Childhood ADHD and Perceived Relationship Quality in Young Women: Core Findings and Adolescent Mediators

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Abstract

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Attention-Deficit/Hyperactivity Disorder (ADHD) in females is associated with notable interpersonal difficulties during childhood and adolescence, yet little is known about the relationship quality of young women with histories of childhood ADHD. The purpose of this study was to examine the association between childhood ADHD and self-reported peer and parent relationship quality in young women, and to examine potential adolescent pathways of this association. Data were drawn from the Berkeley Girls with ADHD Longitudinal Study (BGALS, N = 228), composed of females with childhood ADHD (n = 140) and healthy comparisons (n = 88). Participants were followed prospectively from childhood (Wave 1; M age = 9.6 years) and assessed during adolescence (Wave 2; M age = 14.2 years) and young adulthood (Wave 3; M age = 19.6 years). A principal component analysis (PCA) on items from the Interview of Parent and Peer Relationships (Armsden & Greenberg, 1987), yielded a single peer and a single parent factor, with higher scores reflecting better perceived relationship quality (e.g., more trusting, accessible, and reliable) and lower scores reflecting poorer perceived relationship quality (e.g., less trusting, accessible, and reliable). Participants were compared with respect to Wave 1 ADHD status and symptom severity to their Wave 3 relationship quality. Parallel bivariate analyses were conducted according to ADHD diagnostic subtype at Wave 1 and diagnostic persistence over time. Potential pathways linking Wave 1 ADHD and Wave 3 relationship quality were explored via mediational analyses using four candidate variables assessed during adolescence (Wave 2 social skills, response inhibition, internalizing symptoms, and externalizing symptoms). Analyses were conducted with inclusion of psychiatric, cognitive, and demographic covariates. After covariate adjustment, ADHD diagnostic status was associated with significantly poorer peer and parent relationship quality, with small and medium effect sizes, respectively. There were no differences in relationship quality with respect to diagnostic subtype at Wave 1. Relative to having a lifetime non-diagnosis or transient diagnosis of ADHD, persistent ADHD was associated with significantly lower quality peer and parent relationship quality. Finally, social skills and response inhibition partially mediated the Wave 1 ADHD – Wave 3 relationship quality associations, although only the social skills variable was in the expected direction. In females, childhood ADHD, regardless of diagnostic subtype, is a specific risk factor for diminished quality of relationships with peers and parents during young adulthood. Persistent ADHD appears to be detrimental to parent relationship quality in particular.

Interventions targeting adolescent social skills in girls with ADHD may help to improve the quality of their peer and parent relationships as they transition to adulthood.

Childhood ADHD and Perceived Relationship Quality in Young Women: Core Findings and Adolescent Mediators

Despite a robust body of research documenting the prevalent social and relational difficulties among children and adolescents with Attention-Deficit/Hyperactivity Disorder (ADHD; e.g., Becker, Langberg, Evans, Girio-Herrera, & Vaughn, 2014; Blachman & Hinshaw, 2002; Bunford et al., 2014; Gardner & Gerdes, 2013; Greene, Biederman, Faraone, Sienna, & Garcia-Jetton, 1997; Hinshaw, 2002; Hoza et al., 2005; Lee, Falk, & Aguirre, 2012; Pelham & Bender, 1982; Rinsky & Hinshaw, 2011; for a review, see Hoza et al., 2007), less is known about how these youth – particularly females – fare in their interpersonal relationships by young adulthood. Findings from a handful of longitudinal studies reveal that, relative to comparison groups, young women with childhood ADHD experience greater levels of conflict with their mothers (but not their fathers; Babinski et al., 2012), poorer overall social adjustment (Biederman et al., 2008), higher risk for relational violence (Guendelman, Ahmad, Meza, Owens, & Hinshaw, 2015), and lower levels of social acceptance (Hinshaw et al., 2012). Thus, the limited extant research on women diagnosed with ADHD in childhood suggests that this population experiences significant relational difficulty with both peers and parents that persists into young adulthood. However, no studies to date have examined how these young women *subjectively* evaluate their close relationships.

Subjective evaluations of one's close relationships are important indicators and predictors of health and well-being (Diener, Lucas, & Oishi, 2002; Fiorillo & Sabatini, 2011; Ryff & Singer, 2000; Segrin & Taylor, 2007; Teo, Choi, & Valenstein, 2013). Furthermore, subjective perceptions of relationship quality – including both positive aspects of relationships, such as emotional support provided by significant others, and strained aspects of relationships, such as conflict and stress (Umberson & Montez, 2010) – may differ from objective evaluations (e.g., availability of instrumental support, number and frequency of social contacts, network density), and yield valuable information about mental health missed by objective assessment measures (Haber, Cohen, Lucas, & Baltes, 2007; House & Kahn, 1985). For instance, loneliness – a powerful predictor of mental health outcomes – is, by definition, based on one's perceptions: one person may live a solitary life and not feel lonely, whereas another person can have many social relationships and nevertheless feel lonely (Hawkley et al., 2008). Although the associations are bidirectional and complex (e.g., Hammen & Brennan, 2002), individuals who perceive their relationships as being of high quality have been found to have lower risk of depression and alcohol problems (Umberson, Slaten, Hopkins, House, & Chen, 1996), lower ambulatory blood pressure and physiological indices of allostatic load (Holt-Lunstad, Birmingham, & Jones, 2008; Seeman, Singer, Ryff, Dienberg Love, & Levy-Storms, 2002), and higher overall levels of happiness and life satisfaction (Diener, Lucas, & Oishi, 2002). In addition, subjective evaluations of relationship quality may be a pathway through which objective measures of social functioning affect psychological well-being (e.g., see Adler, Epel, Castellazzo, & Ickovics, 2000, for a parallel argument with regard to subjective socioeconomic status). There is also some evidence to suggest that subjective measures of relationship quality may predict different patterns of psychological adjustment in females relative to males (Kessler, McLeod, & Wethington, 1985, Rueger, Malecki, & Demaray, 2008; but see Fuhrer, Stansfeld, Chemali, & Shipley, 1999, Umberson et al., 1996). In addition, relationship quality may be an important outcome, in and of itself (Pettit, Erath, Lansford, Dodge, & Bates, 2011). Among women with childhood ADHD,

much remains to be learned about the subjective perceptions of the nature and quality of their close relationships.

Attachment theory (Ainsworth & Bowlby, 1991; Bowlby, 1973, 1977) offers a conceptual framework regarding the key dimensions of relationship quality across the lifespan. In general, relationships experienced as trustworthy, accessible and responsive (e.g., "secure") – rather than unpredictable, inconsistent, and unresponsive (e.g., "insecure") – are thought be strongly linked to psychological adjustment, and arguably, to survival as well (Bretherton, 1992). Beginning in infancy, children display certain 'attachment behaviors' that seek to maintain proximity to their attachment figures, in order to obtain security and care. Children whose caregivers are accessible and responsive tend to develop a healthy sense of security and worthiness, both internally and in their environment at large. In adolescents and adults, whose cognitive capacities for abstraction are more developed, representational models (i.e., internalized models rather than behavioral aspects) of attachment are thought to take precedence. Attachment representations are assumed to guide one's expectations, feelings, information processing, and emotion regulation in relationships and in attachment situations (Scharf, Mayseless, Kivenson-Baron, 2004). Over time, individuals develop 'working models' of their relationships given their repeated interpersonal interaction patterns and amalgamation of experiences with a significant person (Bretherton, 1992). Working models appear to be a multi-faceted mediator of past attachment-related experience, with both general features (e.g., abstract rules or assumptions about attachment relationships) and specific features (e.g., information about specific relationships and events within relationships; Pietromonaco & Feldman Barrett, 2000). An internal working model that is higher on dimensions of trust, accessibility, reciprocity, and responsiveness – and lower on unpredictability, inconsistency, and unresponsiveness – is associated with more satisfying, positive, and better quality relationships (Armsted & Greenberg, 1987). Conversely, working models marked by distrust, lack of attunement, and unpredictability are associated with poorer quality relationships.

Although childhood attachment quality does tend to be fairly stable over time, there are important individual differences according to life experiences, especially those related to stress and trauma (Waters, Merrick, Treboux, Crowell, & Albersheim, 2000). By adolescence and young adulthood, rather than the quantity or availability of social relationships, it is the perceived adequacy relationships (guided by, but not entirely predicted by, earlier attachment security), especially in the presence of stress and adversity, that is thought to be most relevant for positive psychological adjustment (Armsted & Greenberg, 1987).

The transitional years of emerging adulthood (e.g., ages 18-25; Arnett, 2004) constitute a distinctive period during which the nature of close relationships, both with peers and parents, are in flux (Barry, Madsen, Nelson, Carroll, & Badger, 2009; Collins & van Dulmen, 2006; Erikson, 1968). In addition to gradually assuming adult roles in society (Arnett, 2007), salient developmental tasks during this stage include developing healthy interpersonal intimacy (Montgomery, 2005) and establishing a coherent and viable identity (Arnett, 2007; Barry et al., 2009; Erickson, 1968). During emerging adulthood, the development of an increasingly autonomous and integrated sense of self is thought to be essential to establishing satisfying interpersonal experiences and relatedness, and vice versa (Inguglia, Ingoglia, Liga, Coco, & Lo Cricchio, 2015). Furthermore, theorists have suggested that, as a result of differential gender socialization patterns, having close, cooperative, and high quality intimate relationships may be particularly important for women's identity formation and mental health (Chodorow, 1978;

Gilligan, 1982; Sneed et al., 2006). The socio-environmental context in which these developmental changes occur tends to include a drop in supportive structures present earlier in life (e.g., reduction in parental support, obligations, and guidance; the end of secondary and post-secondary school) as well as greater instability and transition (e.g., leaving parental home, beginning to work; Arnett, 2007). These changes may allow greater personal agency over interpersonal relationships and intimacy needs than ever before (Cote, 2000; Montgomery, 2005). Nonetheless, despite the increased expectations for autonomy and self-sufficiency, emerging adults still tend to see their parents as their primary sources of support, even following a decline in closeness during adolescence (Fuligni & Pedersen, 2002) and as family contact decreases overall (Sneed et al., 2006). In addition, as expectations around marriage and having children are delayed and become a less prominent feature of young adulthood, friendships during this period take on more importance, but may be more voluntary and transient than in the past (Laursen & Bukowski, 1997). In sum, young women's subjective evaluations of their relationship quality may reveal much about how they are navigating the changing relational terrain of emerging adulthood. However, very little is known about how young women with childhood ADHD, in particular, perceive their close interpersonal relationships during this transitional period.

Females with childhood-diagnosed ADHD appear to be in jeopardy of experiencing poorer quality relationships during emerging adulthood relative to their peers without a history of ADHD. Indeed, as outlined earlier, a small body of research has shown that young women with childhood ADHD tend to have more dysfunctional relationships, with greater levels of conflict and violence (Babinski et al., 2012; Biederman et al., 2008; Guendelman et al., 2015; Hinshaw et al., 2012). Furthermore, this population generally fares poorly across a variety of indicators of psychological adjustment, educational and occupational attainment, and adaptive functioning during young adulthood (Babinski et al., 2011; Hinshaw et al., 2012). The extent to which childhood ADHD affects the quality of peer versus parent relationships in young adulthood has not yet been studied. In general, research has shown that emerging adults with challenges in meeting transitional milestones may be likely to experience conflict with their parents (Nelson et al., 2007). However, Barry and colleagues (2009) found that attainment of adulthood criteria (e.g., role transitions such as finishing education and marrying; norm compliance such as avoiding illegal drugs and drunk driving) was not significantly associated with relationship satisfaction or alliance within adult friendships. Thus, although I hypothesize that women with childhood ADHD are at risk for poorer relationships during young adulthood, effects for friendships versus parent relationships are unclear.

Examination of the mediational pathways between childhood ADHD and relationship quality during young adulthood may help elucidate the specific aspects of childhood ADHD that are responsible for driving the association, and as such, may clarify likely targets for preventive intervention. In line with Research Domain Criteria (RDoC), understanding developmental trajectories across various phases of the life span is essential to early prevention efforts (National Institute of Mental Health, 2014). In this study, I focus on four candidate mediator domains during adolescence, based on research about individual-level factors associated with relationship quality both in general populations and in ADHD-specific populations. The four domains include social skills, response inhibition, internalizing symptoms, and externalizing symptoms. Importantly, these were selected on the basis of their theoretical and empirical relevance both to

ADHD and to relationship quality but were not intended to be exhaustive. Each candidate mediator domain is described below.

Social Skills. Social skills are defined as learned behaviors that affect interpersonal relations with peers and adults (Elliott, Sheridan & Gresham, 1989; Gresham, Sugai & Horner, 2001), comprising a repertoire of verbal and non-verbal abilities used to communicate and govern interactions with others (Merrell & Gimpel, 2014; Spence, 2003). Social skills include behaviors at both a microlevel (e.g., eye contact, facial expression, social distance) and macrolevel (e.g., initiating conversation, selecting appropriate topics of conversation, offering help). Social skills are important for a variety of relationships (e.g., peer, parent, teacher; Spence, 2003) and subserve a variety of socially important outcomes for children and youth (Bagwell, Newcomb & Bukowski, 1998; de Boo & Prins, 2007; Gresham, Sugai, & Horner, 2001; Parker & Asher, 1987). They are commonly impaired in samples diagnosed with ADHD (Becker et al., 2014; deBoo & Prins, 2007; Gentschel & MacLaughlin, 2000; Hinshaw, 2002; Landau & Moore, 1991). Pettit and colleagues have suggested that adolescent social skills could serve as one important area of individual difference that contributes to the development of later relationship quality (Pettit et al., 2011). Indeed, beyond the immediate relevance to effective social interactions with others, the ability to learn and perform appropriate social behaviors predicts a child's broader ability to form and maintain satisfying and supportive relations and to perform competently in social situations (Gresham, Sugai & Horner, 2001; Parker & Asher, 1993; Asher & Coie, 1990; Spence, 2003).

Social skills deficits have been consistently documented in children and adolescents with ADHD (e.g., Greene et al., 1997, 2001), including the present sample of females (Hinshaw, 2002; Hinshaw, Owens, Sami, & Fargeon, 2006; Rinsky & Hinshaw, 2011), and are a common target of intervention for this population (e.g., Pfiffner & McBurnett, 1997; Storebo et al., 2011). Such skills deficits are thought to arise from symptoms of hyperactivity/impulsivity (e.g., conversational interruptions, intrusiveness, blurting comments, restlessness, impatience), which may prevent a child from using social knowledge appropriately, and from symptoms of inattention (e.g., missing social cues, appearing to not care or become easily bored), which may limit social interactions and thereby restrict acquisition of adequate social knowledge (Wheeler & Carlson, 1994; Wheeler Maedgen & Carlson, 2000). In youth with ADHD, social skills impairments are associated with both concurrent and subsequent social difficulties (Greene et al., 1997; Wehmeier, Schacht, & Barkley, 2010). For instance, Normand and colleagues (2013) found that violations of game rules and poor negotiation skills predicted deterioration in friendship quality six months later for 7-13 year olds with and without ADHD. In addition, parents of children with ADHD tend to have social impairments (Mikami, Jack, Emeh, & Stephens, 2010), psychiatric problems (Johnston & Mash, 2001; Johnston, Mash, Miller, & Ninowski, 2012), and maladaptive parenting behaviors (Kaiser, McBurnett & Pfiffner, 2011; Lifford, Harold & Thapar, 2008), which may result in reduced 'transmission' or modeling of key social skills and also potentially interfere with the development of supportive and secure attachment in their offspring (Finzi-Dottan, Manor & Tyano, 2006). However, no study to date has prospectively examined the association between social skills during adolescence and perceived relationship quality during young adulthood, in either samples with ADHD or in normatively developing individuals.

Response Inhibition. Inhibitory control (also referred to as response suppression and executive inhibition) refers to the ability to interrupt a prepotent response during dynamic moment-to-moment behavior (Nigg, 2013), or the ability to suppress inappropriate responses. Inhibitory control falls in the family of executive functions, which refer to those cognitive processes that underlie goal-directed behavior and are orchestrated by activity within the prefrontal cortex and its intensive connections with other brain regions (Best & Miller, 2010). Executive functions continue to develop into young adulthood (Best & Miller, 2010; Cascio et al., 2014). Although certain executive functioning deficits are shared by other psychopathologies (e.g., autism; Pennington & Ozonoff, 1996), the primary role of deficient inhibitory control appears to distinguish ADHD from other disorders (Barkley, 1997; Nigg, 2006; Sonuga-Barke, 2002) and may be particularly relevant to social competence in both ADHD (Barkley, 1997) and in general populations (Zhou, Chen, & Main, 2012).

Although theoretical models of ADHD vary in the extent to which inhibitory deficits are causal (versus merely correlated with or consequences of ADHD), there is wide support both theoretically (e.g., Barkley, 1997; Nigg, 2001; Sonuga-Barke, Bitsakou, & Thompson, 2010) and empirically (e.g., Willcutt, 2010) that response inhibition is an important focal weakness in ADHD. Deficits in inhibitory control are associated with symptoms of impulsivity (i.e., action without foresight) and inattention-disorganization (i.e., in that maintaining focused behavior requires continually suppressing alternative behaviors that may be activated by context), as well as decreased emotion regulation (Barkley, 1997; Nigg, 2013). Inhibitory problems are thought to impede children with ADHD from enacting rule-governed behavior (e.g., complex social rules) and make them more dependent on environmental contingencies (Barkley, 1997; Huang-Pollock et al., 2009). In the present sample, Miller and Hinshaw (2010) found that childhood cognitive inhibition predicted adolescent social functioning, including measures of peer status and social skills (see also Miller, Montenegro-Nevado, & Hinshaw, 2011; Rinsky & Hinshaw, 2011). Another study found that laboratory measures of inhibition in preschool predicted parent and teacher ratings of social problems in elementary school (Gewirtz, Stanton-Chapman, & Reeve, 2009).

Internalizing symptoms. ADHD in girls is associated with increased rates of psychiatric comorbidities, including internalizing (e.g., depression, anxiety) and externalizing (e.g., aggression, conduct problems) disorders (Biederman et al., 2010; Hinshaw et al., 2002; Hinshaw et al., 2006; Hinshaw et al., 2012). For females, the developmental period of adolescence ushers in substantially increased risk, relative to childhood, for internalizing symptomatology (Graber & Sontag, 2009). Indeed, adolescent girls are twice as likely as boys to be depressed (Nolen-Hoeksema & Girgus, 1994), though prevalence varies by racial/ethnic group status (McLaughlin, Hilt, & Nolen-Hoeksema, 2007). A study using the present sample found that, relative to healthy comparisons, females with childhood ADHD displayed significantly higher teacher and parent-rated internalizing symptomatology by adolescence, with medium to large effect sizes (Hinshaw et al., 2006).

Although the well-documented association between internalizing problems and interpersonal dysfunction is complex and bidirectional (Gotlib & Lee, 1989), depressed individuals tend to create a negative social environment by engaging in aversive interactions, which ultimately tend to result in loss of support or negative reactions from close others (Coyne, 1976; Zlotnick, Kohn, Keitner, & Della Grotta, 2000). Evidence links internalizing problems to a

host of relationship difficulties, including lower levels of supportiveness in parent-offspring relationships during young adulthood (Needham, 2008), fewer positive interactions and more negative interactions in romantic relationships (Zlotnick et al., 2000), and poorer quality of close relationships and greater conflict in family relationships (Gotlib & Lee, 1989). Adolescent depression has been linked to disturbances in peer and parent attachment (e.g., less secure attachment; Armsden, McCauley, Greenberg, Burke, & Mitchell, 1990; Kobak, Sudler & Gamble, 1991) and is associated with long-term interpersonal problems, even when the depression subsides (Kennedy & Paykel, 2004). One study of children with ADHD found that co-occurring internalizing symptoms were more strongly associated with negative social preference (i.e., teacher ratings of the proportion of classmates who "like/accept" and "dislike/reject" a given child) in girls compared to boys (Becker, McBurnett, Hinshaw & Pfiffner, 2013).

Externalizing symptoms. Childhood ADHD is a risk factor for subsequent externalizing problems (e.g., oppositional, defiant, and aggressive behaviors) at all ages for both boys and girls (Owens, Cardoos & Hinshaw, 2015). In their prospective follow-up study on girls with childhood ADHD, Biederman and colleagues (2006) found an increased prevalence of disruptive behavior, including conduct disorder (CD; hazard ratio = 10.2) and oppositional defiant disorder (ODD; hazard ratio = 11.0) in the adolescents with childhood ADHD relative to comparisons. In the present sample, Hinshaw and colleagues (2006) found that 50% of adolescent females with childhood ADHD met diagnostic criteria for ODD, compared to only 7% of comparison females, and had significantly higher parent- and teacher-rated externalizing symptoms, regardless of ADHD subtype. Furthermore, Lee and Hinshaw (2006) found that hyperactivity-impulsivity symptoms during childhood predicted adolescent conduct problems in the present sample.

Externalizing symptoms, which include behaviors such as actively defying or refusing to comply with adult rules and requests, frequent temper outbursts, and excessive arguing, can interfere with adaptive adult-child and child-peer interactions (Greene et al., 2002). Greene and colleagues (2002) found that, among male and female adolescents, a diagnosis of ODD was associated with significantly greater family and social dysfunction, including poorer adult-child and child-peer interactions, relative to comparisons. Aggressive youth have been found to be more rejected by their peers and have poorer social problem solving skills (Dodge et al., 1986; Dodge et al., 1990). Furthermore, parents of children who display externalizing behaviors tend to engage in more maladaptive parenting strategies (e.g., coercion), which may lead to a reciprocal process of impaired parent-child relationships and greater child externalizing symptoms (Lansford et al., 2011). One large twin study found that parent-child conflict was a common vulnerability that increased the risk for multiple childhood externalizing disorders, including ADHD, ODD, and CD, suggesting that comorbidity among these disorders may partially reflect core psychopathological processes in the family relational environment (Burt, Krueger, McGue & Iacono, 2003). In parallel, Allen and colleagues (2007) found higher levels of self-reported externalizing behavior among adolescents with insecure attachment relative to those who were securely attached, as indexed by the Adult Attachment Interview (George, Kaplan, & Main, 1996). Externalizing problems during adolescence have also been linked specifically to pervasive social dysfunction during adulthood (Fombonne, Wostear, Cooper, Harrington & Rutter, 2001).

Findings regarding the effect of co-occurring externalizing symptoms on the social and peer functioning (e.g., peer conflict, social skills/competence, friendship quality, peer status) of

youth with ADHD have been mixed (Becker, Luebbe & Langberg, 2012). Most studies have shown that co-occurring externalizing symptomatology exacerbates relationship dysfunction in this population, but others have shown a null effect (Becker et al., 2012). Mikami and Lorenzi (2011) found that the negative impact of conduct problems on peer relationships was stronger for girls than for boys in their school-aged ADHD sample. In sum, ADHD symptoms predict relationship problems, and externalizing comorbidities appear to intensify this association.

The Current Study

First, I examined self-reported peer and parent relationship quality in a longitudinal sample of young adult females with and without childhood ADHD, followed prospectively and assessed during childhood, adolescence, and young adulthood. I analyzed childhood ADHD both diagnostically (i.e., ADHD vs. comparison) and dimensionally (i.e., symptom severity) in accordance with RDoC guidelines (National Institute of Mental Health, 2014).

Hypothesis 1a: Relative to comparisons, participants with a childhood diagnosis of ADHD will show poorer quality peer and parent relationships in young adulthood.

Hypothesis 1b: There will be a negative association between childhood ADHD symptomatology and peer and parent relationship quality in young adulthood (e.g., greater symptom severity will be associated with poorer quality relationships).

Second, within the ADHD group, I examined the self-reported relationship quality according to diagnostic subtype. Research has shown subtype differences in social functioning among youth with ADHD, with hyperactive-impulsive children typically faring worse than inattentive children (Hinshaw, 2002; Nijmeijer et al., 2008; Wheeler Maedgen & Carlson, 2000).

Hypothesis 2: In this sample, participants with childhood ADHD-C (combined-hyperactive/impulsive and inattentive type) will show poorer peer and parent relationship quality compared to participants with ADHD-I (inattentive-type).

Third, I examined whether the diagnostic persistence of ADHD over development was associated with young adulthood relationship quality. Consistent with previous studies using the current sample (Guendelman et al., 2015; Swanson, Owens, & Hinshaw, 2013), I analyzed three groups (non-diagnosed, transient ADHD, and persistent ADHD) with respect to peer and parent relationship quality.

Hypothesis 3: There will be a stepwise relationship between degree of diagnostic persistence and relationship quality, with Persistent ADHD being associated with the poorest quality relationships; Non-Diagnosed ADHD showing the best quality relationships; and Transient ADHD falling somewhere in between.

Finally, to better understand the developmental pathways linking childhood ADHD and young adulthood relationship quality, I examined four potential mediator variables, measured during adolescence: (a) social skills, (b) response inhibition, (c) internalizing symptoms, and (d) externalizing symptoms.

Hypothesis 4: I hypothesized that each of the four candidate mediator domains would partially mediate childhood ADHD-young adulthood relationship quality associations. I did not have any specific hypotheses about the degree of the mediational effect for each mediator.

In all analyses, relationship quality was examined separately with respect to peers and parents. Furthermore, in order to clarify the role of childhood ADHD per se and to account for

potentially confounding factors, all unadjusted analyses were also conducted with adjustment for key baseline comorbidities and cognitive and demographic covariates.

Method

Overview

Detailed study methodology has been previously reported (Hinshaw, 2002; Hinshaw, et al., 2006; Hinshaw et al., 2012). In brief, participants were drawn from the Berkeley Girls with ADHD Longitudinal Study (BGALS), an ongoing case-control study of girls with and without ADHD. At baseline (Wave 1), the project recruited ethnically diverse female participants aged 6-12 years from local physician's offices, mental health centers, school districts, and through direct advertisements to participate in a summer research camp. A thorough, multi-gated screening and diagnostic assessment procedure yielded a baseline sample of 140 girls with ADHD and 88 age- and ethnicity-matched comparison girls (Hinshaw, 2002).

Final inclusion criteria for the clinical group required participants to meet full DSM-IV (American Psychiatric Association, 2000) diagnostic criteria for ADHD via the Diagnostic Interview Schedule for Children (4th edition, DISC-IV; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). Comparison girls could not meet diagnostic criteria for ADHD. To promote generalizability of the sample, common comorbidities (e.g., disruptive behavior disorders, anxiety disorders, depression) were permitted. Potential participants were excluded if they had an IQ of less than 70, overt neurological damage, psychosis, or pervasive developmental disorder, and/or medical conditions precluding participation in a summer camp.

Given the emphasis on collecting ecologically valid data in a naturalistic setting, the summer programs were designed as enrichment day camps rather than as therapeutic interventions. ADHD and comparison girls were mixed and grouped by age in the camps, which featured a series of classroom, art, drama, and outdoor activities. In addition, validated multi-method and multi-informant measures were used to collect information about participants' psychological, cognitive, socio-emotional, and behavioral functioning. Participants taking stimulant medication were assessed while unmedicated. Baseline information collected immediately before and during the camps comprises the baseline (Wave 1) database.

All 228 participants were invited for prospective follow-up five years (Wave 2; Hinshaw et al., 2006) and ten years (Wave 3; Hinshaw et al., 2012) after the summer camps. Retention rates were high at both follow-up assessments (Hinshaw et al., 2006; Hinshaw et al., 2012): 209 (92%) of the original participants were assessed at Wave 2, when their ages ranged from 11-17 years (*M* age = 14.2), and 216 (95%) were assessed at Wave 3, when their ages ranged from 17-23 years (*M* age = 19.6). Comparisons of the retained sample at Wave 3 versus the 12 participants lost to attrition revealed that the non-retained participants had lower family incomes and IQ scores, and higher baseline teacher and parent ratings of ADHD severity. The groups were comparable with regard to parent-rated internalizing symptoms and externalizing symptoms, adopted/foster status, and single-parent household status. Although slightly less impaired, the retained sample appeared generally representative of the original sample. The analytic sample for the present study comprises n = 198 participants who had complete information on their self-rated peer and parent relationship quality at Wave 3.

At Waves 2 and 3, participants and their parents came to the University of California, Berkeley campus for two half-day assessment sessions. If participants were unable or unwilling to travel, interviews were conducted via telephone or at the participants' homes. Assessors were highly trained and supervised post-bachelor's level research assistants and doctoral students in clinical psychology, and they were blind to the participants' baseline diagnostic group (i.e., ADHD vs. comparison) and all prior assessments. The use of objective measures (e.g., neuropsychological testing and computerized structured interviews) along with subjective measures (i.e., self-report questionnaires, interview questions) helped to minimize bias. All procedures were approved by the UC Berkeley Committee for the Protection of Human Subjects.

Measures

Dependent variables.

Peer and Parent Relationship Quality. The *Inventory of Parent and Peer Attachment* (*IPPA*; Armsden & Greenberg, 1987), a self-report instrument consisting of a peer form (n = 25 items) and a parent form (n = 28 items) was administered to participants at Wave 3. Questions tap the respondent's *current* "internal working model" of attachment figures by assessing (a) the positive affective/cognitive experience of trust in the accessibility and responsiveness of attachment figures (e.g., for peers, "My friends sense when I'm upset about something" and "My friends accept me as I am;" for parents, "My parents respect my feelings" and "I can count on my parents when I need to get something off my chest") and (b) the negative affective/cognitive experiences of anger and/or hopelessness resulting from unresponsive or inconsistently responsive attachment figures (e.g., for peers, "Talking over my problems with friends makes me feel ashamed or foolish," and "I feel alone or apart when I am with my friends;" for parents, "Talking over my problems with my parents makes me feel ashamed or foolish" and "I feel angry with my parents"). Respondents are prompted to answer regarding the peer(s) and parent(s) who most influenced them. The negative set of items is reverse scored. Most peer and parent items have parallel wording but several do not. Respondents rate items on a 5-point scale (1 = *almost always or always true*, 2 = *often true*, 3 = *sometimes true*, 4 = *seldom true,* or 5 = *almost never or never true*). The *IPPA* has good reliability and convergent validity; previous studies have consistently shown an association between the *IPPA* and self-esteem and life satisfaction (Armsden & Greenberg, 1987), depression (Agerup, Lydersen, Wallander, & Sund, 2015; Armsden, McCauley, Greenberg, Burke, & Mitchell, 1990) as well as aggression and overall psychological adjustment (Laible, Carlo, & Raffaelli, 2000). Based on results from principal components analyses (see below), I used the average score for (a) all peer items (a = .94; M = 3.18, SD = 0.55) and (b) all parent items (a = .94; M = 2.56, SD = 0.72) to index peer and parent relationship quality, respectively (peer and parent relationship quality r = .37, p < .001). Higher scores represent better quality relationships (e.g., "secure" attachments). Conversely, lower scores represent poorer quality relationships (e.g., "insecure" attachments).

Principal Components Analyses. Armsden and Greenberg (1987) recommended using a unifactorial measure assessing aspects of security-insecurity along a single dimension for peer attachment and parent attachment, respectively. However, using their original sample, they also performed exploratory analyses that suggested that there were three dimensions within the peer

and parent scales, respectively: Trust, Communication, and Alienation. However, within the peer and parent scales, separately, the three factors were moderately to strongly correlated with one another (Armsden & Greenberg, 1987). Findings with respect to the factor structure of the *IPPA* have been equivocal in subsequent studies, with one-factor (e.g., Gallarin & Alonso-Arbiol, 2013; Gunaydin, Selcuk, Sumer, & Uysal, 2005), two-factor (e.g., Johnson, Ketring, & Abshire, 2003), and three-factor (e.g., Pace, San Martini, & Zavattini, 2011) structures observed.

Given that the *IPPA* has, to my knowledge, never been used with young adult women, or with individuals with histories of ADHD, I sought to determine the factor structure (i.e., reveal the simple structure) of the *IPPA* within the present sample. In other words, was the single factor approach best, or were there separable dimensions of attachment quality that would be important to examine separately?

In line with the original design of the measure, I analyzed the peer scale separately from the parent scale. Analyzing the peer and parent attachment scales separately also seemed conceptually justified given that (a) I am interested in examining peer and parent relationship quality separately (e.g., not the general dimensions underlying relationship quality across any type of relationship) and (b) peer and parent attachment are presumed to assess distinct attachment systems (Armsden & Greenberg, 1987).

First, I reverse coded the negatively phrased items (e.g., "I feel angry with my friends") so that all the variables were in the same direction. Second, I conducted a Principal Components Analysis (PCA) with Direct Oblimin Rotation using the peer items (n = 25). I used this oblique rotation method given the assumption that the factors would be correlated. Three factors emerged with Eigenvalues > 1, with the three factors accounting for approximately 55% of the overall variance in the scale. However, nearly all of the peer items were complex and loaded onto more than one factor. Factors 1 and 3 were correlated (r) at .59 and factors 1 and 2 were correlated (r) at .40. While factors 1 and 3 appeared to tap positive aspects of friendship (e.g., feeling accepted and understood by friends, feeling that friendship is characterized by trust, respect, open communication and mutual supportiveness), factor 2 appeared to tap negative aspects of friendship (e.g., feeling apart from or misunderstood by friends; feeling that friendship is characterized by tension, shame, and poor communication). Thus, whereas factors 1 and 3 were not clearly interpretable or distinct from one another, it did appear that perhaps factor 2 was distinct, suggesting a possible two-factor solution.

Thus, to further probe the factor structure of the peer scale, I conducted a PCA limiting the number of factors to two, again using the Direct Oblimin Rotation. There was a more readily interpretable pattern of factor loadings, with the first factor appearing to tap positively-valenced friendship qualities such as trust, respect, acceptance, and support, and the second factor tapping negatively-valenced qualities such as feeling distant, misunderstood, angry, and isolated in one's friendships. On the one hand, this factor structure is consistent with Armsted and Greenberg's (1987) original hypothesis that the "internal working model" of attachment figures may be tapped by assessing ""(1) the positive affective/cognitive experiences of trust in the accessibility and responsiveness of attachment figures, and (2) the negative affective/cognitive experiences of anger and/or hopelessness resulting from unresponsive or inconsistently responsive attachment figures." However, the two factors were strongly correlated (r = -.65) suggesting that a unifactorial, or unidimensional (i.e., with higher scores suggesting more secure or better quality attachment and lower scores suggesting less secure or poorer quality attachment), approach to the peer scale was more appropriate.

Next, I conducted a PCA with Direct Oblimin Rotation using the parent items (n = 28), again with the assumption that the factors would be correlated. Three factors emerged with Eigenvalues > 1, with the three factors accounting for approximately 61% of the overall variance in the scale. However, as with the peer items, nearly all of the parent items were complex and loaded onto more than one factor. Factors 1, 2 and 3 were correlated with one another (rs = .42-.49). Furthermore, while factors 1 and 3 appeared to tap positive aspects of the parent-child relationship (e.g., general positive regard, feeling a sense of mutual trust and respect; feeling understood and supported by parents), factor 2 appeared to tap negative aspects of the parent-child relationship (e.g., feeling shame or anger toward parents; feeling emotionally neglected by parents).Thus, as with the peer scale, whereas factors 1 and 3 on the parent scale were not clearly interpretable or distinct from one another, it did appear that perhaps factor 2 was distinct, suggesting a possible two-factor solution.

As before, to further probe the factor structure of the parent scale, I conducted a PCA limiting the number of factors to two, again using the Direct Oblimin Rotation. There was a more readily interpretable pattern of factor loading, with the first factor appearing to tap positively-valenced parent-child relationship qualities such as trust, respect, communication and mutuality, and the second factor tapping negatively-valenced qualities such as feeling distant, misunderstood, angry, and isolated in one's relationship with one's parent(s). Although this double-valenced, positive-negative factor structure was consistent with Armsden and Greenberg's (1987) initial formulation and with the findings from the two-factor peer solution, the two parent factors were strongly correlated (r = -.71) suggesting that a unifactorial, or unidimensional (i.e., with higher scores suggesting more secure or better quality attachment and lower scores suggesting less secure or poorer quality attachment), approach to the parent scale was more appropriate.

In short, I utilized a single global measure of peer relationship quality and parent relationship quality, respectively, reflecting the single factor solution for each scale in my analyses.

Predictor variables.

ADHD diagnostic status and symptomatology. ADHD was measured both categorically and diagnostically, because of (a) the clinical relevance of considering diagnostic status (and because participants were selected largely on the basis of a diagnostic interview), and (b) the greater statistical power afforded by continuous scores, which also permit dimensionally-based consideration of sub-threshold psychopathology, as encouraged in the RDoC (NIMH, 2014).

ADHD diagnostic status was categorized as present vs. absent (i.e., comparison participant) based on the *Diagnostic Interview Schedule for Children* (*4th ed.;* Shaffer et al., 2000) and the *Swanson, Nolan, and Pelham Rating Scale (4th ed.*; *SNAP-IV*; Swanson, 1992). Hinshaw (2002) provides details regarding diagnostic procedures. The DISC-IV, which also yielded diagnostic subtype (i.e., ADHD-Combined vs. ADHD-Inattentive), is a well-validated, structured diagnostic interview administered to mothers at Wave 1; a parallel version was administered to participants and their parents at Wave 3 (*Young Adult version, DISC-IV-YA*; Shaffer et al., 2000).

The SNAP-IV is a dimensionalized checklist that assesses core ADHD symptoms of inattention and hyperactivity/impulsivity, and symptoms of ODD, on a four-point scale (0 = *not*

at all to 3 = *very much*). The SNAP-IV was administered to mothers and teachers at Wave 1. An ADHD total symptom score was derived from a composite of the average mother-rated and average teacher-rated ADHD items.

Persistence or remission of ADHD diagnosis. Following the procedures of Swanson et al. (2014; see also Guendelman et al., 2015), a dummy variable was created to indicate the persistence or transience of ADHD diagnosis from Wave 1 to Wave 3. Wave 1 ADHD diagnosis was established using the previously described procedures. Subsequently, at Wave 3, I used both parent and youth report from the DISC-IV to establish the presence of ADHD via the 'or' criterion, symptom by symptom (Piacentini, Cohen, & Cohen, 1992). Participants who were negative for ADHD at both Waves 1 and 3 were coded as 0; participants who were positive for ADHD at either Wave 1 or Wave 3 were coded as 1 (transient ADHD), and those who were positive for ADHD at both Waves 1 and 3 were coded as 2 (persistent ADHD).

Mediator Variables. Data for all potential mediator variables was collected at the Wave 2 (adolescent) assessment.

Social skills. Administered to both mothers and teachers at Wave 2, the Social Skills Rating System (*SSRS;* Gresham & Elliott, 1990) is a norm-referenced, multi-rater checklist assessing social behaviors in children ages 3-18. The parent and teacher versions consist of three parallel 10-item subscales: Cooperation (e.g., helping others, sharing materials, complying with rules and directions), Assertion (e.g., asking others for information, introducing oneself, and responding to the actions of others), and Self-Control (e.g., behaviors that emerge in conflict situations, such as responding appropriately to teasing, and in non-conflict situations, such as taking turns and compromising). The parent version has a fourth scale, Responsibility (e.g., behaviors demonstrating the child's ability to communicate with adults and the child's concern for property or work). Thus, there are 30 items on the teacher scale (internal consistency $a = .95$) and 40 items on the parent scale (internal consistency $a = .92$). Examples of parent items include: "Controls temper when arguing with other children," "Compromises in conflict situations by changing own ideas to reach agreement," "Asks sales clerk for information or assistance." Examples of teacher items include: "Volunteers to help peers on classroom tasks," "Politely refuses unreasonable requests from others," and "Appropriately expresses feelings when wronged." Items are rated on a 3-point Likert scale regarding the frequency with which the given behavior occurs (0 = *Never*, 1 = *Sometimes*, 2 = *Very Often*). In samples of children with ADHD, alpha coefficients of the total scale have been found to range from .87 (teacher version) to .88 (parent version; Van der Oord et al., 2005).

I summed all social skills items on the parent version, with the total parent score reflecting cooperation, self-control, assertion, and responsibility. I also summed all social skills items on the teacher *SSRS*, with the total teacher score reflecting cooperation, self-control, and assertion. The total parent and total teacher scores ($r = .44$, $p < .001$) were averaged to yield the composite social skills variable used in meditational analyses. Higher scores indicate better social skills and lower scores indicate poorer social skills.

Response inhibition. The Conners' Continuous Performance Task (CPT; Conners, 1995), a 14-minute computerized task of attentional processing and response inhibition, was

administered to participants at Waves 1 and 2. Three hundred sixty (360) letters ("trials"), divided into 18 consecutive blocks of 20 trials, appear on the computer screen, one at a time, for approximately 250 milliseconds; block-randomized inter-stimulus intervals range from one to four seconds. Participants were required to depress the spacebar when any letter except the letter "X" appeared on the screen. Errors of commission, transformed into a percentage and used to index response inhibition, occurred when participants depressed the spacebar on trials when the letter "X" was presented. The CPT is a particularly accurate measure of response inhibition, because there are relatively frequent displays of target stimuli (requiring response) and relatively infrequent display of non-targets (requiring non-response), so that the emphasis is on response inhibition rather than detection of rare stimuli. Prior work from our group has shown a significantly higher proportion of commission errors in girls with ADHD than in the comparison sample, with effect sizes in the medium range (Hinshaw et al., 2002; Hinshaw et al., 2007). Conners (1995) provided criterion-related validity data for commission errors based on known-groups differentiation. Higher scores indicate worse performance.

Internalizing symptoms. An internalizing composite variable was derived from the total score from the *Children's Depression Inventory* (*CDI*; Kovacs, 1992) and the internalizing broadband scale of the *CBCL* (Achenbach, 1991). The *CDI*, administered to participants at Wave 2, is a 27-item self-reported questionnaire that assesses depressive symptomatology in children and youth, and shows acceptable internal consistency and test-retest reliability and well-established validity (Kovacs, 1992; Kendall, Cantwell, & Kazdin, 1989). Also at Wave 2, participants' primary caregivers completed the CBCL, an extensively used, well-standardized assessment of youth behavior and emotional problems (Achenbach, 1991). The internalizing *CBCL* and *CDI* total scores (r = .36) were standardized and averaged to create an Internalizing composite variable. The mean of this composite was .02 (*SD* = .85, range = -1.42 to 3.16).

Externalizing symptoms. An externalizing composite variable was derived from the Oppositional Defiant Disorder symptom count of the *DISC-IV* (Shaffer et al., 2000), and the externalizing broadband scale from the *CBCL* (Achenbach, 1991). The *CBCL* externalizing broadband scale yields a continuous score tapping negative, defiant, disobedient, and hostile behaviors. The relevant *DISC-IV* and *CBCL* variables (r = .71) were standardized and averaged to yield an Externalizing composite variable. The mean of this composite was .003 (*SD* = .93, range = -1.33 to 2.49).

Covariates.

Five key demographic and cognitive covariates were assessed across all adjusted analyses. The Background Information Questionnaire, devised for BGALS and administered to parents at Wave 1, yielded demographic information including the participants' date of birth, used to calculate participant (1) *age* and baseline (2) *socioeconomic status* (*SES*), a composite of mother's highest level of education and yearly household income. Participants' baseline (3) Full Scale IQ *(FSIQ)* was derived from the Wechsler Intelligence Scale for Children (3rd ed.; Wechsler, 1991), which was administered at Wave 1 and has well-established psychometric properties. The *DISC-IV* (Shaffer et al., 2000) provided two additional baseline covariates: (4)

presence or absence of an anxiety disorder and/or depression/dysthymic disorder (*Anx/Dep*), and (5) presence or absence of ODD or CD (*ODD/CD*).

Furthermore, for all adjusted analyses predicting to parent relationship quality, two additional covariates were included, based on their conceptual relevance to parent-child relationships. First, *adopted/foster status* was dichotomized as having been raised by biological parents vs. by non-related foster or adoptive parents, based on information collected in the Wave 1 Background Information Questionnaire. Second, living arrangement at Wave 3 (*Living arrangement*) was dichotomized as living with a parent or giver full time vs. living independently (e.g., alone or with roommates) at least part-time. Thus, five covariates were used for adjusted peer analyses and seven covariates were used for adjusted parent analyses.

Data analytic plan. Statistical analyses were performed with SPSS for Mac, Version 20 (IBM Corp., 2011).

First, I conducted ANOVAs to assess group differences – Wave 1 diagnostic status (ADHD vs. comparison) – with respect to peer and parent relationship quality on the *IPPA* administered at Wave 3. Parallel ANCOVA analyses were performed to adjust for the potential effects of the demographic, psychiatric and cognitive covariates. Effect sizes were calculated using Cohen's *d* values. In order to test the association between baseline SNAP-IV severity (ADHD symptomatology) and the peer and parent relationship quality outcome measures, Pearson's *r* correlations were calculated. In addition, I conducted independent-samples *t*-tests (for unadjusted analyses) and ANCOVAs (for covariate-adjusted analyses) to assess Wave 3 relationship quality by baseline ADHD diagnostic subtype (inattentive vs. combined hyperactive/impulsive and inattentive).

Next, I conducted ANOVAs and ANCOVAs to assess group differences in self-reported peer and parent relationship quality among young women with a persistent ADHD diagnosis (P), young women with a transient ADHD diagnosis (T), and a lifetime non-diagnosed comparison group (C; see Swanson et al., 2014).

Finally, I conducted mediation effects via a bootstrap procedure (Efron & Tibshirani, 1993) utilizing techniques developed by Hayes (2013) for SPSS (see Swanson et al., 2014, for parallel examples with respect to different mediator and criterion measures). With respect to the association between Wave 1 SNAP-IV severity and Wave 3 peer and parent relationship quality, I tested a single mediator variable per analysis (Preacher & Hayes, 2008; Shrout & Bolger, 2002). Candidate mediators were Wave 2 measures of (1) social skills, (2) response inhibition, (3) internalizing symptoms, and (4) externalizing symptoms. The bootstrapping procedure is a statistical simulation that is used to generate an empirically derived representation of the sampling distribution of the indirect effect (Hayes, 2013). After sampling those cases with replacement, a point estimate of the indirect effect (a-prime x b-prime) is determined for the sample and repeated 10,000 times. Ninety-five percent bias-corrected and accelerated confidence intervals were formed based upon the distribution of these effects and statistical significance was inferred if the given interval did not contain 0 (see Preacher & Hayes, 2008; Shrout & Bolger, 2002). All mediation models were tested controlling for covariates as detailed in the Covariates section (i.e., five covariates for the peer criterion measure and seven for the parent criterion measure). Regression analyses ensured that the predictor-mediator and mediator-outcome pathways were significant and in the hypothesized directions.

To communicate effect sizes for significant mediation effects, I used the κ^2 statistic, which is interpreted as "the proportion of the maximum possible indirect effect that could have occurred, had the constituent effects been as large as the design and data permitted. $\kappa^2 = 0$ implies that there is no linear indirect effect, and $\kappa^2 = 1$ implies that the indirect effect is as large as it potentially could have been. …κ^2 is a standardized value, as it is not wedded to the original scale of the variables, allows (at least) bootstrap confidence intervals to be formed, and is independent of sample size" (p. 106; Preacher & Kelly, 2011). Preacher and Kelly (p. 108; 2011) argue that "the best way to describe κ^2 is with its quantitative value," but concede that qualitative interpretation of the κ^2 statistic according to Cohen's (1988) guidelines for squared correlation coefficients (e.g., small, medium, and large effect sizes defined as .01, .09, and .25) can be useful.

Results

Baseline (Wave 1) Sample Characteristics.

Table 1 displays the demographic and background characteristics of the sample at Wave 1. The baseline sample (N = 228; M age = 9.6 years, SD = 1.7 years) was ethnically diverse, with 52.6% Caucasian, 27.2% African American, 11.0% Latina, 8.8% Asian American, and 0.4% Native American. Total annual household income ranged from <$10,000 to >$75,000 (M = $50-60,000); 13.6% of households received some form of public assistance (e.g., SSI, food stamps). Maternal education ranged from less than high school to advanced degrees (with 57.2% having a college degree or higher). These levels of income and education are not atypical in the San Francisco Bay Area. Over two-thirds (70.2%) of participants came from two-parent households, and 15.4% lived with adoptive or foster parents. Of the 140 participants with ADHD, 93 had combined-type and 47 had inattentive-type. The mean IQ in the comparison group was 112.0 (SD = 12.7) and in the ADHD group was 99.7 (SD = 13.6).

In the overall sample, 75 participants had persistent ADHD (i.e., across the waves), 54 had a diagnosis of ADHD at Wave 1 but not at Wave 3 (e.g., remitting ADHD), 11 had a diagnosis of ADHD at Wave 3 but not at Wave 1 (e.g., later-onset ADHD), and 74 were lifetime non-diagnosed. For the analyses below, 65 participants (54 Wave-1-only plus 11 Wave-3-only) constituted the transient ADHD group.

Participants in the ADHD and comparison groups did not differ significantly at baseline (Wave 1) with respect to age, total annual family income, maternal education level, Caucasian racial/ethnic status, utilization of public assistance, or maltreatment status. In addition, participants in the ADHD group were significantly more likely to come from a single-parent household and have been adopted or in foster care. Relative to the comparison group, participants diagnosed with ADHD had significantly higher baseline ADHD symptomatology, greater rates of DISC-IV diagnoses of ODD/CD and Anxiety/Depression, and lower full-scale IQ scores. See Table 1.

Wave 3 Perceived Peer and Parent Relationship Quality.

Unadjusted Analyses. Wave 3 *IPPA* results for the overall sample appear in Table 2. The ADHD (M = 3.12, SD = 0.56) and comparison (M = 3.25, SD = 0.54) groups did not differ significantly on peer relationship quality, $t(196) = 1.59$, $p = 0.11$, $d = 0.23$. There was a

marginally significant negative correlation between baseline ADHD symptomatology, from the SNAP-IV, and peer relationship quality, r = -0.12, p = .09. Peer relationship quality did not differ by ADHD diagnostic subtype, combined-type M = 3.10 (SD = 0.55) vs. inattentive-type M = 3.16 (SD = 0.58), $t(114) = 0.54$, p = 0.59, d = 0.11.

Relative to comparisons, participants in the ADHD group rated their parent relationship quality to be lower, M = 2.74 (SD = 0.66) vs. M = 2.43 (SD = 0.73), $t(196) = 3.01$, $p < .01$, d = .43. In parallel, baseline ADHD symptomatology using the SNAP-IV was significantly and negatively correlated with parent relationship quality, r = -0.19, $p < .01$. Parent relationship quality did not differ by ADHD diagnostic subtype, combined-type M = 2.39 (SD = 0.78) vs. Inattentive-type M = 2.51 (SD = 0.63), $t(114) = 0.84$, p = 0.14, d = 0.16.

Covariate-Adjusted Analyses. ANCOVA analyses revealed that baseline ADHD diagnostic status was significantly associated with both peer and parent relationship quality. In particular, relative to comparisons, participants in the ADHD group had lower peer relationship quality, $F(1, 187) = 4.59$, $p < .05$, and lower parent relationship quality, $F(1, 180) = 11.82$, $p < .001$. After covariate adjustment, ADHD diagnostic subtype remained a non-significant predictor of either peer or parent relationship quality.

Prediction of Wave 3 Peer & Parent Relationship Quality from Diagnostic Persistence of ADHD.

Table 3 presents differences in participants' Wave 3 peer and parent relationship quality across the persistent ADHD, transient ADHD, and lifetime non-diagnosed comparison groups. Unadjusted results indicated marginally significant omnibus differences with respect to peer relationship quality, and significant differences with respect to parent relationship quality. Specifically, the persistent ADHD group reported significantly lower relationship quality with both peers and parents relative to the lifetime non-diagnosed group, and the transient ADHD group reported significantly lower parent (but not peer) relationship quality relative to the lifetime non-diagnosed group. The transient and persistent ADHD groups did not differ significantly in terms of their relationship quality with peers or parents. After covariate adjustment, the three diagnostic persistence groups were significantly different with regard to both peer and parent relationship quality, such that persistent and transient ADHD were associated with poorer relationship quality relative to the group with lifetime non-diagnosis of ADHD. (Note that contrasts between the Wave 1-only ADHD group (in which ADHD remitted from Wave 1 to Wave 3) and the late-onset ADHD group (in which ADHD was present at Wave 3 but not at Wave 1) showed comparable levels of Wave 3 peer and parent relationship quality.)

Mediational Analyses.

Parallel bootstrap analyses were used to test the association between Wave 1 SNAP-IV symptomatology and Wave 3 peer and parent relationship quality with respect to candidate mediators measured at Wave 2. All meditational analyses included the five core covariates indicated in the Data Analytic Plan (*age, SES, FSIQ, Anx/Dep, ODD/CD*). Additionally, for parent analyses only, two additional covariates were included (*Adopted/Foster status* and *Living Arrangement*). Note that it is possible for *X* (i.e., Wave 1 SNAP-IV severity) to exert an indirect

effect on Y (i.e., Wave 3 peer relationship quality) through a 'mediator' variable *M* even in the absence of a direct association between *X* and *Y* (for discussion, see Hayes, 2009).

Social skills. The Wave 2 social skills composite variable was a significant partial mediator of the relation between Wave 1 SNAP-IV severity and Wave 3 peer relationship quality, *IE* = -0.05, *SE* = 0.02, 95% CI [-0.11, -0.01]. There was a significant and negative association between SNAP-IV severity and social skills, *b* = -0.16, standard error [SE] = 0.03, *t*(184) = -4.97, *p* < .0001, R^2 = 0.28. There was a significant and positive association between social skills and peer relationship quality, *b* = 0.33, standard error [SE] = 0.14, *t*(184) = 2.33, *p* < .05, R^2 = 0.07. The mediation effect was in the small to medium range (κ^2 = 0.08). See Figure 1.

A similar pattern of results emerged with the parent-related outcome measure, such that the social skills composite measure was a significant partial mediator of the relation between SNAP-IV severity and parent relationship quality, *IE* = -0.10, *SE* = 0.03, 95% CI [-0.18, -0.05]. There was a significant and negative association between SNAP-IV severity and social skills, *b* = -0.16, standard error [SE] = 0.03, *t*(179) = -4.92, *p* < .0001, R^2 = 0.29. In addition, there was a significant and positive association between social skills and parent relationship quality, *b* = 0.62, standard error [SE] = 0.18, *t*(179) = 3.40, *p* < .001, R^2 = 0.13. The mediation effect was in the medium range (κ^2 = 0.14). See Figure 2.

Response inhibition. The Wave 2 percent commission errors variable was a significant partial mediator of the relation between Wave 1 SNAP-IV severity and Wave 3 peer relationship quality, *IE* = 0.02, *SE* = 0.01, 95% CI [0.0001, 0.06]. There was a positive but non-significant association between SNAP-IV severity and percent commission errors variable, *b* = 4.19, *SE* = 2.62, *t*(168) = 1.60, *p* = 0.11, R^2 = 0.11. In addition, there was a positive and significant association between the percent commission errors variable and peer relationship quality, *b* = 0.004, *SE* = 0.002, *t*(168) = 2.18, *p* < .05, R^2 = 0.07. The mediation effect was in the small range (κ^2 = 0.03). See Figure 3.

In contrast, the percent commission errors variable was not a significant mediator of the relation between SNAP-IV severity and parent relationship quality, *IE* = 0.03, *SE* = 0.02, 95% CI [-0.0002, 0.08]. There was positive but non-significant relation between SNAP-IV severity and the percent commission errors variable, *b* = 3.99, *SE* = 2.64, *t*(163) = 1.51, *p* = .13, R^2 = 0.13. There was a positive and significant relation between the Wave 2 percent commission errors variable and parent relationship quality, *b* = 0.01, *SE* = 0.003, *t*(163) = 2.63, *p* < .01, R^2 = 0.13.

Internalizing symptoms. The Wave 2 Internalizing composite variable was not a significant mediator of the relation between Wave 1 SNAP-IV severity and Wave 3 Peer Relationship Quality, *IE* = -0.007, *SE* = 0.02, 95% CI [-0.05, 0.02]. There was a positive and significant association between SNAP-IV severity and internalizing, *b* = 3.40, *SE* = 1.05, *t*(184) = 3.24, *p* > .01, R^2 = 0.16. There was a negative and non-significant association between internalizing and peer relationship quality, *IE* = -0.002, *SE* = 0.005, *t*(184) = -0.47, *p* = 0.64, R^2 = 0.04.

The internalizing composite variable was not a significant mediator of the relation between SNAP-IV severity and parent relationship quality, *IE* = 0.001, *SE* = .02, 95% CI [-0.04,

0.04]. There was a positive and significant relation between SNAP-IV severity and internalizing, b = 3.38, SE = 1.07, t(179) = 3.15, $p < .01$, R^2 = 0.17. There was a positive and non-significant association between internalizing and parent relationship quality, b = 0.0004, SE = .01, t(179) = 0.06, p = .95, R^2 = 0.08.

Externalizing symptoms. The Wave 2 Externalizing composite variable was not a significant mediator of the relation between Wave 1 SNAP-IV severity and Wave 3 Peer Relationship Quality, IE = -0.03, SE = 0.04, 95% CI [-0.12, 0.04]. There was a positive and significant association between SNAP-IV severity and externalizing, b = 9.82, SE = 1.44, t(177) = 6.81, $p < .0001$, R^2 = 0.39. There was a negative and non-significant association between externalizing and peer relationship quality, b = -0.003, SE = 0.004, t(177) = -0.99, p = .32, R^2 = 0.05.

The externalizing composite variable was not a significant mediator of the relation between SNAP-IV severity and parent relationship quality, IE = -0.04, SE = 0.05, 95% CI [-0.16, 0.05]. There was a positive and significant association between SNAP-IV severity and externalizing, b = 9.78, SE = 1.44, t(172) = 6.80, $p < .0001$, R^2 = 0.42. There was a negative and non-significant association between externalizing and parent relationship quality, b = -0.004, SE = 0.005, t(172) = -0.97, p = 0.33, R^2 = 0.11.

Multiple Mediation. When both Wave 2 social skills and percent commission errors were included together in the model, the partial mediation effect was not significant, IE = -0.05, SE = 0.03, 95% CI [-0.11, 0.01].

Discussion

The key aims of this dissertation study were to examine (a) the bivariate associations and (b) adolescent meditational pathways between ADHD during childhood and perceived relationship quality with peers and parents during young adulthood in a longitudinal sample of females. In line with my first hypothesis, bivariate findings revealed that, after adjusting for key baseline demographic, cognitive, and psychiatric covariates, childhood ADHD, whether measured diagnostically or dimensionally, was significantly associated with poorer peer and parent relationship quality. In other words, ADHD during childhood was specifically linked to perceiving one's friendships and parent relationships as characterized by significantly lower quality and security. Thus, the bivariate findings from the present study contribute to the small body of extant research showing that in females, childhood ADHD, specifically, is associated with poorer relationship outcomes during young adulthood (Babinski et al., 2012; Biederman et al., 2008; Guendelman et al., 2015; Hinshaw et al., 2012), and are not limited to childhood and adolescence (e.g., Hoza et al., 2007). Furthermore, findings extend existing research by suggesting that the interpersonal difficulties experienced by young women with childhood ADHD may be deeply ingrained in their internal working models of attachment. Beyond outwardly measurable constructs of measures of interpersonal functioning (e.g., number of friends, presence vs. absence of conflict or violence), the internal working models of the young women with childhood ADHD appeared to be less secure with respect to their relationships with both friends and parents. The degree to which a person understands her relationships as

characterized by trust, accessibility, and responsiveness is thought to be a crucial component of overall psychic well-being (Armsted & Greenberg, 1987).

Contrary to hypothesis 2, there were no differences in either peer or parent relationship quality by baseline ADHD subtype (i.e., combined-type vs. inattentive-type). Findings indicated that the increased risk of having poorer quality relationships in young adulthood was comparable with respect to childhood diagnostic subtype. This finding stands in contrast to research showing greater social impairments in children with hyperactive/impulsive and combined-type relative to inattentive-type ADHD (e.g., Hinshaw, 2002; Nijmeijer et al., 2008; Wheeler Maedgen & Carlson, 2000). It is possible that the specific developmental mechanisms (i.e., during childhood or adolescence) that lead to poorer young adulthood relationship quality differ by subtype. For instance, Solanto and colleagues (2009) found that children with combined-type vs. inattentive-type showed equivalent levels of social impairment on the *SSRS*, but children with inattentive-type were impaired in assertiveness whereas children with combined-type were deficient in self-control. It is plausible that sub-type differences in social functioning during various periods of development may ultimately demonstrate equifinality by young adulthood. More longitudinal research is needed to clarify the role of childhood diagnostic subtype on adulthood relationships.

Hypothesis 3 was partially supported. Adjusted findings showed poorer peer and parent relationship quality in the lifetime persistent group relative to the transient and lifetime non-diagnosed group. Thus, consistent with my hypotheses, those with persistent ADHD exhibited the poorest relationship quality. This result may be because the social impairments associated with ADHD may have followed a "developmental cascades" model (Masten & Cicchetti, 2010), whereby earlier risk factors exerted a cumulative influence on later relationship quality. It may also be that, in the persistent group, relationship quality was measured concurrently with having an "active" ADHD, resulting in a stronger association. In terms of relationship quality in the transient ADHD versus lifetime non-diagnosed groups, significant differences emerged only for parent relationship quality. Thus, even when it occurs during a time-limited window of development, ADHD appears to be associated with diminished parent relationship quality. In contrast, the transient group was not significantly different from the comparison or the persistent group with respect to peer relationship quality. One explanation for this null finding was that I may have lacked statistical power to detect smaller differences. It is also possible that the greater agency to pick and choose friendships opened the door to changing and focusing on friendships that were more satisfying. For the young women with transient ADHD, they may have been able to cultivate higher quality friendships during periods in which they were less affected by ADHD. Conversely, for parent-offspring relationships, even time-limited ADHD may have a more lasting negative influence on the quality of these attachments, possibly because there is no "escape hatch" (e.g., one cannot typically change one's parents) and because earlier relationship dynamics may carry forth and affect later dynamics.

Mediational analyses revealed that social skills during adolescence partially mediated the association between childhood ADHD severity and young adulthood relationship quality with peers and parents, respectively. As expected, ADHD symptomatology was negatively associated with social skills, and social skills were positively associated with relationship quality. The magnitude of this mediational effect was small-to-medium for peer relationships and medium for parent relationships. Thus, across the entire sample, adolescent social skills contributed to later attachment quality across relationship types, consistent with research indicating that social skills subserve a variety of socially important outcomes across a range of relationship types (Bagwell,

Newcomb & Bukowski, 1998; de Boo & Prins, 2007; Gresham, Sugai, & Horner, 2001; Parker & Asher, 1987; Spence, 2003). In youth with ADHD, social skills – including behaviors such as introducing oneself, sharing materials, and taking turns – are commonly impaired (Becker et al., 2014; deBoo & Prins, 2007; Gentschel & MacLaughlin, 2000; Hinshaw, 2002; Landau & Moore, 1991), and as such, are a frequent target of treatment (Pfeiffner & McBurnett, 1997; Storebo et al., 2011). Thus, present findings provide some of the first empirical support that, in females, improving social skills during adolescence may have far-reaching, positive implications for parent-child relationships and friendships during young adulthood. In sum, better social skills during adolescence may function as a buffer against the negative interpersonal risk factors that are common in ADHD. Furthermore, regardless of ADHD symptomatology, intact social skills during adolescence appear to foreshadow favorable distal outcomes, in the form of more trusting, healthy, and reliable attachments with peers and parents during young adulthood.

Mediational findings with respect to response inhibition during adolescence were significant for peer relationships, but the direction of the effects was contrary to my hypothesis. As expected, greater childhood ADHD symptomatology was associated with poorer response inhibition (i.e., greater percent commission errors on the CPT). Unexpectedly, however, poorer response inhibition was associated with *better* peer relationship quality during young adulthood. The partial mediation effect for response inhibition with respect to peer relationship quality was small. Conceptually, executive functions such as inhibitory control would seem essential for social tasks (e.g., following social norms, holding back-and-forth conversations, regulating one's social behavior appropriately; Wolfe et al., 2013). One possible explanation for the unexpected findings is that youth with poorer response inhibition may be susceptible to overestimating their relationship quality, or perceiving it to be of a higher quality than might be externally observed. In line with this interpretation, a recent study showed that global executive functioning deficits, including a measure of inhibition, contributed to the positive illusory bias phenomenon (e.g., overestimating one's competence, or lack of awareness of one's deficits) with respect to scholastic competence in a sample of youth with ADHD (Golden, 2009). Another conceivable explanation for negative association between response inhibition and relationship quality may be that the participants with the greatest potential for gains in their inhibitory abilities (i.e., those with poorer response inhibition during adolescence) may be more likely to subsequently experience their relationships as being of higher quality. However, although research suggests that inhibitory abilities continue to improve well into young adulthood (Williams, Ponesse, Schachar, Logan, & Tannock, 1999), I was not able to examine the individual changes in response inhibition from adolescence to young adulthood with respect to relationship quality in this sample. A final plausible explanation for my unexpected findings could be that, unlike behavioral inhibition, which is associated with social anxiety (Biederman et al., 2001), laboratory measures of response inhibition have been found in other samples to be associated with personality traits, such as venturesomeness, openness, and extraversion (Burton et al., 2010) that might support the development and health of close relationships. More research is needed to clarify the association between response inhibition and relationship quality in ADHD samples.

When I included both social skills and response inhibition in a multiple mediation model, the total indirect was not significant. In other words, the specific indirect effect through social skills (i.e., the ability of social skills to mediate the effect of childhood ADHD on young adulthood relationship quality) was no longer significant when conditional on the inclusion of response inhibition in the model. Conversely, the specific indirect effect through response

inhibition was no longer significant when conditional on the inclusion of social skills in the model. Preacher and Hayes (pp. 882, 2008) suggest that "it is entirely possible to find specific indirect effects to be significant in the presence of a non-significant total indirect effect." Furthermore, they posit that collinearity plays a role in multiple mediation models such that "the effects of the mediators on *Y*…are often attenuated to the degree to which the mediators are correlated, a phenomenon that can compromise the significance of particular specific indirect effects" (pp. 882, Preacher & Hayes, 2008). In my analyses, there was a small but significant correlation between the Wave 2 social skills and response inhibition variables (r = -0.16, p < .05), increasing the likelihood that as individual mediators each would not demonstrate large unique effects on the outcome when included together in the mediation analyses.

Contrary to my hypotheses, neither adolescent internalizing nor externalizing symptoms significantly mediated the association between childhood ADHD and young adulthood peer or parent relationship quality. This is surprising given research showing positive bivariate associations amongst ADHD, internalizing and externalizing symptoms, and long-term family and social dysfunction, respectively (e.g., Armsden et al., 1990; Fombonne et al., 2001; Greene et al., 2002; Hinshaw et al., 2006; Kennedy & Paykel, 2004; Kobak et al., 1991). One reason for the null mediational effects for both internalizing and externalizing symptoms was possibly related to over-control, given that I included parallel baseline covariates (i.e., childhood internalizing and externalizing problems) in my mediational analyses. Thus, although internalizing and externalizing symptomatology *emerging* around adolescence may not be an especially relevant pathway whereby ADHD influences relationship quality, it is still possible that longstanding psychiatric symptomatology that persists from childhood into adolescence may influence subsequent relationship quality in young adulthood. (However, when I removed the baseline *Anx/Dep* and *ODD/CD* covariates from meditational analyses, all meditational findings remained non-significant.) In addition, a recent review study on the effects of co-occurring internalizing and externalizing mental health problems on peer functioning among youth with ADHD concluded that, across several studies, externalizing problems had no effect on friendship functioning, and that too few studies examined the effect of depression and anxiety on friendship quality to draw any conclusions (Becker et al., 2012). As highlighted by Becker and colleagues (2012), it is possible that ADHD may confer floor or range effects in regard to social impairments that are not further affected by internalizing and/or externalizing comorbidities.

Limitations and Conclusion

Findings from the present study must be considered in light of several important limitations. First, the outcome variables – peer relationship quality and parent relationship quality – were derived from a single, self-report measure originally designed for adolescents. Though my objective was, indeed, to examine the participants' perceptions of relationship quality, given the lack of appropriate measures in the existing archival dataset, I was unable to compare these subjective evaluations against more "objective" (e.g., outwardly verifiable) or dyadic assessments (e.g., mutual ratings of relationship quality as perceived by participants' parents or peers) of relationship quality. Adults with ADHD have been shown to be poor reporters of their own behavior (e.g., Smith, Pelham, Gnagy, Molina, & Evans, 2000), and subject to biases in self-perception (e.g., Gerdes, Hoza, & Pelham, 2003), making external corroboration especially relevant in this population. Second, there is a question of ecological

validity, such that while I found statistically significant differences in relationship quality as a function of childhood ADHD status, it is unclear how this association meaningfully operates in daily life. Third, my attachment-based outcome variables (i.e., peer and parent relationship quality using the *IPPA*) were assessed in young adulthood, even though research has suggested that there is a high degree of stability in one's attachment from infancy to adulthood (Waters, Weinfield, & Hamilton, 2003). Furthermore, because one's attachments with parents typically precede those with peers, it is possible that the ratings of peer attachment quality may have been confounded with the parent ratings. Finally, based on my principal components analysis of the *IPPA* and on previous research using this instrument, I used single-factor measures of relationship quality, even though relationship quality is a complex and multi-dimensional construct (e.g., Pietromonaco & Feldman Barrett, 2000). Future studies are needed to examine the more nuanced aspects of relationship quality (e.g., trust vs. responsiveness vs. accessibility; person-specific vs. group-specific relationships; "state" vs. "trait" aspects) in this population.

Nonetheless, this study has several notable methodological strengths, including the longitudinal nature and good generalizability of the sample, low attrition rate over time, and rigorous determination of baseline ADHD status. In line with RDoC guidelines (NIMH, 2014), ADHD was assessed both diagnostically and dimensionally with respect to the criterion variables. With the exception of the outcome variables, which were strictly self-report, the independent and mediator variables were derived from standardized diagnostic and neuropsychological measures, and behavior ratings were obtained from multiple reporters (e.g., parent and teacher), aiding in the attenuation of bias. Examination of several candidate mediator variables, although not exhaustive, helped elucidate the potential mechanisms linking the bivariate association between childhood ADHD and young adulthood relationship quality. Finally, use of stringent covariate control helped clarify the associations between childhood ADHD, specifically, and subsequent relationship quality.

In conclusion, findings from the present study indicate that childhood ADHD, regardless of subtype, is associated with poorer perceived quality of young women's relationships with their peers and parents, respectively. Even when it remits, childhood ADHD is still associated with poorer parent relationship quality. This finding points to the long-term nature of the negative parent-offspring sequelae associated with ADHD. On the other hand, young women with transient ADHD had better peer outcomes, suggesting a possible sparing or recovery (e.g., resilience) of young adult friendships when ADHD is limited to childhood. Taken together, however, findings contribute to a small body of evidence showing that the impairments in social functioning consistently found in children and adolescents with ADHD persist into young adulthood, in the form of subjectively lower levels of trust, responsiveness, and accessibility experienced by young women in relation to their friendships and parent attachments. This is the first study to examine subjective relationship quality – a strong indicator of mental health and overall well-being (e.g., Diener, Lucas, & Oishi, 2002), and an important outcome in and of itself (Pettit et al., 2011) – in young women with childhood ADHD. In addition, this study offers insight into the potential developmental pathways linking ADHD to interpersonal functioning. The pattern of findings suggest that, perhaps more important than comorbid internalizing or externalizing symptomatology, social skills during adolescence are an important and potentially modifiable pathway leading from childhood ADHD to relationship dysfunction during young adulthood. Although more research is needed, interventions targeting social skills in youth with ADHD may lead to distal improvements in the quality of their young adult relationships.

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Table 1. Wave 1 Characteristics of Overall Sample and for ADHD Group vs. Comparison Group

Variable	Overall Sample	ADHD Group	Comparison Group	p[a]
	N = 228	N = 140	N = 88	
	M(*SD*)	M(*SD*)	M(*SD*)	
Demographic and Cognitive				
Age (years)	9.6 (*1.7*)	9.6 (*1.7*)	9.4 (*1.6*)	*ns*
Caucasian (%)	52.6	56.4	46.6	.10+
Total annual family income[b]	6.4 (*2.6*)	6.2 (*2.7*)	6.8 (*2.5*)	.10+
Maternal education[c]	4.8 (*1.0*)	4.7 (*1.0*)	4.9 (*1.0*)	.10+
Public assistance (%)	13.6	15.0	11.4	*ns*
Adopted or in foster care (%)	15.4	22.1	4.5	<.001***
Single-parent household (%)	29.8	34.3	22.7	<.05*
Maltreated (%)	12.7	15.0	9.1	*ns*
WISC-III Full Scale IQ	104.4 (*14.5*)	99.7 (*13.6*)	112 (*12.7*)	<.001***
Comorbidities				
DISC-IV ODD and/or CD[d] (%)	42.5	65	6.8	<.001***
DISC-IV Anxiety and/or Depression[e] (%)	17.5	26.4	3.4	<.001***
ADHD-Related				
SNAP-IV Total Symptom Score (0-3)	1.2 (*0.8*)	1.8 (*0.5*)	0.3 (*0.2*)	<.001***
Subtype: Inattentive (%)	20.6	33.6	0.0	<.001***
Subtype: Combined (%)	40.8	66.4	0.0	<.001***

WISC-III = Wechsler Intelligence Scale for Children, 3rd Edition; *SNAP-IV* = Swanson, Nolan, and Pelham rating scale (see Swanson, 1992); *DISC-IV* = Diagnostic Interview Schedule for Children, 4th Edition; *ns* = Not significant.

* $p < .05$; ** $p < .01$; *** $p < .001$; + $p < .10$

[a] ADHD vs. Comparison group. Significance: *t*-test for continuous variables; Pearson chi-square statistic for categorical variables.

[b] For total annual family income, 1 ≤ $10,000; 9 ≥ $75,000.

[c] For maternal education, 1 = less than 8th grade; 6 = advanced or professional degree.

[d] Diagnosis of Oppositional Defiant Disorder and/or Conduct Disorder.

[e] Diagnosis of Anxiety Disorder and/or Major Depressive Episode and/or Dysthymia.

[f] SNAP-IV Total Symptom Score: composite of the averaged mother-rated ADHD items and the averaged teacher-rated ADHD items.

Table 2. Young Adult Self-Reported Quality of Parent and Peer Relationships by Wave 1 ADHD Diagnostic Status

	ADHD Group	Comparison Group			
	N = 116	*N* = 82			
Self-Reported Relationship Quality	M(*SD*)	M(*SD*)	*p*[a]	Effect Size *d*[b]	Adjusted *p*[c]
Wave 3 *IPPA* Peer	3.12 (*0.56*)	3.25 (*0.54*)	.11	0.23	.03*
Wave 3 *IPPA* Parent	2.43 (*0.73*)	2.74 (*0.66*)	.003**	0.43	.001***

Note: IPPA = Interview of Parent and Peer Attachment (see Armsden & Greenberg, 1987).

[a] Significance: *t*-test.

[b] Cohen's *d* computed using unadjusted means.

[c] Covariates: age, SES, WISC-III FSIQ, baseline Anx/Dep, baseline CD/ODD. Additionally, for the *IPPA* Parent measure, Adopted/Foster status and Wave 3 Living situation were included.

* $p < .05$; ** $p < .01$; *** $p < .001$; + $p < .10$

Table 3. Wave 3 Self-Reported Quality of Peer and Parent Relationships by ADHD Diagnostic Persistence.

	Comparison	Transient ADHD	Persistent ADHD	*p*-value[a]	ES[b] and Post-Hoc			*p*-value[c]
	n = 72	*n* = 58	*n* = 68		*C-T*	*C-P*	*T-P*	
Self-Reported Relationship Quality	M(*SD*)	M(*SD*)	M(*SD*)					
Wave 3 *IPPA* Peer	3.29 (*0.49*)	3.11 (*0.64*)	3.11 (*0.52*)	.09+	0.32+	0.35*	0.20	.02*
Wave 3 *IPPA* Parent	3.29 (*0.49*)	2.50 (*0.73*)	2.35 (*0.76*)	<.001***	0.46**	0.64***	0.00	<.001***

Note: IPPA = Interview of Parent and Peer Attachment (see Armsden & Greenberg, 1987).

* $p < .05$; ** $p < .01$; *** $p < .001$; + $p < .10$

[a] Significance: ANOVA

[b] Cohen's *d*s computed using unadjusted means, reflecting subgroup contrasts.

[c] Significance: ANCOVA. Covariates: age, SES, WISC-III FSIQ, baseline Anx/Dep, baseline CD/ODD. Additionally, for the IPPA Parent measure, Adopted/Foster status and Wave 3 Living situation were included.

Figure 1. The relation between Wave 1 ADHD and Wave 3 Peer Relationship Quality is partially mediated by Wave 2 Social Skills, controlling for: (1) age; (2) SES; (3) WISC-III FSIQ; (4) baseline Anx/Dep; (5) baseline CD/ODD; data represent indirect effect and standard errors using 10,000 bootstrap samples to obtain bias-corrected and accelerated 95% confidence intervals.

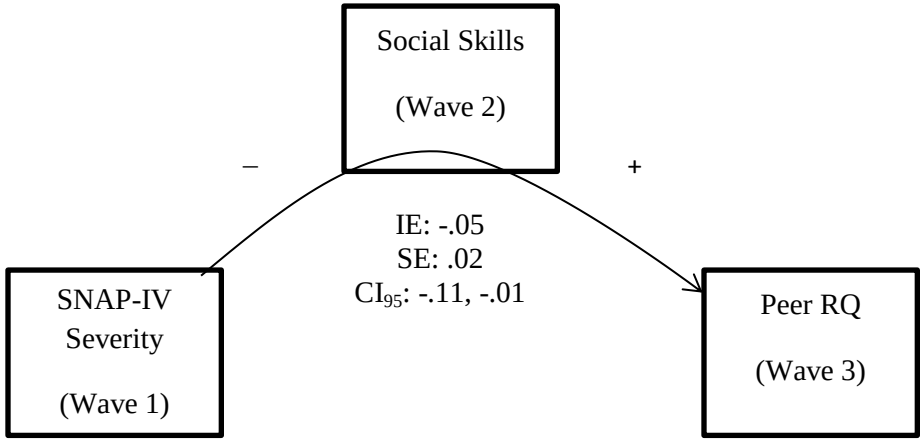

Figure 2. The relation between Wave 1 ADHD and Wave 3 Parent Relationship Quality is partially mediated by Wave 2 Social Skills, controlling for: (1) age; (2) SES; (3) WISC-III FSIQ; (4) baseline Anx/Dep; (5) baseline CD/ODD; (6) Living Situation; (7) Adopted/Foster Status; data represent indirect effect and standard errors using 10,000 bootstrap samples to obtain bias-corrected and accelerated 95% confidence intervals.

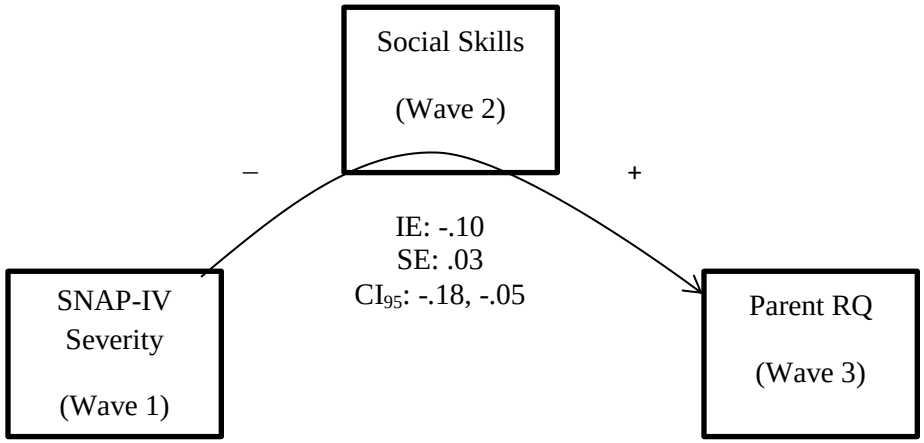

Figure 3. The relation between Wave 1 ADHD and Wave 3 Peer Relationship Quality is partially mediated by Wave 2 Response Inhibition (% errors), controlling for: (1) age; (2) SES; (3) WISC-III FSIQ; (4) baseline Anx/Dep; (5) baseline CD/ODD; data represent indirect effect and standard errors using 10,000 bootstrap samples to obtain bias-corrected and accelerated 95% confidence intervals.