., 2021a; Klymkiw et al., 2017; Menghini et al., 2018; Sørensen et al., 2011). For example, some literature indicates that anxiety symptoms exacerbate attention problems (e.g., Bowen et al., 2008) and inhibitory control impairments (e.g., Sørensen et al., 2011). However, other studies have reported that co-occurring anxiety does not significantly affect performance on laboratory-based tests of attention (e.g., Jarrett et al., 2016; Maric et al., 2018; Newcorn et al., 2001) or inhibitory/impulse control (e.g.,

Jarrett et al., 2016; Newcorn et al., 2001; Vloet et al., 2010). Still other studies suggest that anxiety symptoms may reduce or mitigate these ADHD symptoms, such that co-occurring anxiety has been associated with *better* performance on laboratory-based tests of inhibitory/impulse control (Maric et al., 2018; Menghini et al., 2018; Pliszka, 1992) and sustained attention (Klymkiw et al., 2017; Vloet et al., 2010), and increases in teacher-perceived resilience (Chan et al., 2021a) for children with ADHD. Taken together, the literature suggests that anxiety may influence ADHD-related symptom expression (e.g., Bowen et al., 2008; Klymkiw et al., 2017; Maric et al., 2018; Menghini et al., 2018; Pliszka, 1992; Sørensen et al., 2011; Vloet et al., 2010), but the direction of this effect remains unclear. The current study examined the extent to which this hypothesized interaction extends to affect the parent-child relationship.

ADHD, Anxiety, and the Parent-Child Relationship

Only a few studies have examined how the co-occurrence of child ADHD and anxiety symptoms impact the parent-child relationship (Kepley & Ostrander, 2007; Pfiffner & McBurnett, 2006). This gap in the literature is important to address as research suggests that children with comorbid ADHD and anxiety symptoms may present with unique risks and functional outcomes (Jensen et al. 1997; Jensen, 2003), including within the parent-child relationship. For example, emerging evidence indicates that parental stress, discipline, and confidence – which are all impaired in childhood ADHD (e.g., Alizadeh et al., 2007; Ellis & Nigg, 2009; Theule et al., 2013) – are also impaired in the parent-child relationship among children with anxiety disorders. Specifically, parents of children with anxiety report higher levels of parenting stress (Costa et al., 2006; Rodriguez, 2011; van Oort et al., 2010), higher use of ineffective and inconsistent disciplinary practices (Laskey & Cartwright-Hatton, 2009; Otto et al., 2016), and lower levels of parenting confidence (Aminayi et al., 2015; Herren et al. 2013) when compared to parents of children without anxiety disorders. Further, research suggests that children with both ADHD and anxiety may experience greater negative parent-child relationships than children with ADHD alone (e.g., Pfiffner & McBurnett, 2006). For example, parents of children with co-occurring ADHD and anxiety have been found to exhibit less positive parenting (Pfiffner & McBurnett, 2006) and lower familial independence (Kepley & Ostrander, 2007) as compared to parents of children with ADHD alone. In contrast, parents of children with ADHD with and without co-occurring anxiety symptoms report similarly high levels of family conflict (Kepley & Ostrander, 2007), suggesting that co-morbid anxiety may affect some aspects of the parent-child relationship more than others. Thus, the extant literature demonstrates that both ADHD and anxiety symptoms may independently and additively affect the parent-child relationship (e.g., Ellis & Nigg, 2009; Otto et al., 2016; Pfiffner & McBurnett, 2006). Yet, while there is some evidence that anxiety symptoms may influence the parent-child relationship for children with ADHD (Jarrett & Ollendick, 2008), it remains uncertain whether differences in the parent-child relationship are related to the interaction of the child's ADHD and anxiety symptoms. To our knowledge, no study to date has specifically examined the moderating influence of anxiety symptoms on the relations between both ADHD symptom dimensions (inattentive, hyperactive/impulsive) and the parent-child relationship.

Current Study

Taken together, the literature at this time suggests that children's ADHD symptoms confer risks for difficulties in several aspects of the parent-child relationship, specifically in terms of parental stress, discipline, and confidence (e.g., Alizadeh et al., 2007; Ellis & Nigg, 2009; Miranda et al., 2007). However, the majority of research has focused on comparing ADHD subtypes/presentations rather than assessing continuous relations between each symptom cluster and parent-child relationship outcomes. Therefore, the extent to which each symptom cluster uniquely predicts aspects of the parent-child relationship remains unclear. In addition, the available evidence suggests that a child's anxiety symptoms may affect ADHD hyperactive/impulsive and inattentive symptom expression (e.g., Bowen et al., 2008; Klymkiw et al., 2017; Maric et al., 2018; Menghini et al., 2018; Pliszka, 1992; Sørensen et al., 2011; Vloet et al., 2010). However, the extent to which it influences the association between ADHD symptoms and the parent-child relationship for these children remains uncertain. The current study addresses these gaps by examining the extent to which (a) ADHD inattentive and hyperactive/impulsive symptom dimensions uniquely predict parental stress, discipline practices, and confidence and (b) anxiety symptoms moderate the relation between each ADHD symptom dimension and each parent-child relationship component. Based on prior literature, we hypothesized that (i) higher levels of hyperactivity/impulsivity symptoms would predict greater parental stress, (ii) higher levels of inattentive symptoms would predict more ineffective/poor disciplinary practices, (iii) both ADHD symptom clusters would predict lower parenting confidence, and (iv) anxiety symptoms would moderate these relations, such that ADHD symptoms would have a weaker effect on the parent-child relationship for children with higher levels of anxiety symptoms.

Methods

Participants

The sample included 188 clinically-evaluated children aged 8 to 13 years ($M = 10.30$, $SD = 1.47$; 63 girls) from the Southeastern United States, recruited by or referred to a university-based children's learning clinic (CLC) through community resources (e.g., pediatricians, community mental health clinics, school system personnel, self-referral) from March 2015 to February 2020 for participation in a larger study of the neurocognitive mechanisms underlying pediatric attention and behavioral problems. Recruitment for the larger study was closed due to the COVID-19 pandemic. The sample is comprised of consecutive referrals whose evaluations were completed prior to the shutdown. The CLC is a research-practitioner training clinic known to the surrounding community for conducting developmental and clinical child research and providing *pro bono* comprehensive diagnostic and psychoeducational services. Its client base consists of children with suspected learning, behavioral, or emotional problems, as well as typically developing children (those without a suspected psychological disorder) whose parents agreed to have them participate in developmental/clinical research studies. All parents and children gave informed consent/assent, and the Florida State University Institutional Review Board approval was obtained/maintained throughout data collection. Sample race/ethnicity was mixed with 127 White

(67.6%), 16 Hispanic (8.5%), 22 Black (11.7%), 20 Multiracial (10.6%), and 3 Asian children (1.6%). All participants spoke English.

All children and caregivers completed an identical, comprehensive psychoeducational and diagnostic evaluation that included a detailed, semi-structured clinical interview using the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Aged Children (K-SADS; Kaufman et al., 1997). The K-SADS (2013 Update) allows differential diagnosis according to symptom onset, course, duration, quantity, severity, and impairment in children and adolescents based on DSM-5 criteria. Its psychometric properties are well established, including inter-rater agreement of .93 to 1.00, test-retest reliability of .63 to 1.00, and concurrent (criterion) validity between the K-SADS and psychometrically established parent rating scales (Kaufman et al., 1997). K-SADS interviews were supplemented with standardized, norm-referenced parent, teacher, and child self-report rating scales. A psychoeducational report was provided to parents. Please see the larger study's preregistration for a detailed account of the comprehensive psychoeducational evaluation and study procedures (<https://osf.io/2hmqp/>).

The final sample included 188 children: 60 children with ADHD only; 58 children with ADHD and common comorbidities (29 anxiety, 4 depression, 13 autism spectrum disorder/ASD, 12 oppositional-defiant disorder/ODD); 29 with common clinical diagnos(es) but not ADHD (16 anxiety, 5 depression, 7 ASD; 2 ODD); and 41 neurotypical children. Thirty-nine children in the ADHD sample were prescribed psychostimulant medication (26 ADHD-only cases, 13 ADHD+comorbidity cases). Due to funding constraints, 13 of the neurotypical participants completed an abbreviated screening evaluation that included parent questionnaires, a 1-subtest IQ screener, and detailed developmental, medical, educational, and psychiatric histories. Children were excluded from the larger study if they presented with (a) gross neurological, sensory, or motor impairment, (b) history of a seizure disorder, psychosis, or intellectual disability, or (c) non-stimulant medications that could not be withheld for testing.

Measures

Parenting Relationship Questionnaire—The Parenting Relationship Questionnaire–Child/Adolescent (PRQ) was completed by parents to assess their perceptions regarding the quality of their relationship with their child (Kamphaus & Reynolds, 2015). The PRQ was designed to examine key factors in the parent-child relationship for children and adolescents aged 6 to 18 years. The current study utilized raw scores from the Relational Frustration, Discipline Practices, and Parenting Confidence subscales. These three subscales were selected *a priori* because they correspond most closely with aspects of the parent-child relationship linked with children's ADHD symptoms in prior studies (e.g., Johnston & Mash, 2001; Modesto-Lowe et al., 2008). Psychometric support (Kamphaus & Reynolds, 2015) includes good internal consistency (Relational Frustration $\alpha = .89$ –.93, Discipline Practices $\alpha = .76$ –.83, Parenting Confidence $\alpha = .81$ –.87) and 1- to 3-week test-retest reliability (Relational Frustration $r = .86$, Discipline Practices $r = .70$, Parenting Confidence $r = .71$). Internal consistency within the sample was also good (Relational Frustration $\alpha = .92$, Discipline Practices $\alpha = .89$, Parenting Confidence $\alpha = .88$). Relational Frustration

is a 16-item subscale that measures the parent's perceived stress over common parenting situations (e.g., "My child frustrates me"; "I lose my patience with my child"). Discipline Practices is a 9-item subscale measuring parent's consistency in responding to a child's misbehavior as well as personal beliefs of the importance of establishing household and family rules (e.g., "I respond immediately to my child's misbehavior"; "It is important for a child to follow family rules"). Parenting Confidence is a 12-item subscale that measures the parent's confidence and comfort with caring for and raising their child (e.g., "I am confident in my parenting ability"; "I make good parenting decisions"). Higher scores on the Relational Frustration subscale reflect greater perceived frustration/stress, whereas higher scores on the Discipline Practices and Parenting Confidence subscales reflect better perceived consistent discipline and confidence.

ADHD Symptoms—The ADHD-RS-4/5 (DuPaul et al., 2016) was completed by teachers to assess the frequency and severity of ADHD symptoms based on DSM criteria in children and adolescents aged 5 to 17 years (18 items; 4-point Likert scale). Teacher reports were selected *a priori* for the current study to avoid the mono-informant bias that would occur if the parent reported on both the child's ADHD symptoms and their parent-child relationship. Additionally, teacher reports have been shown to outperform parent reports in regards to sensitivity, specificity, and classification accuracy of ADHD diagnosis (Tripp et al., 2006). The ADHD-RS-4/5 comprises two symptom subscales: Inattention (9 items) and Hyperactivity-Impulsivity (9 items). Psychometric support includes good internal consistency (Inattention $\alpha = .96$, Hyperactivity-Impulsivity $\alpha = .94-.95$) and 1- to 6-week test-retest reliability (Inattention $r = .85-.91$, Hyperactivity-Impulsivity $r = .77-.90$). Internal consistency for current the sample was also high ($\alpha = .95$). Higher raw scores reflect greater ADHD symptom severity.

Anxiety Symptoms—The Multidimensional Anxiety Scale for Children 2nd Edition Self-Report (MASC-2; March, 2013) was completed by child participants and assesses emotional, physical, cognitive, and behavioral symptoms related to anxiety disorders in children and adolescents ages 8 to 19 years. The MASC-2 Total Score measures the overall extent to which the child is experiencing anxiety symptoms. In addition to controlling for mono-informant bias, child self-report of anxiety symptoms were selected because self-reports appear to be more sensitive to early symptom emergence than parent reports; parent and child reports of symptoms over time are highly correlated ($r_{med} = .65$; Cole et al., 2002). The MASC-2 Total Score has demonstrated high internal consistency ($\alpha = .92$) and 1- to 4-week test-retest reliability ($r = .89$; March, 2013). Internal consistency for the current sample was also high ($\alpha = .91$). Higher raw scores reflect more severe and/or a greater number of total anxious symptoms.

Intellectual Functioning (IQ) and Socioeconomic Status (SES)—All children were administered the WISC-V Short Form or Matrix Reasoning subtest (Sattler et al., 2016) to obtain an estimate of intellectual functioning. Hollingshead (1975) SES was estimated based on the caregiver(s)' education and occupation.

Data Analysis Plan

The study's primary questions involved the extent to which each ADHD symptom domain (inattentive, hyperactive/impulsive) uniquely affects parenting outcomes, and the extent to which child anxiety buffers against these expected negative effects. Thus, a series of hierarchical regressions were conducted, with separate models for each parent-child outcome (relational frustration, discipline practices, parenting confidence). Step 1 included demographic covariates (child age, sex, IQ, SES, ADHD medication status). Child inattentive, hyperactive/impulsive, and anxiety symptoms were then added (Step 2), followed by inattention x anxiety and hyperactivity/impulsivity x anxiety interactions in the final step (Step 3). These primary models were then supplemented with a series of exploratory analyses to probe the impact of our *a priori* decisions to (a) recruit a clinically diverse sample; and (b) model the ADHD symptom dimensions separately. Analyses were conducted using JASP v. 0.14.1 (JASP Team, 2020); significant interactions were probed with simple slope analyses using the R package medmod as implemented in jamovi v. 1.6.23.0 (Jamovi Project, 2021).

Power Analyses

A power analysis was conducted using GPower v3.1 (Faul et al., 2007) to determine our sensitivity for detecting effects. For $\alpha = .05$ and power $(1-\beta) = .80$, in the event that all 10 potential predictors were retained in the final model (age, sex, IQ, SES, medication status, anxiety, inattention, hyperactivity/impulsivity, inattention x anxiety, and hyperactivity/impulsivity x anxiety), we would be sufficiently powered to detect $R^2 = .08$. A single predictor is expected to be significant if it explains at least 4.1% of the variance in a parent-child relationship domain. Thus, the study is sufficiently powered to detect clinically meaningful effects.

Results

Data Screening/Cleaning

All independent and dependent variables were screened for univariate outliers, defined as values greater than 3.00 SD above or below the within-group mean. Outliers were corrected to the most extreme value 3 SD above or below the within-group mean, with 0.14% of all data points being affected by this process. Missing data were determined to be missing completely at random (Little's MCAR test: $\chi^2 = 31.89$, $p = .94$) and therefore imputed using mean imputation based on all available data. This process affected 0.69% of data points. Range (min/max), skewness, and kurtosis for all variables were within expected limits as shown in Table 1. We have not previously reported parent-child relationship or child anxiety data for any children in the current sample; teacher-reported ADHD symptoms have been reported in prior papers for subsets of the current sample for the purpose of characterizing the same or predicting outcomes unrelated to parenting or the parent-child relationship. Intercorrelations among study variables are shown in Table 2.

Primary Analyses: Child Predictors of the Parent-Child Relationship

Relational Frustration.—Results of Step 1 indicated that child age, sex, medication status, SES, and IQ were not significant predictors of parent relational frustration; (all $p > .26$; model $R^2=.01$, $p=.81$). Adding child inattention ($\beta = .09$, $p = .32$), hyperactivity/impulsivity ($\beta = .10$, $p = .26$), and anxiety ($\beta = .06$, $p = .44$) failed to significantly increase the amount of explained variance ($R^2=.03$, $p=.16$; Step 2). Similarly, there was no improvement in explained variance when adding the child inattention x anxiety ($\beta = -.20$, $p=.57$) and hyperactivity/impulsivity x anxiety ($\beta = .01$, $p=.99$) interaction terms ($R^2 = -.01$, $p=.82$).

Discipline Practices.—Similar to the previous model, child age, sex, medication status, SES, and IQ were not significant predictors of discipline practices; (all $p>.14$; model $R^2=.03$, $p=.31$), and adding child inattention ($\beta=.04$, $p=.66$), hyperactivity/impulsivity ($\beta = -.05$, $p=.57$), and anxiety ($\beta = -.14$, $p=.07$) failed to significantly increase the amount of explained variance ($R^2=.02$, $p=.30$; Step 2). Similarly, there was no improvement in explained variance when adding the child inattention x anxiety ($\beta = -.09$, $p=.81$) and hyperactivity/impulsivity x anxiety ($\beta=.36$, $p=.20$) interaction terms ($R^2 = -.01$, $p=.41$).

Parenting Confidence.—In contrast to the previous models, child age ($\beta = -.15$, $p=.047$) and IQ ($\beta = -.14$, $p=.046$) significantly predicted parenting confidence, whereas sex, medication status, and SES did not (all $p>.30$; model $R^2=.05$, $p=.10$). Child inattention ($\beta = -.07$, $p=.45$), hyperactivity/impulsivity ($\beta=.04$, $p=.63$), and anxiety ($\beta = -.01$, $p=.85$) failed to significantly increase the amount of explained variance ($R^2=.01$, $p=.88$) in Step 2. Interestingly, however, when the interaction terms were added to the model, there was a significant improvement in variance explained ($R^2=.05$, $p=.008$), and the main effects of child inattention ($\beta=.71$, $p=.008$) and anxiety symptoms ($\beta=.46$, $p=.01$) became significant. Further, while the interaction between hyperactivity/impulsivity and anxiety symptoms was not significant ($\beta=.28$, $p=.31$), the inattention x anxiety interaction term significantly predicted parenting confidence ($\beta = -1.06$, $p=.002$; Step 3; Figure 1). Inspection of the valence of the β -weights for the significant main effects in the context of the significant interaction indicates that higher levels of child anxiety and inattention independently predict *greater* parental confidence when symptoms of the other condition are absent, whereas the interaction of higher child anxiety and inattention predict significantly *lower* levels of parental confidence. Simple slope analyses with anxiety as the moderator were consistent with this interpretation, and revealed that higher inattention symptoms were associated with higher parenting confidence for children with low levels of anxiety ($\beta=.20$, $p=.03$), but associated (albeit non-significantly) with lower levels of parenting confidence for children with high levels of anxiety ($\beta = -.19$, $p=.07$). In other words, it appears that the combination of greater child attention problems and anxiety, rather than elevations in either symptom domain in and of itself, predicts adverse parenting outcomes in terms of reduced parental confidence.

Sensitivity Analyses

Finally, we conducted a series of sensitivity analyses to examine the extent to which our findings may have been impacted by our *a priori* decisions to (a) recruit a clinically

heterogeneous sample that included children with clinical disorders beyond just ADHD and anxiety; and (b) examine ADHD inattention and hyperactivity/impulsivity domains separately. First, to probe the impact of our clinically heterogeneous sample, we repeated the primary analyses above, this time including covariates for each diagnostic category (coded as 0=no, 1=yes for depression, ODD, ASD, SLD-math, and SLD-reading).¹ The pattern and interpretation of results was unchanged from those reported above with one minor exception: ODD status predicted parent-reported relational frustration ($\beta=.23$, $p=.008$; all others $p>.22$), but there was no change to the (lack of) significance of the primary results for relational frustration. None of the child diagnostic categories predicted parent discipline practices (SLD-math $\beta=.15$, $p=.09$; all others $p>.16$) and their inclusion did not alter the pattern of (non-) significance reported above. Similarly, none of the child diagnostic categories predicted parental confidence ($p>.18$), and there were no changes to the significance or valence of the results reported above (child inattention $\beta=.66$, $p=.02$; anxiety $\beta=.46$, $p=.01$; inattention x anxiety $\beta= -1.01$, $p=.005$).

Finally, given that we did not find the predicted negative relations between ADHD symptom domains and parenting outcomes in the main effect models, we repeated the primary analyses again, this time using total ADHD symptoms instead of separate inattention and hyperactivity/impulsivity estimates. Interestingly, and different from the primary model above, adding child ADHD symptoms ($\beta=.16$, $p=.04$) and anxiety ($\beta=.06$, $p=.44$) modestly but significantly increased the amount of explained variance in parental relational frustration ($R^2=.02$, $p=.04$; Step 2), with higher child ADHD symptoms predicting greater parental relational frustration. However, this effect disappeared when controlling for comorbidities and became consistent with the exploratory model above, such that child ODD status ($\beta=.20$, $p=.01$) but not child ADHD symptoms ($\beta=.25$, $p=.33$) predicted relational frustration; the ADHD x anxiety interaction was not significant before or after controlling for comorbidities (both $p>.66$).

The discipline practices model with total ADHD symptoms was highly similar to the results reported above, with no significant effects of child ADHD ($\beta= -.16$, $p=.66$), anxiety ($\beta= -.13$, $p=.07$), their interaction ($\beta=.30$, $p=.30$), or comorbidities (all $p>.06$). Finally, the parenting confidence model with total ADHD symptoms produced results that were similar to, but less robust than, those reported above, highlighting the importance of assessing each ADHD symptom domain separately. Specifically, the nonsignificant effects of child ADHD ($\beta= -.02$ vs. $.40$, $p= .81$ vs. $.10$) and anxiety ($\beta= -.02$ vs. $.24$, $p= .78$ vs. $.14$) symptoms in Step 2 became 'closer' to significant (but remained nonsignificant) when adding the ADHD x anxiety interaction, and the improvement in variance explained when adding the interaction term ($R^2=.02$, $p=.07$) and the β -weight for the ADHD x anxiety interaction term ($\beta= -.53$, $p=.07$) both failed to reach significance. Controlling for comorbidities did not alter the pattern of obtained results, and similar to the primary model none of the comorbid conditions significantly predicted parent-reported discipline practices (all $p>.27$).

¹For completeness, we also re-ran these models while also including ADHD and Anxiety diagnostic categories. The pattern and interpretation of results was once again unchanged. Interestingly, child ADHD and anxiety diagnoses were not associated with any of the parenting variables assessed (all $p>.12$) despite the continuous measures of child ADHD and anxiety symptoms predicting parenting confidence as described above.

Summary of results.—Taken together, the current study was unable to detect any reliable child-level demographic, diagnostic, or behavioral predictors of parent-reported discipline practices, and only child ODD predicted increased parent relational frustration. In contrast, child anxiety and inattentive symptoms, and their interaction, along with child age and IQ, appear to be important for understanding the extent to which parents perceive themselves as confident and competent parents. Interestingly, child anxiety and inattentive symptoms interacted to predict parenting confidence, such that the combination of greater child attention problems and anxiety, rather than elevations in either symptom domain in and of itself, predicted adverse parenting outcomes in terms of reduced parental confidence. Stated differently, we found that low levels of anxiety exerted a significant protective effect on parenting confidence for children with high levels of attention problems. These findings were robust to control for child demographic characteristics, clinical diagnoses, and intellectual functioning, with sensitivity analyses highlighting the importance of assessing ADHD inattentive vs. hyperactive/impulsive symptoms separately for understanding parenting outcomes.

Discussion

The current study was the first to systematically examine the influence of co-occurring anxiety and ADHD symptoms on specific dimensions of the parent-child relationship in a clinically evaluated and carefully phenotyped sample of school-aged children with and without ADHD and anxiety disorders. Of principal interest was whether children's anxiety symptoms would exacerbate or attenuate the relation between each ADHD symptom cluster and the impairments in parent-child relationship quality that are commonly seen in children with ADHD (Alizadeh et al., 2007; Ellis & Nigg, 2009; Miranda et al., 2007). Interestingly, our results indicated that the risk for reduced parenting confidence appears attributable to the combination of greater child attention problems and anxiety, rather than elevations in either symptom domain in and of itself. Further, probing the interaction term revealed that low levels of child anxiety significantly mitigated, or conferred protective effects, against the risk of low parenting confidence conveyed by elevated child inattentive symptoms. In other words, it appears that high levels of anxiety or attention problems may not independently confer risk for reduced parenting confidence per se, and may even predict higher parenting confidence in the absence of symptoms of the other condition, but the combination of high anxiety and high attention problems appears particularly difficult for parents. Prior research examining the relation between continuous measures of anxiety, ADHD symptoms, and the parent-child relationship is minimal. Nevertheless, our results appear broadly consistent with experimental findings by Greco (2000), who found that lower levels of child anxiety were associated with more positive parent-child interactions, such as greater parental warmth, in comparison to children who exhibit high levels of anxiety during a laboratory based parent-child dyadic task. Although not explicitly assessed in Greco (2000), it seems reasonable to hypothesize that children with high anxiety in that study likely also presented with high inattention given that (a) concentration difficulties, i.e., attention problems, are a core symptom of anxiety disorders (APA, 2013), and (b) the current findings suggest that high levels of child anxiety may confer negative parenting outcomes only, or primarily, in the context of high inattention symptoms. This hypothesis is

of course speculative, but highlights the importance of assessing both inattention and anxiety when studying the causes, correlates, and outcomes of either syndrome.

As noted above, our results also revealed that higher levels of anxiety were associated with lower levels of parenting confidence for children with higher attention problems. This finding was aligned with prior evidence demonstrating that families of children with clinically diagnosed ADHD and anxiety report higher levels of parent-child difficulties (Pfiffner & McBurnett, 2006; Kepley & Ostrander, 2007). Interestingly, however, we also found that child anxiety was associated with overall *greater* parenting confidence when it presents in the absence of inattentive symptoms. This finding stands in contrast to a study by Aminayi et al. (2015), who found that parents of children with anxiety reported *lower* levels of parenting confidence compared to parents of children without anxiety. A possible explanation for this discrepancy may be Aminayi's reliance on parental perceptions of both their child's anxiety and their relationship with their child (i.e., monoinformant effects), and/or our use of global, child-reported anxiety symptoms relative to Aminayi's use of children's anxiety disorder diagnoses. For example, Herren et al. (2013) found that parents of children with separation anxiety had lower parenting confidence than parents of children with social anxiety, suggesting that level of parental confidence can differ based on the specific type of anxiety symptoms with which a child presents. Alternatively, it may be that the children in Aminayi et al. (2015) also presented with elevated (but unassessed) inattention symptoms, in which case their findings would be consistent with those reported herein. Taken together, our pattern of findings indicate that different levels of child anxiety may be associated with different adaptive or maladaptive parenting outcomes, and that this relation may vary as a function of the child's inattentive symptom severity, but further research is needed to examine whether ADHD and co-occurring symptoms of different forms of anxiety have disparate influences on a parent's parenting confidence.

Notably, we did not detect any reliable child-level demographic, diagnostic, or behavioral predictors of parental discipline practices. This pattern of results stands in contrast to prior work documenting hyperactivity/impulsivity symptoms as a risk factor for harsh and inconsistent parental discipline styles (e.g., Khamis, 2006; Weinberger et al., 2018). The reason for this discrepancy is unclear, but may be related to our control for mono-informant bias, reliance on parent self-report of discipline practices that may be subject to social desirability effects, and/or inclusion of a clinically heterogeneous sample. Although the latter possibility is unlikely given the sensitivity analyses reported above, and prior work supports the construct validity of our measure of parent-reported discipline practices (Lewallen & Neece, 2015; Fosco et al., 2018; Rubinic & Schwickrath, 2010), the discipline practices subscale's lack of associations with child behavior in the current study is curious and warrants further investigation in future studies. Overall, however, our findings appear broadly consistent with evidence that co-occurring anxiety and ADHD symptoms may differentially affect different aspects of the parent-child relationship (Pfiffner & McBurnett, 2006; Kepley & Ostrander, 2007).

Interestingly, with the exception of the parental confidence model, inattentive and hyperactivity/impulsivity symptoms did not predict most examined parent-child relationship outcomes. Our finding that child inattentive symptoms were associated with higher parental

confidence (in the absence of child anxiety symptoms) is somewhat counterintuitive, yet consistent with prior work showing that parents of children with primarily inattentive symptoms reported better parenting confidence than parents of children with both inattentive and hyperactive/impulsive symptoms (Miranda et al., 2007). In contrast, at first glance the non-significant relations between ADHD symptoms and parent-reported relational frustration/stress and discipline practices were surprising given prior evidence that a diagnosis of ADHD confers risk for difficulties within the parent-child relationship (Ellis & Nigg, 2009; Miranda et al., 2007; Weinberger et al., 2018). Our sensitivity analyses suggest a potential explanation for this discrepancy. That is, consistent with prior work we found that higher ADHD symptoms modestly but significantly predicted increased parent relational frustration. However, this relation disappeared when controlling for co-occurring child ODD, suggesting that at least some parent-child difficulties associated with ADHD may be attributable to common comorbidities rather than ADHD (e.g., Fergusson, Lynskey, & Horwood, 1997).

Alternatively, a potential explanation for this discrepancy may be that the current study included clinically evaluated children, many of whom may exhibit elevated inattentive and hyperactive/impulsive symptoms due to conditions other than ADHD (e.g., concentration problems and restlessness are also core symptoms of anxiety; concentration problems and psychomotor agitation observable to others are also core symptoms of depression; APA, 2013). Stated differently, no symptom of ADHD is unique to ADHD, and it appears likely that similar behavioral symptoms across disorders may be attributable to different underlying mechanisms and processes (e.g., Youngstrom et al., 2010). For example, executive function deficits may feature more prominently in ADHD than in other disorders associated with attention/concentration problems (e.g., Kofler et al., 2019; Snyder, 2013), and appear to predict parent-child relationship problems for these children. For instance, Joyner et al. (2009) found that greater executive functioning deficits in children with ADHD are associated with greater difficulties in parent-child relationships, and Kofler et al. (2017) reported that working memory and inhibitory control were each uniquely associated with parenting confidence in parents of children with ADHD. In turn, Fosco et al. (2018) found that better child executive functioning predicted greater reductions in parent-reported child inattention in response to behavioral parent training for youth with ADHD. These studies highlight evidence from the ADHD literature broadly (Rapport et al., 2000) and intervention literature specifically (Chan et al., 2021b) that ADHD-related inattentive and impulsive/hyperactive symptoms may represent outcomes rather than core features of the disorder that directly cause functional impairments (Kofler et al., 2016; Rapport et al., 2000), including within aspects of the parent-child relationship examined in the present study. Indeed, Muñoz-Silva et al. (2017) found that children's problematic behaviors predicted negative family outcomes over and above their ADHD symptoms, and several studies have found that ADHD symptoms fail to predict functional outcomes in academic, peer, and family functioning after accounting for executive function difficulties (e.g., Kofler et al., 2017). To that end, we speculate that mechanisms and processes that underlie inattentive and hyperactive/impulsive symptoms for children with ADHD, rather than these behavioral symptoms themselves, may be driving the impairments in parental relational frustration/stress, discipline practices, and/or confidence reported in the current/previous

studies (Ellis & Nigg, 2009; Miranda et al., 2007; Weinberger et al., 2018). Inclusion of child neurocognitive abilities, as well as a broader range of parent-child relational outcomes, will be important as this line of research expands to clarify the underlying mechanisms and processes that positively and negatively impact distinct aspects of the parent-child relationship for children with neurodevelopmental vulnerabilities such as ADHD.

Limitations

The present study was the first to specifically and systematically assess the extent to which child anxiety buffers or exacerbates the impact of children's ADHD symptoms on multiple dimensions of the parent-child relationship. A strength of our study was the use of psychometrically validated measures of all constructs of interest, and the use of parent, teacher, and child reports to avoid the mono-informant bias that would occur, for example, if we relied on parents to report both their relationship with their child and their child's clinical symptoms. Despite these methodological refinements, the following limitations must be considered when interpreting results. Although we controlled for mono-informant bias via the use of different informants for each construct of interest, informant report methods introduce potential confounds such as social desirability (Nederhof, 1985), halo effects (Forgas & Laham, 2016), and retrospective recall bias (Raphael, 1987). An additional strength of our study was the use of continuous measures of all assessed constructs given our goal of examining whether anxiety symptoms serve as a risk or protective factor for the parent-child relationships of children with elevated ADHD symptoms. Thus, we were able to maximize power relative to approaches that dichotomize symptoms that are normally distributed in the population at large. At the same time, it would be helpful for future work to examine these relations separately for children diagnosed with different forms of child psychopathology given the hypothesis that different mechanisms may affect the child's behavioral symptoms and the parent-child relationship for different groups of children. Next, our cross-sectional design precludes us from drawing conclusions about cause and effect; longitudinal and experimental designs will be important as this line of work expands. Finally, while our sample was generally similar to expectations based on U.S. Census data, the majority of children were White Non-Hispanic, and all were English-speaking. Replications with more racially/ethnically diverse samples are needed to assess the extent to which our findings may be generalizable to minority families of children with ADHD and anxiety symptoms.

Clinical and Research Implications

Results from the present study provide evidence for the significant and interactive influence of children's anxiety and inattentive symptoms on parenting confidence. That is, the present study found that the combination of high child anxiety and high child inattention, rather than either symptom cluster in and of itself, confers risk for parental perceptions of their own parenting skills. In contrast, ODD but not child ADHD or anxiety appear important for understanding parents' relational frustration, whereas we were unable to detect any child-level factors that influenced parent reports of their discipline practices. Taken together, it appears that child anxiety and inattention symptoms may have interactive influences on specific rather than broad-based aspects of the parent-child relationship, and produce differently valenced outcomes in the presence vs. absence of the other condition. Future

research examining neurocognitive and additional behavioral mechanisms and processes through which anxiety operates to produce differently valanced outcomes in the parent-child relationship for children with elevated ADHD symptoms is needed.

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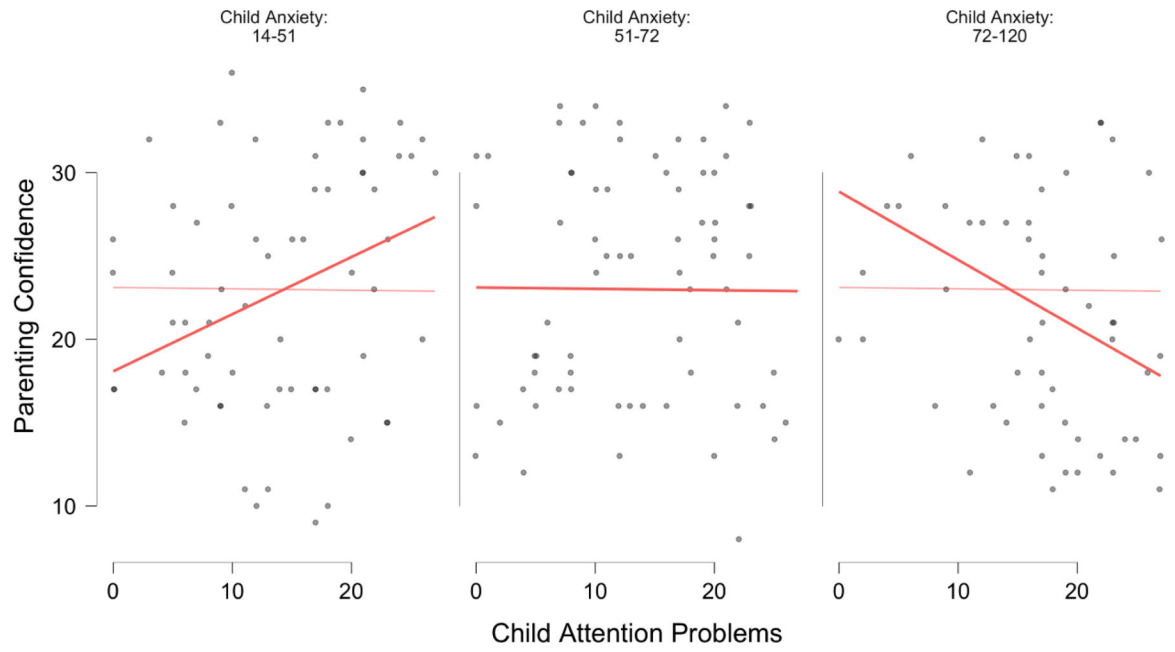


Figure 1. Child anxiety and attention problems interact to predict parenting confidence.

Table 1.

Sample and Demographic Variables.

	M	SD	Min	Max	Skew	Kurtosis
Sex (Boys/Girls)	125/63		--	--	--	--
Age	10.30	1.47	8.11	13.37	0.51	-0.92
Medication Status (Y/N)	50/138		--	--	--	--
SES	48.30	11.09	20.00	66.00	-0.45	-0.51
IQ (Standard Scores)	103.60	14.35	80	147	-0.08	0.04
ADHD-RS-4/5 – Inattention						
Teacher (Raw Score)	14.61	7.33	0	27	-0.27	-0.89
ADHD-RS-4/5 – Hyperactivity/Impulsivity						
Teacher (Raw Score)	9.70	8.36	0	27	0.65	-0.87
MASC-2 – Total						
Child (Raw Score)	61.06	21.78	14	120	0.09	-0.21
PRQ – Relational Frustration						
Parent (Raw Score)	12.63	6.13	0	32	0.75	0.69
PRQ – Discipline Practices						
Parent (Raw Score)	18.81	4.94	6	33	-0.01	-0.26
PRQ – Parenting Confidence						
Parent (Raw Score)	22.76	7.01	8	36	-0.05	0.35

Note. Medication Status = Current ADHD psychostimulant medication status, SES = Hollingshead socioeconomic status, IQ = Full Scale Intelligence (WISC-V Short Form), ADHD-RS-4/5 = ADHD Rating Scale for DSM-IV/5, MASC-2 = Multidimensional Anxiety Scale for Children 2nd Edition Self-Report, PRQ = Children Parenting Relationship Questionnaire.

Table 2.

Intercorrelation matrix.

	Parenting Outcomes			Child Symptoms			Child Demographics			
	Discipline Practices	Parent Confidence	Relational Frustration	Inattention	Hyperactive / Impulsive	Anxiety	Med Status	SES	Sex	Age
Parent Discipline Practices	—									
Parental Confidence	.23 **	—								
Parent Relational Frustration	.01	-.12 †	—							
Child Inattentive Symptoms	.04	.01	.15 *	—						
Child Hyperactive/Impulsive	.00	.07	.16 *	.50 ***	—					
Child Anxiety Symptoms	-.12	-.01	.07	.15 *	.05	—				
ADHD Medication Status	-.07	-.08	-.01	.10	.05	-.01	—			
SES	-.09	.04	.04	-.08	.05	-.04	.09	—		
Sex	-.11	-.01	-.08	-.11	-.21 **	-.01	-.12 †	-.02	—	
Age	.03	-.16 *	-.02	-.12 †	-.22 **	-.09	.13 †	-.01	-.09	—
IQ	-.11	-.12 †	-.05	-.27 ***	-.06	.04	-.02	.22 **	-.02	-.04

Note:

† $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$