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Influence Of Child And Family Factors On Parent And Teacher Ratings Of Impairment

Amanda Korsmo
Indiana State University

INFLUENCE OF CHILD AND FAMILY FACTORS ON PARENT AND TEACHER RATINGS OF IMPAIRMENT

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by

Amanda Korsmo

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VITAE

AMANDA V. KORSMO

EDUCATION

- Doctoral Candidate (Psy.D.) In Clinical Psychology at Indiana State University
  August 2015- July 2020
- Master of Science (M.S.) In Psychology at Indiana State University.
  August 2015- May 2017
- Bachelor of Science (B.S.) In Neuroscience at Indiana University (Honors)
  Minor in Biology
  August 2008- May 2013
- Bachelor of Science (B.S.) In Psychology at Indiana University
  August 2008- May 2013
- Bachelor of Arts (B.A.) In History at Indiana University
  Certificate in Jewish Studies
  August 2008- May 2013

CLINICAL EMPLOYMENT

- *Predoctoral Psychology Intern,* University of Texas Health Science Center at Tyler, July 2019-June 2020. Responsibilities included: conducting integrated neuropsychological assessments; providing outpatient therapy to individuals across the lifespan; providing group and individual therapy in both acute inpatient and state hospital settings.
- *Behavioral Health Clinician,* Valley Professionals Community Health, August 2018-June 2019. Responsibilities included: conducting individual, family, and couples therapy with clients across the lifespan; providing behavioral health client consultation services to primary care physicians; attending grand rounds and didactic seminars.
- *Clinical Associate,* Murphy-Urban & Associates, July 2017-August 2018. Responsibilities included: providing individual and family therapy to predominantly child and adolescent clients; conducting psychological evaluations primarily focused on differential diagnosis and ADHD; attending DCS/IEP meetings and collaborating with school professionals.
- *Graduate Student Clinician,* Indiana State University Psychology Clinic, August 2016-December 2018. Responsibilities included: providing individual and family therapy to primarily child and adolescent clients; administering and interpreting psychological assessments which incorporated a wide variety of objective and projective measures; coordinating care with community mental health, wrap-around, educational, and medical professionals.

CLINICAL & RESEARCH EXPERIENCE

- *Research Assistant,* Richard Roudebush VA Medical Center, April 2017-April 2018. Research activities included: administering research measures focused on analyzing quantitative phenotypes of psychiatric/psychological disorders; collecting information on mental health history from veterans with a variety of serious mental health diagnoses.
- *Research Assistant*, Indiana State University ADHD Clinic, August 2015-May 2016. Research activities included: scoring parent and teacher questionnaires used in ADHD

assessment batteries; creating summary documents from assessment measures; scheduling evaluation appointments.

- *Research Assistant,* IU School of Medicine Neuroscience Center, January 2015-July 2015. Research activities included: conducting interviews with potential candidates for alcohol-related research studies; collecting and entering data into statistical software; maintaining accurate records of all interviews conducted; completing phone screens to determine eligibility in research studies.
- *ABA Therapist,* Verbal Behavior Center for Autism, July 2013- January 2015. Responsibilities included: providing client care in individual and group settings utilizing a combination of intensive teaching and behavioral therapy techniques; recording data regarding skill acquisition, behavior plan protocols, and skill tracking; providing home therapy and in-school consultation.

PRESENTATIONS

Korsmo, A., O' Laughlin, E., & Khan, F. (2018). *Predictors of Parent and Teacher Ratings of Impairment Among Children Referred for ADHD Assessment.* Presented at the Society of Clinical Child and Adolescent Psychology (Division 53) Program at the 2018 APA Convention. San Francisco, CA.

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Korsmo, A., Byrge, L., & Smith, L. (2013). *Verbal and Spatial Skills as Predictors of Children's Multi-Digit Number Writing*. Presented at Psychology Department Honors Banquet. Indiana University, Bloomington, IN.

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

American Psychological Association	Aug. 2016-Present
Society of IDD/ Autism Spectrum Disorder (Div. 33)	Aug. 2017-Present
Society of Clinical Child and Adolescent Psychology (Div. 53)	Aug. 2017-Present
Society of Clinical Psychology (Div. 12)	Aug. 2018-Present
Society for Child and Family Policy and Practice (Div. 37)	Oct. 2019- Present
Society for Clinical Neuropsychology (Div. 40)	Oct. 2019- Present
Texas Psychological Association	Aug. 2019-Present

Committee Members

Committee Chair: Liz O' Laughlin, Ph.D.

Professor of Psychology

Indiana State University

Committee Member: Kevin Jordan, Ph.D.

Assistant Professor of Psychology

Indiana State University

Committee Member: Michelle Abraham, Ph.D.

Assistant Professor of Psychology

Indiana State University

Abstract

Several studies have evaluated child and family factors that impact informant ratings of ADHD symptoms, however few studies have examined factors that may impact ratings of ADHD-related impairment. The present study evaluated several child and family factors (i.e. age, gender, family income, ethnicity), to understand the possible influence these factors have on parent and teacher ratings of impairment. Based on a sample of 322 participants, parent and teacher ratings of ADHD symptoms were found to be strongly correlated with ratings of ADHD-related impairment. In addition, child age and gender were found to be significantly correlated with ratings of impairment. Teachers rated boys and younger children higher in peer impairment as compared to girls and older children, whereas parents provided higher ratings of peer impairment for girls as compared to boys. Demographic variables (i.e. age, gender, ethnicity, family income, ODD symptoms) were no longer associated with ratings of impairment after ratings of ADHD symptoms were accounted for.

The results of the current study suggest that child and family factors may be less influential on informant ratings of impairment as compared to informant ratings of ADHD symptoms. Results revealed a stronger association between ratings of symptoms and ratings of impairment for teachers as compared to parents, perhaps reflecting the greater impact of ADHD symptoms on behavior in the classroom as compared to home. Given the low percentage of variance accounted for in analyses considering parent ratings, it may be that other parent or family related factors not considered in the present study (e.g. parental stress, parental psychopathology), may influence parent ratings of ADHD-related impairment. The current

research has implications for better understanding how to make sense of possible variations between ratings of ADHD-symptomology and impairment, to assist in the assessment, treatment, and understanding of ADHD.

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CHAPTER 1

Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is characterized by a persistent pattern of inattention and/or hyperactivity/impulsivity and is one of the most diagnosed neurodevelopmental disorders in children (Polanczyk et al., 2007). In addition to inattentive and/or hyperactive symptoms, a diagnosis of ADHD requires that symptoms are present in two or more settings, and that these symptoms interfere with or reduce the quality of social, academic, or occupational functioning (American Psychiatric Association, 2013). Several studies have explored the impact of ADHD symptoms on child functioning. For example, children with ADHD earn poorer grades, are more likely to be held back, experience increased peer rejection, have fewer friends, and present with an increased risk for school dropout (Evans et al., 2013; Faraone et al., 1998; Garner et al., 2013; Loe & Feldman, 2007). These functional impairments generally continue into adulthood, even though core symptoms may improve with age. Thus, it is recommended that both ADHD-related symptomology and impairment be assessed to aid in diagnosis, treatment planning, and outcome evaluations (Pelham et al., 2005).

Guidelines for assessment of ADHD developed by the American Academy of Pediatrics (Wolraich et al., 2019) recommend that information be obtained from multiple informants such as parents, teachers, or guardians. This recommendation is based on the premise that individuals are molded by biological, psychological, and sociocultural factors which may lead to variable

behaviors, or symptom manifestation, across situations. Therefore, a salient behavior for a child in the school context may be virtually absent in the home setting and vice versa. By integrating information from informants who observe child behavior in different contexts, mental health professionals are better able to establish a clear picture regarding the stability of the child's behaviors (De Los Reyes et al., 2015). In addition to gaining information from multiple informants, it is recommended that information regarding functional impairment be gathered in order to improve diagnostic validity, develop appropriate recommendations, help with intervention selection, and to establish appropriate treatment plans (DuPaul et al., 2014).

Research on assessment for ADHD has historically focused on ADHD symptoms rather than impairment (e.g. Achenbach et al., 1987; De Los Reyes & Kazdin, 2005; Youngstrom et al., 1999). Barkley and colleagues (2006) define ADHD symptoms as the behavioral expressions associated with the disorder, whereas impairments are the consequences that result from behavioral expressions (Barkley et al., 2006). Therefore, information regarding child behavior will typically be comprised of questions related to symptomology and gathered through rating scales completed by parents, guardians, or teachers. Broad-range behavior rating scales include the Behavior Assessment Scale for Children-Third Edition (BASC-3; Reynolds & Kamphaus, 2015), and the Achenbach Behavior Rating System (ABRS; Achenbach, 2009). These questionnaires allow a clinician to obtain a comprehensive and global view of a child's behavioral patterns and potential comorbidity. In contrast, narrow-range behavior rating scales are typically developed and normed to assess for symptoms associated with a specific mental health disorder. In the case of ADHD, questionnaires include the ADHD Rating Scale- Fifth Edition (ADHD-RS-5; DuPaul et al., 2016), and the Conners Rating Scale (Conners et al., 1998).

Research has begun to focus on identifying psychometrically sound measures to assess functional impairment in children with ADHD (e.g., Pelham et al., 2005). In general, information on functional impairment is typically obtained in a similar fashion to that of behavioral ratings (e.g. diagnostic interviews, questionnaires). Objective measures of impairment can include measurements of functioning in real-world time, such as academic performance or GPA. Diagnostic interviews, such as the Diagnostic Interview Schedule for Children (DISC-IV; Shaffer et al., 2000), provide information related to both symptomology and impairment. However, these interviews tend to be impractical due to their cost, amount of training, and significant time commitment. Information regarding functional impairment can also be obtained using questionnaires, which may consider functional impairment from a global perspective (i.e., Children's Global Assessment Scale; Bird et al., 1993 or through focusing on a specific domain of functioning (i.e., Social Skills Rating System; Elliot et al., 1988). Other measures examine impairment across multiple domains which can assist in developing specific treatment goals. Measures of impairment that assess multiple domains of functioning include the Impairment Rating Scale (IRS; Fabiano et al., 2006), the Barkley Functional Impairment Scale-Children (BFIS-CA; Barkley, 2011), the Weiss Functional Impairment Rating Scale- Parent Version (WFIRS-P; Weiss et al., 2005), the Vanderbilt Assessment Scale (VRS; Wolraich et al., 1998) and the ADHD Rating Scale- Fifth Edition (ADHR-RS-5; DuPaul et al., 2016).

While gathering reports from multiple informants and through multiple measures can be advantageous, research has consistently demonstrated low-to-moderate agreement between informants when rating child behavior (e.g. De Los Reyes et al., 2015; Lavigne et al., 2015). Previous research has focused mainly on whether rater differences regarding symptomology and/or behavior can be attributed to confounds such as rater bias or measurement error.

Measurement error can occur when informants use instruments that are not psychometrically sound or different measures of the same construct are provided to different informants (e.g., teacher BASC and parent Vanderbilt) (Achenbach & Rescorla, 2001; De Los Reyes et al., 2013). Rater bias is based on the idea that perception of the child's behavior will vary based on the informant's personal expectations as well as unique perspective and motivations for providing ratings of the child's behavior (Dumenci et al., 2011). Situation-specific and child- specific factors also contribute to differences between informant ratings (e.g. De Los Reyes et al., 2013). The situation-specific hypothesis attributes differences in ratings to differences in the expectations and demands across settings. Under this hypothesis, differences between raters are expected, given that behaviors exhibited by the child will vary based on the type and intensity of the demand as well as the situation. Several studies have found greater agreement between raters in the same setting (i.e., mother and father) as compared to those in different settings (i.e., parent and teacher), providing support for this hypothesis (De Los Reyes et al., 2009). In addition to consideration of variability across settings, a variety of child-specific factors including age, gender, ethnicity, and SES, have been considered in explaining differences in informant ratings (Achenbach et al., 1987; Langberg et al., 2010).

There is currently very little research examining differences across informants in ratings of child impairment. Most research considering impairment has focused on the association between ratings of ADHD symptomology and ratings of functional impairment (e.g. Power et al., 2017; Zoromski et al., 2015). Research examining the relationship between informant ratings of ADHD symptoms and ratings of impairment has revealed low to moderate agreement, suggesting that both domains (symptoms and impairment) provide unique and valid information related to ADHD (Narad et al., 2015). It is likely that the same factors which have been found to

contribute to differences between informants in ratings of ADHD symptoms (i.e., measurement error, rater bias, situation specificity) also contribute to differences between informants in ratings of impairment. Situation specificity likely influences ratings of impairment as different informants have different opportunities to observe the impact of symptoms on functioning.

Several recent studies have begun to explore the influence of family and child factors on ratings of child impairment. For example, DuPaul and colleagues (2014) found significant effects for gender, with teachers rating greater symptom-related impairment for boys as compared to girls. They found age to be inversely related to child impairment, with younger children rated as more impaired, particularly for impairment associated with hyperactive-impulsive symptoms. Considering child ethnicity, teachers rated non-Hispanic black students as more impaired than non-Hispanic Caucasian students. However, the authors indicate that additional research is needed to determine the possible unique contribution for SES, separate from race/ethnicity (DuPaul et al., 2014).

Power and colleagues (2017) also found a relationship between child gender and parent ratings of impairment, with parents rating boys as more impaired than girls in two domains (homework and behavioral). Teachers rated boys as more impaired than girls in all domains including teacher-student relationship, peer relationships, homework, academic, behavior, and self-esteem. The authors also found age to be negatively related to teacher ratings of peer and behavioral impairment (i.e., older children rated as less impaired); whereas age was positively related to parent ratings of homework and academic impairment (i.e., older children rated as more impaired). Additionally, non-Hispanic black children were rated as more impaired than non-Hispanic Caucasian children on teacher ratings of academic and behavioral impairment (Power et al., 2017).

Although differences between parent and teacher ratings of ADHD symptomology are now viewed as the norm rather than the exception, research has only begun to examine if similar differences are observed between informants in ratings of ADHD-related impairment. The few studies that have examined informant differences in ratings of impairment have found moderate support for child factors such as gender, age, and ethnicity. DuPaul and colleagues (2014) note that research is needed to further explore the source of these informant differences, particularly regarding possible informant bias contributing to greater teacher ratings of impairment for non-Hispanic black children as compared to Caucasian children.

The present study will expand on the findings of DuPaul et al. (2014) and Power et al. (2017) in exploring the unique contribution of child demographic factors and ratings of ADHD-symptoms on ratings of impairment. Expanding on Power and colleagues (2017), this study will utilize a clinical (rather than community) sample of children referred for an ADHD evaluation, and will compare parent versus teacher ratings of impairment for the same child. In addition, the present study will consider both child ethnicity and family income to better understand the unique contribution of each factor in predicting impairment ratings. This study will utilize an adapted version of the Impairment Rating Scale (IRS; Fabiano et al., 2006), which assesses impairment in domains similar to the ADHD Rating Scale- 5th Edition, to help expand our current understanding of cross-informant differences between ratings of impairment.

Better understanding of cross-informant differences in ratings of child impairment is essential in understanding the most effective method to integrate data from multiple informants. Understanding of common patterns of responding can help clinicians recognize atypical response patterns that may have implications for both diagnosis and treatment. For example, if peer impairment is reported only by teachers, this could suggest situational difficulties that occur

specifically at school (i.e., bullying). If academic impairment is reported by parents and not the teacher, this could suggest other factors, such as parental stress, playing a role in how the parent is rating his/her child. Additionally, understanding the degree to which impairment is due to ADHD-symptoms, as opposed to other psychosocial factors, may improve diagnostic accuracy and individualized treatment planning. Lastly, research examining the influence of child specific factors in ratings of impairment can help further establish the level at which impairment secondary to ADHD symptoms should be considered developmentally deviant and at the diagnostic threshold for supporting an ADHD diagnosis (Power et al., 2017).

CHAPTER 2

Review of Related Literature

Overview of ADHD

Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most diagnosed neurodevelopmental disorders in children (5.3%) and is characterized by a persistent pattern of inattention and/or hyperactivity/impulsivity (Polanczyk et al., 2007). The *DSM-5* describes three subtypes of ADHD: predominantly inattentive presentation (ADHD-PI), predominantly hyperactive/impulsive presentation (ADHD-HI), and combined presentation (ADHD-C), with specifiers used to indicate partial remission and severity level (Appendix A). Individuals with ADHD-PI must exhibit six or more inattentive symptoms and fewer than six hyperactivity/impulsivity symptoms. Individuals with ADHD-HI must exhibit six or more hyperactive/impulsive symptoms and fewer than six inattentive symptoms. To qualify for ADHD-C, an individual must exhibit at least six symptoms of both inattention and hyperactivity/impulsivity. Two other categories (Other Specified ADHD and Unspecified ADHD) are reserved for individuals who present with symptoms of inattention or hyperactivity/impulsivity, but do not meet full criteria for an ADHD diagnosis. Examples include individuals who do not demonstrate at least six symptoms in one domain, but still exhibit behaviors associated with inattention or hyperactivity that contribute to impairment (See Appendix A for abbreviated DSM-5 criteria; American Psychiatric Association, 2013).

In addition to inattentive and/or hyperactive/impulsive symptoms, a diagnosis of ADHD requires that symptoms interfere with, or reduce the quality of social, academic, or occupational functioning (i.e. impairment). Barkley and colleagues (2006) define ADHD symptoms as the behavioral expressions associated with the disorder, whereas impairments are the consequences which result from behavioral expressions (Barkley et al., 2006). Several studies have explored the impact that ADHD-related symptoms have on child functioning. For example, children with ADHD earn poorer grades, are more likely to be held back, receive more suspensions, and utilize special education services at a more frequent rate as compared to children without ADHD (Garner et al., 2013; Loe & Feldman, 2007). In the classroom, children with ADHD are less likely to complete in-class work, more likely to violate classroom rules, and are at higher risk for retention (Sasser et al., 2017). Socially, children with ADHD tend to experience more peer rejection and report having fewer friends. Classmates may view children with ADHD as bossy, annoying, or aggressive, and find it difficult to interact with them (Faraone et al., 1998; Gaub & Carlson, 1997). These problems during childhood can increase the risk of negative outcomes during adolescence such as academic failure, school dropout, associating with deviant peers, and engaging in substance use (Evans et al., 2013). Finally, parents of children with ADHD tend to report greater levels of stress, family conflict, and reduced parental efficacy as compared to parents of children without ADHD (Johnston & Mash, 2001).

As mentioned, the *DSM-5* requires that symptoms interfere with functioning in at least one area (i.e., social, academic). This contrasts with the *DSM-IV* criteria for ADHD, which specified that impairment must be evident in two more settings (American Psychiatric Association, 1994). This focus on impairment in the *DSM-IV* provided additional support that the child's behaviors differ from that of "typical behavior." It also made the criteria for receiving a

diagnosis of ADHD more stringent, with individuals only receiving the diagnosis if the symptoms were judged to be sufficiently impairing. While some argue that the addition of severity specifiers in the *DSM-5* criteria will help in establishing appropriate treatment recommendations, other researchers have voiced concern that the revised criteria related to impairment may result in over diagnosis of ADHD. For example, they note that children diagnosed at the mild and moderate level based on the *DSM-5* would not have to meet criteria for an ADHD diagnosis based on the *DSM-IV* criteria. Therefore, by altering the criteria related to impairment, it is hypothesized that the percentage of children who are diagnosed with ADHD will increase (Rabiner, 2013). Despite this change in focus on impairment in the DSM-5 criteria, research has consistently demonstrated that the use of impairment information significantly improves the validity of an ADHD diagnosis (e.g., DuPaul et al., 2014).

Additionally, including ratings of child impairment is essential in understanding the most effective method to integrate data from multiple informants. Understanding of common differences can help clinicians recognize less common differences that may have implications for both diagnosis and treatment. For example, if peer impairment is reported only by teachers, this could suggest situational difficulties that occur specifically at school (i.e., bullying). If academic impairment is reported by parents and not the teacher, this could suggest other factors, such as parental stress, playing a role in how the parent is rating their child. Additionally, understanding the degree which impairment is due to ADHD-symptoms, as opposed to other psychosocial factors, is critical for diagnostic accuracy and individualized treatment planning. Therefore, consideration of impairment continues to be a central component of the diagnostic process (Power et al., 2017).

Best Practices for the Assessment of ADHD

Although there is no "gold standard" for the diagnosis of ADHD, current best practices recommend collecting information from multiple informants (Loeber et al., 1990; Wolraich et al., 2019). The use of multiple informants is especially important when evaluating children, as child behavior is strongly influenced by a variety of biological, psychological, and sociocultural factors. These influences may cause an individual to demonstrate mental health concerns to a varying degree based on the setting (De Los Reyes et al., 2015). Thus, the use of information from multiple informants allows more opportunity to elicit unique information regarding an individual's behaviors, resulting in a more comprehensive and detailed conceptualization (Achenbach et al., 1987). For child assessment, the two most utilized informant types are parents and teachers.

Guidelines developed by the American Academy of Child and Adolescent Psychiatry (AACAP) also support the use of multiple informants, such as parents, school personnel, or the client. The AACAP guidelines suggest the use of a standardized rating scale completed by parents and teacher if possible, a detailed interview with focus on DSM symptoms, as well as information pertaining to the patient's medical, social, and family history (e.g. developmental milestones, family mental health history). The AACAP guidelines also recommend a brief interview with the child, even if the child is not able to report on symptoms, to obtain behavioral observations. The AACAP guidelines note that psychological or neuropsychological tests are not mandatory for a diagnosis of ADHD but are recommended if the patient's history suggests low general cognitive ability or a significant discrepancy between the patient's achievement and intellectual abilities (Pliszka, 2007). In addition to gaining information from multiple informants regarding behavior, it is recommended that information regarding functional impairment be

gathered, in order to improve diagnostic validity, develop appropriate recommendations, help with intervention selection, and establish appropriate treatment plans (DuPaul et al., 2014).

Information on child behavior is often obtained through rating scales completed by parents, teachers, or guardians. A variety of assessment measures currently exist which allow clinicians to obtain ratings of behavior and symptom-related impairment. Structured interviews include the Diagnostic Interview Schedule for Children (DISC-IV; Shaffer et al., 2000), and the Child and Adolescent Psychiatric Assessment (CAPA; Angold & Costello, 2000). Due to the expense and time commitment required for diagnostic interviews, many clinicians opt to use questionnaires as a more cost and time-efficient alternative. Currently, a wide variety of both broad-range and narrow-range behavior rating scales, are available for the assessment of ADHD in children. Broad-range behavior rating scales include the Behavior Assessment Scale for Children- Third Edition (BASC-3; Reynolds & Kamphaus, 2015), and the Achenbach System of Empirically Based Assessment (ASEBA; Achenbach, 2009) which includes the Child Behavior Checklist (CBCL) and Teacher Report Form (TRF). These questionnaires allow a clinician to obtain a comprehensive and global view of a child's behavioral patterns and can provide information regarding potential comorbidity. In contrast, narrow-range behavior rating scales are typically developed and normed to assess for symptoms associated with a specific mental health disorder. In the case of ADHD, narrow-range questionnaires include the ADHD Rating Scale-Fifth Edition (ADHD-RS-5; DuPaul et al., 2016) and the Conners Rating Scale (Conners et al., 1998).

Assessment of Functional Impairment

Research on assessment for ADHD has historically focused on ADHD symptoms rather than impairment. However, research has begun to focus on identifying psychometrically sound

measures that may be appropriate for identifying functional impairment in children with ADHD (e.g., Pelham et al., 2005). In general, ratings of functional impairment can be obtained in a similar fashion to that of behavioral ratings. Objective measures of impairment can include measurements of functioning in real-world time, such as academic performance or GPA. Clinicians can also use a structured diagnostic interview, such as the Diagnostic Interview Schedule for Children (DISC-IV; Shaffer et al., 2000), which includes questions related to both symptoms and impairment. However, as mentioned, interviews tend to be impractical due to their cost, amount of training, and significant time commitment. Therefore, information regarding functional impairment is often gathered using questionnaires assessing broad impairment, specific domains of impairment and/or impairment in multiple domains of functioning. There are also a handful of measures which include items assessing impairment as part of a behavior rating scale, such as the Vanderbilt (Wolraich et al., 1998) or ADHD Rating Scales (DuPaul et al., 1998).

Global and Specific Measures of Impairment

The Children's Global Assessment Scale (CGAS; Shaffer et al., 1983) has been utilized frequently to assess impairment among children and adolescents. The questionnaire asks respondents to consider the child's lowest level of emotional and behavioral functioning in the past three months and to provide a rating from 1 to 100, based on 10 categories with behavior examples for each (i.e., 1-10 extremely impaired, requires constant supervision; 91-100 doing very well, superior functioning in all areas) (Winters et al., 2005). Another global measure is the Columbia Impairment Scale (CIS; Bird et al., 1993), which measures four domains of functional impairment (i.e. interpersonal relationships, psychopathology, school, and use of leisure time). However, research has demonstrated through factor analyses that these four domains factor into a

single impairment factor (Sasser et al., 2017). Therefore, the measure appears to function more as a global domain of assessment (Winters et al., 2005).

Several measures have been developed to assess one specific domain of impairment. For example, the Teacher Assessment of Social Behavior (TASB; Cassidy & Asher, 1992) measures impairment in social behavior, the Impact on Family Scale (IFS; Stein & Riessman, 1980) measures impairment related to family functioning, and the Academic Performance Rating Scale (APRS; DuPaul et al., 1991) measures impairment in academic skills. Some of these measures are lengthy and may require use of multiple raters. Therefore, if an examiner is wanting to gain an understanding regarding multiple domains of impairment, use of multiple specific measures of impairment may prove to be time consuming and potentially expensive (Fabiano & Pelham Jr, 2009).

Multidimensional Assessments of Impairment

Assessment of impairment related to ADHD would ideally consider multiple impairment domains to assess severity and to develop specific treatment goals. This can be achieved through a variety of available measures such as the Impairment Rating Scale (IRS; Fabiano et al., 2006). The IRS can be used with children ages 4 to 12 and includes eight items (seven in the teacher version) which assess for impairment in interpersonal relationships (peer, sibling, parent, and teacher), academics, self-esteem, and classroom/family. The IRS asks respondents to mark an X on a line to reflect the impact of the child's problems on this area and whether he or she needs treatment or special services for the problems (Fabiano & Pelham, 2009). The psychometric properties of the IRS were analyzed in four samples of children, including children with ADHD and a matched comparison group, and results provided good psychometric support for the measure (Fabiano et al., 2006).

The Barkley Functional Impairment Scale- Children and Adolescent Scale (BFIS-CA; Barkley, 2011), was developed as a rating scale of impairment based on research accumulated from the Home Situations Questionnaire. The measure consists of 15-items rated on a 10-point Likert scale, ranging from 0 (not impaired) to 9 (severely impaired). Two broad impairment scores (Home-School, Community-Leisure), as well as an overall score are calculated. The Home-School domain considers nine areas of impairment (i.e. interactions with mother, interactions with father, chores, homework, following rules, school performance, interactions with siblings, self-care, and managing money), and the Community-Leisure domain considers six areas of impairment (i.e. play with neighborhood children, play at school, community activities, sports, visiting others, interactions with other adults). Similar to the Impairment Rating Scale, the BFIS-CA demonstrates moderate to high correlation with symptom ratings of ADHD and can be used to assess impairment associated with any psychiatric disorder (Barkley, 2011).

In contrast to the IRS and the BFIS-CA, measures such as the Weiss Functional Impairment Rating Scale, and the ADHD-FX Scale, include multiple items for each domain of impairment, rendering stronger psychometric support. One such questionnaire is the Weiss Functional Impairment Rating Scale- Parent Version (WFIRS-P; Weiss et al., 2005). The WFIRS-P instructs respondents to rate how emotional or behavioral problems have affected a variety of activities. Similar to the IRS, the WFIRS-P considers multiple areas of functioning including family, learning and school, life skills, self-concept, social activities, and engagement in risky activities. Unlike the IRS, the WFIRS-P includes 50 items rated on a 4-point Likert scale, and has both a parent version as well as a self-report version which can be used for adolescents as well as adults (The Canadian ADHD Resource Alliance, 2014). While a teacher version of this questionnaire was not created, the questionnaire does have the added advantage of

being constructed in several languages, as well as being available through public domain (Gajria et al., 2015).

The ADHD-FX scale was developed in 2013 as a culturally sensitive measure of impairment related to ADHD symptomology, and was normed based on responses from parents of school-age Hispanic children. The measure is comprised of 32-items that assess the degree to which behavior affects the child in his/her everyday life, using a 4-point Likert scale. The first 19 items assess impairment in the child's school performance, and the remaining 13 items assess impairment in the home setting. The measure includes subscales assessing academic, peer, and family impairment. In support of construct validity, ratings on the ADHD-FX were found to correlate with related subscales of functional impairment including the Rule Breaking Behavior subscale on the Child Behavior Checklist (Haack et al., 2016).

Combined Behavior & Impairment Measures

A few measures have been developed to assess both symptoms of ADHD (or externalizing disorders more broadly) and impairment simultaneously. Two such rating scales are the Vanderbilt Assessment Scale and the ADHD-Rating Scale. The Vanderbilt was created to reflect updated DSM criteria, to allow for the assessment of comorbid behaviors (e.g. anxiety, depression), and includes items which assess impairment (Wolraich et al.,1998). Both the parent and teacher version include all 18 of the DSM criteria for ADHD, as well as multiple items assessing oppositional defiant disorder, conduct problems, as well as anxiety and depression. The performance (i.e., impairment) section includes items related to academic performance (i.e. overall performance, reading, mathematics, and written expression), classroom behavior (teacher version), and family relationships (parent version). The Vanderbilt has been found to have

acceptable internal consistency that is consistent with other accepted measures of ADHD (Wolraich et al., 1998).

The ADHD Rating Scale-Fifth Edition (ADHD-RS-5) asks raters to consider the extent to which hyperactive and inattentive symptoms contribute to impairment in functioning. The ADHD-RS-5 can be used for children ages 5 to 17 and includes parent and teacher forms. Respondents rate behavior on a 4-point Likert scale corresponding to the *DSM-5* inattentive and hyperactive/impulsive symptoms, followed by six questions related to impairment (i.e. relationship with family members or school professionals, peer relationships, academic functioning, behavioral functioning, homework functioning, and self-esteem). Informants are asked to rate impairment twice, once for inattentive symptoms and once for hyperactive/impulsive symptoms (DuPaul et al., 2016).

Impairment is recorded as present if the informant rates any of the six domains as moderate or severe. To calculate percentiles based on the normative sample, the greater of the two impairment ratings (Inattentive, Hyperactive/Impulsive) for each domain is considered in the scoring profile appendix based on child's gender and age. Separate profiles are available for boys/girls and for school versus home ratings. DuPaul et al. (2016) found that teachers generally provide higher ratings of impairment than parents, with 92.6% of teachers reporting up to four domains of impairment whereas most parents (92.7%) endorsed two or fewer areas of impairment. DuPaul et al. (2016) suggest a cut-off score for demonstrating "clinically significant impairment" as having one or more domains of parent-rated impairment (ratings of 2 or 3) and/or three or more teacher-rated domains of impairment (DuPaul et al., 2016).

In summary, there are several different types of measures of impairment including those that conceptualize impairment globally, measures that provide specific behaviors and ask the

informant to rate the impact of these behaviors on functioning, and ADHD-specific measures of impairment (i.e., ADHD-5 Rating scale) which involve a single rating of impairment (in multiple domains) due to ADHD symptoms. Selection of a measure of impairment should consider factors such as cost, time, resources, and the referral question. For the present study, which makes use of archival data from an ADHD evaluation clinic, a modified version of the Impairment Rating Scale (IRS; Fabiano et al., 2006), which assesses impairment through parent and teacher ratings on a single item (for each domain), was used. Similar to the format of Power et al. (2017), parents and teachers were asked to rate impairment due specifically to inattention and/or hyperactive/impulsive symptoms.

Factors Associated with Informant Differences on Ratings of Behavior

While gathering reports from multiple informants and multiple measures can be advantageous, research has consistently demonstrated low-to-moderate agreement between informants when rating child behavior (De Los Reyes et al., 2015; Lavigne et al., 2015). This was first demonstrated in a pivotal study conducted by Achenbach et al. (1987), who observed that the mean correlation between reports from informants in the same setting (i.e. mother vs. father) was .60, whereas the mean correlation between reports from informants in different settings (i.e. teacher vs. mother) was .28. Results of a meta-analysis conducted by De Los Reyes et al. (2015) revealed very similar findings with greater agreement between informants in similar environments (r = .48) as compared to informants in different environments (r = .28). They also observed higher correlations between informants when they were asked to report on externalizing behaviors versus internalizing behaviors, due to externalizing behaviors being more readily observable for informants (De Los Reyes et al., 2015).

Factors thought to explain informant discrepancies include measurement error, rater bias, situation specificity, and child-specific factors. Broadly speaking, measurement error is defined as variations that an observed score has from the individual's true score due to errors associated with the instrument or manner in which the instrument is being used (De Los Reyes et al., 2013). Rater bias is based on the premise that perception of the child's behavior will vary based on the informant's personal expectations as well as unique perspective and motivations for providing ratings of the child's behavior (Dumenci et al., 2011). A specific type of rater bias is mood congruent reporting, which states that a negative mood state or bias within the rater will influence perceptions and ratings of child behavior (Takeda et al., 2016). For example, Richters (1992) first used the term *depression distortion bias* to describe the tendency of mothers experiencing depressive symptoms to rate their child's behavior in a more negative manner. Another type of rater bias is the halo effect. This effect can occur when an informant provides exaggerated ratings of one disorder when the child has comorbid conditions or impairments due to another disorder (Dirks et al., 2012). Situation-specific and child-specific factors are also found to predict differences in ratings between informants (e.g. De Los Reyes et al., 2013). Situation specificity refers to the expectation that children will demonstrate variable behaviors in different settings due to the unique demands and structure of each setting. Under this perspective, differences between raters are expected, given that behaviors exhibited by the child will vary based on the type and intensity of the demand (DuPaul, 2003). In addition to consideration of variability across settings, a variety of child-specific factors have been examined in explaining differences in informant ratings (Achenbach et al., 1987; Langberg et al., 2010).

ADHD Symptoms and Ratings of Impairment

While low-to-moderate agreement is consistently demonstrated between informants who are rating child behavior, there is little research examining cross-informant agreement in ratings of impairment. This is perhaps due to the expectation that impairment, more so than symptoms, will be dependent on the situation as well as perceptions of the rater. Most research which has assessed impairment has focused on the association between ratings of impairment and ratings of ADHD symptomology (e.g., Power et al., 2017; Zoromski et al., 2015).

For example, Willcutt et al. (2012) conducted a meta-analysis to investigate the external validity of the *DSM-IV* model of ADHD (N = 546 studies). They found both inattentive and hyperactive dimensions to be significantly associated with global, social, and adaptive impairment in children. Additionally, most of these relationships remained significant after controlling for factors such as SES, gender, ethnicity, IQ, and comorbidity. Results of the meta-analyses revealed that inattentive symptoms were associated with passive social behavior, impaired adaptive functioning, and impaired academic functioning, while hyperactive/impulsive symptoms were more strongly associated with overt peer rejection. ADHD-Combined type and ADHD-Inattentive type were found to be associated with similar adaptive and academic impairment. The authors note that the differences in strength of relationships between symptom dimensions and specific domains of impairment provides support for the distinction between the ADHD subtypes (Willcutt et al., 2012).

Watabe et al. (2014) used the IRS to examine the impairment profiles of children who present with symptoms associated with Sluggish Cognitive Tempo (SCT). This study considered parent and teacher ratings on the IRS for 584 children in kindergarten through 8th grade. They found the presence of SCT symptoms to be associated with greater functional impairment at

home as compared to school, after considering total symptom ratings of ADHD. The decreased level of overall impairment endorsed by teachers was explained by the fact that behaviors which are typically reported as "impairing" in the school setting (i.e. completing work, blurting out answers) were accounted for through symptom ratings. Given that parents tend to have more individualized interactions with their children, parents may have more opportunities to observe impairment associated with passive inattentive symptoms. Therefore, they may view SCT symptoms as a domain which can result in elevated impairment, separate from symptoms associated with the domains of inattention and hyperactivity/impulsivity (Watabe et al., 2014).

Zoromski et al. (2015) looked specifically at the relationship between inattentive symptoms and academic impairment. This study considered ratings from 788 teachers on the Disruptive Behavior Disorders (DBD) Rating Scale and the IRS for children categorized in three development stages (i.e. early childhood, middle childhood, adolescence). Consistent with their hypothesis, they found a strong relationship between academic impairment and inattentive symptoms, which remained stable across development. It has been posited that this relationship may be due to several DSM-5 inattentive symptoms containing items which include problems specific to the school environment. Hyperactive/impulsive symptoms were more strongly associated with social impairment for early childhood students, while inattention was found to be more strongly associated with social impairment at the high school level. This could be due to older children with inattentive symptoms being less likely to attend to positive behaviors exhibited in other children and a failure to understand the cause and effect relationship between their behaviors and social competence. A limitation of this study was that only teacher ratings were considered (Zoromski et al., 2015).

Power et al. (2017) also examined the relationship between ratings of impairment and symptom dimensions of ADHD in a community sample which included both parent (N = 2,079) and teacher (N = 1,070) ratings on the ADHD-RS-5.They found parent-endorsed inattentive symptoms to be related to all six impairment dimensions, with correlations ranging from .46 to .64, and the strongest relationship occurring between inattentive symptoms and impairment in homework completion. Parent-endorsed hyperactive/impulsive symptoms were related to all six impairment dimensions, with correlations ranging from .35 to .53, and the strongest relationship occurring between hyperactive/impulsive symptoms and impairment in controlling behavior. Similarly, teacher-endorsed inattentive symptoms were strongly related to all six impairment dimensions, ranging from $r = .62$ for peer impairment to $r = .84$ for academic impairment. Teacher-endorsed hyperactive/impulsivity symptoms were strongly related to all six impairment domains, ranging from $r = .54$ for impairment in self-esteem correlation to $r = .80$ for impairment in controlling one's behavior at school. Overall, the relationship between ADHD symptoms and impairment domains was stronger for teachers than for parents. Specifically, the median correlation for teachers was .61 and .49 for parents (Power et al., 2017).

A study conducted by Barkley et al. (2006) revisited a previous study the authors had conducted in 2005, regarding the relationship between ADHD symptoms and the risk of impairment. In their original article, the authors found a modest relationship between ADHD symptoms and impairment (typically between 0.10 and 0.30), when impairment was defined through a single outcome measure. However, they observed a strong relationship between ADHD symptoms and impairment (typically between 0.60 and 0.80) when impairment included multiple measures and domains of impairment. Barkley et al. (2006) also found the relationship between symptoms and impairment to be far higher when impairment was specifically addressed

through clinical interviews and rating scales, rather than determined by the examiner (Barkley et al., 2006). The tendency for stronger correlations to be observed between symptoms and impairment was also observed in the study conducted by Power et al. (2017), despite utilizing a single item to assess each domain of impairment. However, Power and colleagues (2017) were unique in their use of impairment ratings which were based solely on inattentive and hyperactive/impulsive symptoms. Therefore, although previous research has considered the relationships between ratings of ADHD symptoms and impairment, there remains very little research examining how informants may be influenced by child and family factors when rating impairment specific to ADHD.

Child-Specific Factors Associated with Cross-Informant Ratings of Behavior

Several child-specific factors have been found to predict ratings of child behavior. The following sections will briefly summarize the researching examining the influence of several child demographic factors on ratings of child behavior.

Age and Gender

Research regarding the impact of age and gender on ratings of child behavior has revealed mixed findings. Some studies suggest that as children get older, they become more adept not only at assessing their own behaviors, but also managing problematic behavior, which results in an overall decrease in ratings of problematic behavior, for both parents and teachers alike (Achenbach et al., 1987; Loeber et al., 1990). Other studies have demonstrated that the influence of child age on ratings of behavior is contingent on which behavioral domain is being assessed (i.e., externalizing vs. internalizing behaviors). For instance, in a longitudinal study (N = 405 children) conducted by Keiley et al. (2000), patterns of behavioral ratings were observed for children beginning in kindergarten and ending in 7th grade. It was observed that as the child

got older, parents reported a decrease in externalizing behaviors, while teachers reported an increase in externalizing behavior. However, ratings for both parents and teachers remained stable for internalizing behaviors across development (Keiley et al., 2000). Other research has found that teachers tend to rate males as more hyperactive and inattentive than females (Biederman et al., 2002; Gaub & Carlson, 1997).

Meyer et al. (2017) explored gender differences in parent and teacher ratings of ADHD symptoms, as compared to direct observation of ADHD behavior, for children in two age groups, 3-4-years old and 8-9-years-old. One hypothesis of this study was that the difference between parent ratings and direct observation would be greater for girls as compared to boys. Results revealed that despite clinicians providing similar ratings of ADHD symptoms for boys and girls, parents provided higher ratings of behavioral concerns for girls, but not for boys. This same pattern was true for both parents and teachers in ratings for the 8-9-years-old age group, as ratings for boys tended to mirror direct observations, whereas ratings for girls in the high ADHD behavior group (based on direct observation) were only slightly higher than ratings for girls in the low to moderate ADHD behavior groups. The authors suggest that both parents and teachers may tend to under-endorse ADHD symptoms in girls compared to boys, and that parents may fail to recognize externalizing behaviors among girls. The authors note that the measures used for this study mainly included items related to hyperactivity/impulsivity and had fewer items assessing inattention (Meyer et al., 2017).

In summary, results of previous research are mixed regarding the influence of age and gender on parent and teacher ratings of behavior. Several studies have found that parents tend to rate younger children and boys as more symptomatic than older children and girls. However, child age is not always a consistent predictor for teacher ratings of ADHD symptoms, as studies

have demonstrated both positive and negative correlations between child age and ratings of child behavior for teachers. The results regarding gender have been more consistent, with both parents and teachers rating males as more symptomatic than females. However, clinicians need to consider which behavioral domain they are assessing (i.e. internalizing or externalizing) and consider how age and gender may differentially impact perceptions in each of these domains.

Ethnicity and Family Income

Cross-cultural differences have consistently been observed in ratings of child behavior, with several studies finding that teachers tend to rate ethnic minority children as having more behavioral difficulties, relative to non-Hispanic Caucasian children (Alban-Metcalfe et al., 2002; Mann et al., 1992; Reid et al., 1998). Cultural differences in ratings may reflect differences in behavior across settings and/or differences in perceptions of behavior as individuals will vary in their perceptions of acceptable behavior based on their respective culture. For example, it has been suggested that Latino/a parents differ from Caucasian parents regarding beliefs on mental health and schemas associated with somatic symptoms. These cultural differences are likely to influence how parents define and identify problematic behaviors in children (Bauermeister et al., 2005; Garland et al., 2005). Harvey et al. (2013) examined cross-cultural differences in parent and teacher ratings of ADHD-symptoms in a sample of 3-year old children. They found lower ratings for negative behaviors by parents of black children, relative to teacher ratings, while higher ratings of hyperactive and inattentive behaviors were found for Latino(a) mothers, relative to teachers (Harvey et al., 2013).

Takeda et al. (2016) considered both ethnicity and SES in examining parent and teacher ratings of child behavior, using the ADHD Rating Scale-Fourth Edition with a sample of 4 to 17-year-old children (N = 1,364 children). They found that teachers reported greater symptomology

for ethnic minority children; however, further analysis revealed that SES was a stronger factor than ethnicity for children in which large differences between informant ratings were observed. In other words, parents who had reported the highest levels of problematic behavior were from a higher socioeconomic status. However, no effect for SES or ethnicity was found when teachers reported the highest levels of problematic behavior. Takeda et al. (2016) note that many of the children in their study came from relatively high-income households, which likely impacted their results.

Research regarding the impact of family income on informant ratings of child behavior is relatively limited. One study found higher parental ratings of negative child behavior for children who are in a low-income family (Stone et al., 2013), whereas another study found no difference associated with family income for teacher ratings (Lawson et al., 2017). In a recent meta-analysis conducted by Russell et al. (2016), they looked at the association between ADHD and various constructs of SES for 42 studies. Overall, 86% of the studies found an association between socioeconomic disadvantage and increased risk of ADHD. Of the 22 studies that considered family income, 15 found increased risk of ADHD among children in the lowest identified income bracket. Although they observed lower family income to be associated with a greater likelihood of diagnosis of ADHD, the authors noted that differences in how family income was defined and measured made it difficult to directly compare results across studies. For instance, a study may elect to classify income using several categories, labeling income as “low or high” based on the poverty marker for each region or defining income as a continuous variable (Russell et al., 2016).

Given the association between ethnicity and SES, several studies have looked at whether differences based on child ethnicity/race remain after SES is accounted for. Martel (2013) found

that both parents and teaches rated African American children as demonstrating more ADHD symptoms. However, when family income was entered as a covariate, ethnicity became non-significant except for teacher ratings of inattention. This is in line with other research which has found SES to moderate treatment effects, whereas ethnicity does not (Arnold et al., 2003; Rieppi et al., 2002).

In summary, similar to research considering the influences of age and gender, findings are mixed regarding the impact of ethnicity and SES on ratings of child behavior. This may be partly due to differences in how socioeconomic status was operationalized across studies (i.e., inclusion of parental education, annual income, and/or parental occupation). However, the general trend is for teachers to rate minority children as more impaired, relative to parents, and for children from lower SES background to receive higher parent ratings of ADHD-symptoms, relative to children from "middle" or "upper" class backgrounds. However, as noted, a limitation of the research considering SES is the different methods of calculating SES.

Child-Specific Factors Associated with Cross-Informant Ratings of Impairment

Age and Gender

As mentioned, there is minimal research examining informant ratings of impairment, and fewer devoted to exploring ratings of impairment based on ADHD-symptoms. DuPaul et al. (2014) examined teacher-reported prevalence of ADHD symptoms and associated impairment in a diverse community sample of children ages 5 to 17 years old (N = 2,140 children). Teachers were asked to provide a rating using a 4-point Likert Scale (no problem to severe problem) to indicate the degree to which ADHD symptoms contribute to impairment in the child's ability to get along with school personnel, get along with peers, complete or return homework, control his/her behavior in school, and self-esteem. The authors found differences in teacher ratings of

impairment associated with student age and gender. Specifically, fewer areas of impairment were endorsed for older versus younger children, as well as girls versus boys. Additionally, teachers rated non-Hispanic, Black students higher in both symptoms and impairment as compared to non-Hispanic, Caucasian students. The authors propose that future research should examine the unique contributions of both SES and race, to better understand the elevated ratings given for Black students relative to Caucasian students (DuPaul et al., 2014).

Similar to the study conducted by DuPaul et al. (2014), Power et al. (2017) found non-Hispanic Black children to be rated as more impaired than non-Hispanic Caucasian children by teachers, in regard to academic and behavior impairment (Power et al., 2017). They also found that child age and gender were associated with both parent and teacher ratings of impairment; however, effect sizes were relatively weak. Specifically, they found that for parent ratings of homework and behavior problems, boys were rated as demonstrating more impairment than girls. For teachers, boys were rated as being more impaired than girls in all areas of impairment. Regarding age, older children were rated as more impaired in their homework and academic functioning by parents, whereas older age was associated with lower impairment in peer and behavioral impairment for teachers (Power et al., 2017).

Booster et al. (2012) found greater homework problems endorsed by parents of older children (ages 12-16) but did not observe a relationship between age and academic performance. Interestingly, less social impairment was reported by parents of younger children (ages 5-11), whereas there were no significant differences based on age for teacher report of social impairment. They note that the presence of comorbid internalizing and externalizing disorders may have influenced their findings (Booster et al. (2012).

The limited research on factors associated with parent and teacher ratings of ADHD related impairment suggests that both child gender and age may influence perceptions of impairment. Considering gender, both parents and teachers tend to endorse greater impairment for boys as compared to girls. Regarding age, teachers tend to report less impairment for older versus younger children whereas parents report greater impairment for older versus younger children regarding homework and academic impairment specifically.

Ethnicity and Family Income

Only a few studies have considered the possible influence of ethnicity and family income on informant ratings of ADHD-related impairment. DuPaul et al. (2014) noted a trend for teachers to provide higher ratings of ADHD-related impairment for non-Hispanic, Black students, relative to Hispanic and non-Hispanic, Caucasian students. Similar findings were observed for teacher ratings of academic and behavioral impairment with higher ratings for African American children as compared to non-Hispanic Caucasian children in a study conducted by Power et al. (2017). However, no ethnic differences were observed when comparing Caucasian children to children who identified as Asian Non-Hispanic, Hispanic, or other. Additionally, parent ratings of ADHD-related impairment were not associated with child ethnicity. Lastly, socioeconomic status, as defined by parental level of education, was not related to parent ratings of ADHD-related impairment (Power et al., 2017).

Haack et al. (2016) provide some insight as to why parent and teacher ratings of impairment may differ from ratings of ADHD symptoms. The authors hypothesize that impairment may be an easier concept for raters to accurately report, as impairment may be more "culturally universal" as compared to ratings of specific behaviors. For instance, a parent may find it easier to respond to questions regarding impairment (i.e., has difficulty completing

homework, has difficulty making and keeping friends) as such statements simply and objectively describe interactions with the environment that are common for most children. In contrast, symptoms focused items such as "is always on the go" or "acts as though they are being driven by a motor," may be more nuanced and complicated for informants to understand, contributing to greater variability across raters. The informant may also feel that symptom focused questions are less relevant to the problems for which they are seeking help (Haack et al., 2016).

In summary, it appears that demographic factors may influence how an informant may rate ADHD-symptoms as well as ADHD-related impairment in children. However, the influence of factors such as child age, gender, and ethnicity, may depend on the type of informant (i.e., parent versus teacher), as well as the specific domains being assessed. Further research is needed to better understand how demographic factors such as age, gender and SES may influence ratings of impairment. Greater understanding of factors that may influence parent and teacher ratings of impairment may aid in understanding cross-informant differences.

Present Study

Although differences between parent and teacher ratings of ADHD symptoms are common, research has only begun to examine if similar differences are observed between informants in ratings of ADHD-related impairment. Recent literature has provided support for the use of both ratings of symptoms and impairment, by examining the resulting diagnostic prevalence rates that result from using both types of measures individually and in combination (DuPaul et al., 2014). However, there is little research examining the influence of child and family factors on ratings of ADHD-related impairment. Rather, research which has included ratings of impairment have primarily focused on the association between impairment and symptoms of ADHD (e.g. Gordon et al., 2006; Zoromski et al., 2015). The present study will

expand on the findings of DuPaul et al. (2014) and Power et al. (2017) regarding the possible influence of child demographic factors in predicting parent and teacher ratings of impairment after considering ADHD symptoms. In contrast to previous research (i.e., Power et al., 2017), this study will utilize a clinical sample of children referred for an ADHD evaluation. In addition, the present study will consider both child ethnicity and family income to better understand the possible unique contribution each of these factors has in predicting impairment ratings. Better understanding of cross-informant differences in ratings of impairment may aid in integration of data from multiple informants. Understanding both typical and atypical patterns of informant responding can also help clinicians recognize less common differences that may have implications for both diagnosis and treatment. Additionally, understanding the degree to which impairment is due to ADHD-related behaviors, as opposed to other psychosocial factors, is critical for diagnostic accuracy and individualized treatment planning.

The following specific hypotheses have been developed to examine the unique influence of various child demographic factors (i.e. age, gender, ethnicity, SES) and ratings of ADHD-symptoms on parent and teacher ratings of peer and academic impairment.

Hypotheses

1. Based on previous literature, it is predicted that ratings of ADHD symptoms will correlate moderately with ratings of ADHD- related impairment (Gordon et al., 2006; Willcutt et al., 2012). The correlations between ADHD symptoms (inattention, hyperactive/impulsive) and both peer and academic impairment will be stronger for teachers, relative to parents.
2. Replicating the results of Power et al. (2017), it is predicted that peer and academic impairment will be greater for boys versus girls for both parent and teacher ratings.

3. Consistent with previous research, there will be a significant negative correlation, for both teacher and parent ratings, for peer impairment and child age. However, there will be an insignificant correlation, for both teacher and parent ratings, for academic impairment and child age. The insignificant correlation is expected due to the stability in ratings of inattention and the impact of inattention on academic performance across development (Zoromski et al., 2015).
4. Consistent with previous research on SES (Lawson et al., 2017; Stone et al., 2013; Takeda et al., 2016), it is predicted that there will be a negative correlation between family income and ratings of academic and peer impairment for both parents and teachers.
5. Given the consistently observed correlation between child ethnicity and ratings of impairment for teachers, (e.g. DuPaul et al., 2014; Power et al., 2017), it is predicted that ethnicity will predict teacher ratings of both peer and academic impairment. The influence of ethnicity in predicting teacher-rated impairment will be significantly reduced when family income is included as a predictor. It is hypothesized that child ethnicity will not be a specific predictor of parent ratings of impairment.
6. Based on previous research examining child and family demographic factors which predict parent and teacher ratings of ADHD symptoms (Gordon et al., 2006), it is predicted that child age, gender, and family income will predict parent and teacher ratings of impairment (academic and peer) after accounting for symptoms of ADHD (inattention, hyperactive/impulsive).

CHAPTER 3

Method

Participants

The present study utilized archival data based on evaluations conducted with children at a Midwest university-based ADHD evaluation clinic. The sample used for this study included 322 children (219 males, 103 females) between the ages of 5 and 12 years old (M = 95.61 months, SD = 20.24 months) who were referred for an ADHD evaluation between 2013 and 2018. Consistent with the demographics of the community, the majority (90.1%) of participants identified as non-Caucasian. Almost half (48.8%) of the participants reported an annual family income of less than $30,000; 37.0% reported a yearly income of between $30,000 and $60,000; 14.2% reported an annual income over $60,000. Approximately 70% of the children met DSM-IV-TR or DSM-5 diagnostic criteria for a diagnosis of ADHD. In addition, approximately 65% of the children diagnosed with ADHD met criteria for a second, non-ADHD diagnosis (e.g., Oppositional Defiant Disorder, anxiety or mood disorder, cognitive impairment, learning disorder). See Table 1 for more information on participants.

Measures

ADHD Symptom Ratings

The ADHD-Rating Scale- Fourth Edition (ADHD-RS-IV; DuPaul et al., 1998) is a norm-referenced checklist that measures the symptoms of attention deficit/ hyperactivity disorder (ADHD) according to diagnostic criteria of the *DSM-IV* (See Appendix B for abbreviated

version). The purpose of this scale is to provide clinicians with a means of gathering information regarding the frequency of certain behaviors from parents and teachers, which can be used to screen, diagnose, or evaluate treatment of ADHD. The questionnaire can be administered to parents and teachers of children ages five to 18 years old and takes approximately five minutes to complete. The ADHD-RS-IV assesses two separate factors of ADHD: Inattention and Hyperactivity/ Impulsivity. The inattentive domain includes the nine inattentive symptoms included in Section A-1 of the *DSM-IV* and the hyperactive/impulsivity domain includes the nine hyperactive symptoms included in Section A-2 (American Psychiatric Association, 1994).

The measure is comprised of 18 items that are rated on a four-point Likert-type scale (*never or rarely, sometimes, often,* or *very often*). The Inattention subscale is scored by summing the responses on all the odd-numbered items, and the Hyperactivity/Impulsivity subscale is scored by summing the responses on all the even-numbered items. The Total Scale raw score is the total of the Inattention and Hyperactivity/ Impulsivity subscale scores. Raw scores are converted to percentile scores considering the child's gender and age.

The ADHD-RS-IV has been demonstrated to be both reliable and valid. For internal consistency, coefficient alphas on the school version were calculated at .94 for total score, .96 for inattention, and .88 for hyperactivity/impulsivity. Coefficient alphas on the home version were .92 for total score, .86 for inattention, and .88 for hyperactivity/impulsivity. Test-retest reliability over four weeks ranged from .88 to .90 for the school version and from .78 to .85 for the home version. The measure was also found to have good convergent validity with the Conners rating scales. Limitations of the scale include generalized and limited information on the SES of the participants, urban/rural residence status, parent education levels, and lack of data for different ethnic groups (DuPaul et al., 1998).

The ADHD Rating Scale- Fifth Edition (ADHD-RS-5; DuPaul et al., 2016) is an updated version of the ADHD-RS-IV, and includes the same items regarding ADHD symptoms as the ADHD-RS-IV, and also includes items assessing impairment (See Appendix C for abbreviated version). Parents and teachers are asked to report the frequency with which the child displays the 18 symptomatic behaviors of ADHD over the previous 6 months. The ADHD-RS-5 asks raters to consider the extent to which hyperactive and inattentive symptoms contribute to impairment in functioning, in addition to reporting ADHD symptoms. Respondents rate behavior on a 4-point Likert scale corresponding to the *DSM-5* inattentive and hyperactive/impulsive symptoms, followed by six questions related to impairment (i.e. relationship with family members or school professionals, peer relationships, academic functioning, behavioral functioning, homework functioning, and self-esteem). Informants are asked to rate impairment twice, once for inattentive symptoms and once for hyperactive/impulsive symptoms (DuPaul et al., 2016). For the present study, participants who were evaluated prior to August 2017 were given the ADHD-RS-IV, while those evaluated after August 2017 received the ADHD-RS-5. The ADHD-RS (4^{th} and 5^{th} editions) will be used as a measure of parent and teacher ratings of ADHD symptoms (DuPaul et al., 2016). Similar to DuPaul et al. (2014), parent and teacher ratings of '2' (often) or '3' (very often) were summed to create a total symptom count for inattentive and hyperactive/impulsive symptoms, as well as overall symptoms (inattentive + hyperactive/impulsive).

ADHD Impairment Ratings

An adapted version of the Impairment Rating Scale (IRS; Fabiano et al., 2006) was used to assess ADHD-related functional impairment. Rather than a written rating of impairment, the adapted version asks parents to provide a verbal rating from 1 (not at all) to 7 (very negative impact) in regard to the impact of inattentive and/or hyperactive/impulsive symptoms on peer

interactions, sibling interactions, parent-child relationship, academic progress/learning, and self-esteem (See Appendix D for abbreviated version). Teachers provided a written rating of impairment for peer interactions, academic progress/learning, and the teacher-student relationship using the same 7-point Likert scale. The differences in the adapted version of the IRS used in the present study, as compared to the original IRS, was that parents provided verbal rather than written ratings of impairment, and some of the domains of impairment included in the original IRS (i.e., overall family functioning, overall impairment for parents; overall classroom function and child's self-esteem for teachers) were not included in the adapted version. The IRS has strong test-retest reliability and moderate to high inter-rater reliability between parents and teachers. Correlations between parents and teacher ratings on the IRS have been found to be moderate: peer (r = .59), academic progress (r = .59), self-esteem (r = .47), and global impairment (r = .64). Correlations between the IRS and other ratings of impairment demonstrated a moderate to high degree of correspondence (Fabiano et al., 2006).

Conners March Developmental Questionnaire

The Conners March Developmental Questionnaire (CMDQ; Conners, 1996) is a paper-and-pencil questionnaire that asks parents/caregivers to provide information on a variety of topics including developmental milestones, child temperament, birth history, school behavior and performance, treatment history, medical history, and a general description of the child's presenting problem. The questionnaire was developed for children 3 to 17-years old and takes roughly 20 minutes for the caretaker to complete. For the present study, demographic information (i.e. age, gender, ethnicity, SES) was obtained via the Conners March Developmental Questionnaire.

Procedure

The present study used archival data collected over a period of approximately five years (2013-2018), for children referred to an ADHD evaluation clinic. Children are typically referred to the clinic by a parent, teacher, or primary care physician due to concerns related to attention or hyperactivity/impulsivity. Following referral for the evaluation, teacher questionnaires (BASC-2 teacher rating form, BRIEF, ADHD Rating Scale) were mailed to the child's parent/guardian along with a consent form. Parents were asked to complete the consent form and deliver the questionnaires to the teacher along with a return envelope addressed to the clinic. Parents were also asked to complete the developmental questionnaire prior to coming to their scheduled assessment. The child's mother completed the assessment questionnaires for most of the children. For a small percentage of participants, the questionnaires were completed by a grandparent or other legal guardian (e.g., foster parent). Teacher materials were typically obtained from the child's regular education teacher. For children with multiple teachers or children who received special education services in an alternate classroom, the teacher who was most familiar with the child was asked to complete the questionnaires. Teachers were asked to provide ratings of the child's behavior after at least one month of classroom experience with the child.

Informed consent for the assessment procedure, as well as consent to participate in an IRB-approved research study was obtained by parents or legal guardians prior to the assessment. Only data from parents who completed the consent for research participation was used in the present study. Each participant was given a unique subject identification number and all data were entered using this number. All documents containing client identifying information are secured in a locked filing cabinet contained in a locked office in the clinic. Evaluations were

completed by a graduate level clinician and/or licensed psychologist and include a semi-structured diagnostic interview with the parent or guardian, brief measures of cognitive ability and academic achievement, and a computer-based test of attention given to the child.

The archival data used in the present study was entered into an SPSS data file by graduate and undergraduate research assistants who completed IRB training and were given additional supervision and trained by either the ADHD Evaluation Clinic director or a graduate research assistant. The data were entered into a password protected computer located in a locked office in the clinic. All assessment data collected in the ADHD Evaluation Clinic is protected according to the requirements of the Health Insurance Portability and Accountability Act of 1996.

CHAPTER 4

Results

Plan of Analysis

Descriptive statistics are presented to describe the demographic characteristics of the sample, including child gender, age, ethnicity, and annual family income. Correlations were used to examine the relationship between ADHD symptoms (i.e. inattentive and hyperactive) and functional impairment (i.e. peer and academic impairment) as rated by both parents and teachers. Additionally, correlational analyses were conducted to examine the relationship between child age and family income and parent and teacher ratings of impairment. Regression analyses were used to examine the relative contribution of gender and ethnicity (i.e. Caucasian, Non-Caucasian) in predicting impairment. Hierarchical regression analyses were utilized to examine demographic factors that predict parent and teacher ratings of impairment (academic and peer) after accounting for symptoms of ADHD (inattention, hyperactive/ impulsive). For each of the four regressions, the first step included the sum of inattentive symptoms and the sum of hyperactive/impulsive symptoms, followed by child and family factors, including gender, age (in months), ethnicity (Non-Caucasian or Caucasian) and family income in the second step of the model.

Several supplemental analyses were also conducted. First, the pattern of correlations between parent and teacher ratings of impairment across different methods and measures (i.e., ADHD-RS-5, parent verbal report of impairment) was explored. It was predicted that the

correlation between ratings of ADHD symptoms and ratings of impairment would be stronger when impairment items directly followed ADHD symptoms ratings (i.e., ADHD-5 Rating scale), relative to ratings of impairment provided separately from ratings of ADHD symptoms. Second, several hierarchical regressions were conducted to examine whether inclusion of ODD symptoms changed the relationship between demographic factors and parent and teacher ratings of impairment, after accounting for symptoms of ADHD.

Descriptive Analyses

Descriptive information regarding child and family factors, as well parent and teacher ratings of impairment and ADHD symptoms are presented in Table 1. Almost half of the participants reported a family income of less than $30,000 annually (48.8%), consistent with the population served by the ADHD evaluation clinic (i.e. majority of those referred are Medicaid eligible). Additionally, the ratio of male to female participants is consistent with research related to males being referred for ADHD evaluations at a higher rate than females. Child ethnicity was predominantly Caucasian (90.1%), consistent with demographics of the area in which the study was conducted. Due to the low rate of non-Caucasian participants, a dichotomous variable was created (1 = Caucasian; 2 = Non-Caucasian) to code ethnicity, collapsing across all non-Caucasian ethnicities reported. The correlations between the predictor variables and variables of interest are presented in Tables 2 and 3.

Table 4 provides frequency information on parent and teacher ratings of impairment on the ADHD-RS-5. When considering impairment as a dichotomous variable (no impairment, any rating of impairment) parents report academic impairment most frequently followed by controlling behaviors at school and completing or returning homework. For teachers, academic impairment was also most frequently reported, followed by controlling behaviors at school, and

peer impairment. Teachers tended to report a slightly higher percentage of children as demonstrating moderate or severe impairment. For instance, 57.7% of teachers provided a moderate or severe rating of academic impairment due to inattentive behaviors, and 60.0% due to hyperactive behaviors. A slightly fewer percent of parents provided a moderate or severe rating of academic impairment due to inattentive behaviors (52.8%), and 57.9% reported academic impairment due to hyperactive behaviors (see Table 4).

Correlational Analyses

Correlational analyses were conducted to examine the relationship between parent and teacher ratings of ADHD-related impairment (peer and academic). The correlation between parent and teacher ratings was significant for peer impairment ($r = .28$, $p < .01$) but not for academic impairment ($r = .07$, $p = .25$). Next, a correlational analysis was conducted to examine the relationship between ratings of ADHD symptoms (inattention, hyperactivity/ impulsivity) and parent and teacher ratings of impairment. For parents, correlations ranged from .12 to .43, with the strongest correlation emerging between peer impairment and hyperactive symptoms. For teachers, correlations ranged from .42 to .72, with the strongest correlation emerging between academic impairment and inattentive symptoms (see Tables 2 and 3). Fisher's standardized Z-test revealed that the correlations between teacher ratings of ADHD symptoms and impairment were stronger than the correlations between parent ratings of ADHD symptoms and impairment for inattention and peer impairment ($z = -3.31$, $p < .001$), hyperactivity and peer impairment ($z = -4.31$, $p < .01$), inattention and academic impairment ($z = -7.66$, $p < .001$), and hyperactivity and academic impairment ($z = -4.11$, $p < .001$).

Considering child and family factors and association with parent and teacher ratings of impairment, child age was the only factor found to be significantly correlated with ratings of

impairment. More specifically, there was a significant negative correlation between child age and teacher rating of peer impairment (r = -.14, p = .01); the correlation for parent ratings of peer impairment and child age was in the same direction but did not reach significance (r = -.09, p =.13). Thus, as predicted, teachers tended to rate younger students as having greater peer impairment. However, when hyperactive symptoms were entered as a covariate, the correlation between teacher ratings of peer impairment and child age was no longer significant (r = .04, p =.50), thus suggesting that hyperactive symptoms explain the relationship between younger child age and teacher ratings of peer impairment. Also consistent with predictions, age was not significantly associated with parent (p = .16) or teacher (p = .92) ratings of academic impairment. Lastly, the correlations between family income and parent and teacher ratings for both peer and academic impairment were not significant (all p-values > .15).

An ANOVA was conducted to examine possible gender differences in parent and teacher report of peer and academic impairment. Results of the ANOVA, grouping by gender, were significant for both parent (F (1,311) = 5.27, p = .02, η^2= .02) and teacher (F (1,319) = 5.69, p = .02, η^2= .02) ratings of peer impairment. Consistent with our hypothesis, teachers rated boys higher in peer impairment (M = 3.9) as compared to girls (M = 3.4), however parents rated girls significantly higher in peer impairment (M = 3.5) as compared to boys (M = 2.9). Contrary to our hypothesis, no significant group differences for gender were observed for parent (F (1,316) = 1.04, p = .31, η^2= .005) or teacher (F (1,319) = 1.52, p = .22, η^2= .004) ratings of academic impairment. A second ANOVA, grouping by child ethnicity (Caucasian, non-Caucasian) was conducted to consider group differences based on child ethnicity. No group difference in ethnicity was found for parent or teacher ratings of peer or academic impairment

(all p-values > .74, all η^2 < .0016). Given that neither family income or ethnicity was found to be associated with parent or teacher ratings of peer or academic impairment, further analyses exploring the combined influence of ethnicity and family income in predicting impairment were not conducted.

Regression Analyses

Hierarchical regressions were conducted to determine whether specific child and family factors (child gender, age, ethnicity and family income) would predict parent and teacher ratings of impairment (peer and academic) after accounting for symptoms of ADHD (inattention, hyperactivity/impulsivity). Prior to completing the hierarchical regression analyses, correlational analyses were conducted to examine relationships between the predictors and the independent variable and to assess for multicollinearity. Cohen et al. (2003) indicated that a correlation of .75 or greater between independent or modifying variables would suggest an issue with multicollinearity. As seen in Tables 2, the strongest correlation between predictor variables for both parent and teacher ratings was between ratings of Inattentive and Hyperactive symptoms (*r* = .58 and .60). The correlations were within the acceptable range (< .75), thus indicating an acceptable level of multicollinearity. For each of the four regressions, the sum of inattentive symptoms and the sum of hyperactive/impulsive symptoms were entered in the first step, followed by child gender, age (in months), ethnicity (non-Caucasian or Caucasian), and family income in the second step of the model.

Parent Ratings of Impairment

Considering parent ratings of peer impairment, the first step of the model, entering ADHD symptoms, was significant and accounted for 18.6% of the variance. Hyperactive symptoms emerged as a significant individual predictor ($p < .001$), such that children rated as

more hyperactive tended to be rated as more socially impaired. The second step of the model, which included child and family factors was also significant and added an additional 1.3% to the overall variance. A non-significant trend was noted for child gender ($p = .08$), such that parents tended to rate girls higher in peer impairment as compared to boys.

Regarding academic impairment, the first step of the model was significant and accounted for 9.5% of the variance. Inattentive symptoms emerged as a significant individual predictor, ($p < .001$), such that children rated as more inattentive were rated as having more academic impairment. The second step of the model was also significant and accounted for an additional 1.60% of the variance. Income approached the .05 level of significance ($p = .06$), likely due to the relationship between family income and parent ratings of hyperactivity ($r = -.19$). When including parent rating of hyperactivity as a covariate, the correlation between parent rating of academic impairment and family income increases from $r = .08$ to $r = .11$, thus suggesting that the influence of family income on ratings of academic impairment is associated with perceptions of hyperactivity. Results of these regressions can be found in Table 5.

Teacher Ratings of Impairment

Regarding peer impairment, the first step of the model, entering ADHD symptoms, was significant and accounted for 41.20% of the variance. Both inattentive ($p < .01$) and hyperactive symptoms ($p < .01$) emerged as significant individual predictors, such that children rated as more inattentive and/or hyperactive tended to be rated as more socially impaired. The second step of the model, which included child and family factors, was also significant and added 0.4% to the overall variance. No child or family factors emerged as significant predictors in this model.

Regarding academic impairment, the first step of the model was significant and accounted for 51.60% of the variance. Inattentive symptoms emerged as a significant individual

predictor ($p < .01$), such that children rated as more inattentive were rated as more academically impaired. The second step of the model was also significant and accounted for an additional 0.40% of the variance. No child or family factors emerged as significant predictors in this model. Results of these regressions can be found in Table 5.

Supplemental Analyses

Given that the present study utilized more than one method and measure of impairment for a subset of parents, supplementary analyses were conducted to examine whether the association between ratings of ADHD symptoms and ADHD-related impairment would be stronger when reported on the same questionnaire (and same page) as compared to ratings of impairment separate from ratings of ADHD symptoms. If the association was significantly greater when symptoms and impairment were rated on the same page, this might suggest a halo effect such that higher symptoms endorsement would contribute to inflated ratings of impairment. Additionally, the potential influence of child ODD symptoms on ratings of ADHD impairment was explored, as previous research has suggested that comorbid externalizing diagnoses, particularly ODD, may result in elevated ratings of ADHD due to halo effects (DeVries et al., 2017).

Correlations were conducted in order to examine the relationship between parent and teacher ADHD-related impairment and ADHD symptoms on the ADHD-RS 5 in order to examine the hypothesis that the association between ADHD symptoms and ratings of impairment would be stronger when ratings of impairment were reported on the same questionnaire (and same page) as symptoms ratings. For parents, the correlation between ADHD symptoms and impairment ranged from .12 to .58, with the strongest correlation occurring between inattentive symptoms and academic impairment. For teacher ratings, the correlations between ADHD

symptoms and impairment ratings ranged from .29 to .72, with the strongest correlation again being between inattentive symptoms and academic impairment. Fisher's standardized Z-test revealed that the correlations between teacher ratings of ADHD symptoms and impairment were similar regardless of whether ratings were provided on the same (ADHD-RS-5) or different page (ADHD-RS-IV and Academic Performance Rating Scale). This pattern was observed between teacher ratings of inattentive symptoms and peer impairment (z= .00, p = 1.00), hyperactive symptoms and peer impairment (z = -1.64, p = .10), inattentive symptoms and academic impairment (z = .80, p = .42), and hyperactive symptoms and academic impairment (z = -1.31, p = .19).

We then looked at the relationship between parent report of ADHD symptoms on the ADHD Rating Scale and verbal report of impairment (during the clinical interview). The correlation of .42 between ratings of inattentive symptoms and (verbal) report of academic impairment was very similar to the .47 correlation between inattentive symptoms and rating of academic impairment on the ADHD RS-5. Likewise, the correlation between hyperactive symptoms and parent (verbal) report of peer impairment was .41, almost identical to the correlation between hyperactivity and peer impairment as reported on the ADHD-RS-5 (r = .42). Fisher's standardized Z-test revealed that the correlations between parent ratings of ADHD symptoms and impairment were similar regardless of whether impairment was rated verbally or through circling an answer on the ADHD-RS-5. This pattern was observed between parent ratings of inattentive symptoms and peer impairment (z = .53, p = .60), hyperactive symptoms and peer impairment (z = .10, p = .92), inattentive symptoms and academic impairment (z= -1.64, p= .10), and hyperactive symptoms and academic impairment (z = -.75, p = .45).

In order to examine the possible influence of this type of rater bias for teachers (i.e., halo effect), we examined teacher ratings of impairment on the ADHD RS-5 and reports of inattentive and hyperactive behavior on the BASC 2nd and 3rd Edition The pattern and strength of the correlations across measures (BASC and ADHD-RS-5) was very similar to ratings of symptoms and impairment on the same measure. For example, the correlation between ratings of peer impairment and report of hyperactivity on the BASC was .73 and almost identical to the correlation of .72 between ratings of hyperactivity and peer impairment, both from the ADHD-RS-5. Fisher's standardized Z-test revealed that the correlations between teacher ratings of ADHD symptoms and impairment were similar regardless of whether ADHD symptoms were rated on a broad (BASC-2/3) or specific (ADHD-RS-5) behavioral rating scale. This pattern was observed between teacher ratings of inattentive symptoms and peer impairment (z = -1.07, p = .28), hyperactive symptoms and peer impairment (z = .14, p = .89), inattentive symptoms and academic impairment (z = 0.00, p = 1.00), and hyperactive symptoms and academic impairment (z = -.19, p = .85). Thus, there does not appear to be any support for a halo effect in ratings of impairment relative to ratings of ADHD symptoms on the ADHD RS-5 scale for parents or teachers. Results of these correlations can be found in Table 6.

Lastly, the potential influence of child ODD symptoms on ratings of impairment was explored by including *parent* report of ODD symptoms (based on clinical interview), along with inattentive and hyperactive symptoms in the first step of a regression and child and family variables in the second step, similar to the primary analyses. For parents, considering peer impairment, the first step of the model, entering ADHD and ODD symptoms, was significant and accounted for 22.2% of the variance. ODD symptoms and hyperactive symptoms both emerged as significant individual predictors, such that children rated as having elevated ODD and/or

hyperactive symptoms tended to be rated as more socially impaired. The second step of the model, which included child and family factors, was also significant and accounted for an additional 1.4% of the variance. No child or family factors emerged as significant predictors in this model. However, child gender approached the .05 level of significance (p = .06), with greater ratings of peer impairment for girls as compared to boys. Hyperactive symptoms remained a significant predictor when also considering ODD symptoms, suggesting that hyperactivity is a risk factor for peer impairment in addition to ODD symptoms.

For parent ratings of academic impairment, the first step of the model was significant and accounted for 9.60% of the variance. Inattentive symptoms emerged as significant individual predictors, such that children rated as having more inattentive symptoms tended to be rated as more academically impaired. The second step of the model was also significant and accounted for an additional 1.60% of the variance. Results of this regression were very similar to the regression that did not include ODD symptoms in the first step of the model. No child or family factors emerged as significant predictors in this model. However, family income approached the .05 level of significance (p = .08), with academic impairment increasing as a family's level of income increases.

For teachers, adding ODD symptoms to the model had very little impact in predicting both peer and academic impairment. Similar to the results of the regression without ODD symptoms, hyperactive symptoms were the only significant predictor of peer impairment and overall variance was similar (40%). Likewise, inattentive symptoms were the only predictor of teacher ratings of academic impairment and the overall variance accounted for was identical (52%) to the model that did not include ODD symptoms. Results of these regressions can be found in Table 7 and Table 8.

CHAPTER 5

Discussion

Guidelines for assessment of ADHD developed by the American Academy of Pediatrics (Wolraich et al., 2019) advocate for information from multiple informants such as parents, teachers, or guardians. This is based on the idea that individuals are molded by biological, psychological, and sociocultural factors which may lead to variable display of symptoms across situations. Additionally, it is recommended that information regarding functional impairment be collected to improve diagnostic validity, develop appropriate recommendations, and assist with intervention and treatment planning (DuPaul et al., 2014). A number of studies have explored the impact of ADHD on child functioning, such as increased peer rejection and an increased risk for school dropout (Evans et al., 2013; Faraone et al., 1998; Garner et al., 2013; Loe & Feldman, 2007). Impairment associated with ADHD generally continues into adulthood, even though core symptoms may improve with age (Pelham et al., 2005). Historically, research on assessment for ADHD has focused primarily on ADHD symptoms rather than impairment (e.g., Achenbach et al., 1987; De Los Reyes & Kazdin, 2005; Youngstrom et al., 1999). However, research has started to identify psychometrically sound measures to assess functional impairment in children with ADHD (e.g., Pelham et al., 2005). Additionally, recent research has examined differences in ratings of impairment that may occur between parents and teachers, and found support for demographics variables, such as child age and gender, to be associated with parent and teacher ratings of impairment (De Los Reyes et al., 2015; Lavigne et al., 2015).

The goal of the present study was to expand on the findings of DuPaul et al. (2014) and Power et al. (2017) regarding the impact that both child demographic factors and ratings of ADHD-symptoms have in predicting parent and teacher ratings of impairment. This study also adds to the current literature by considering parent and teacher ratings of impairment from a clinical sample of children referred for an ADHD evaluation versus a community sample. In addition, the present study included children/families representing a broader range of socioeconomic backgrounds as compared to past research in this area. The present study considered several child/family factors (i.e. child age, gender, ethnicity, and family income) in predicting parent and teacher ratings of impairment in social functioning and academic performance.

Consistent with previous research (i.e., Power et al., 2017), the present study found that ratings of ADHD-related impairment were correlated with ratings of ADHD symptoms, and these correlations were greater for teachers as compared to parents. Specifically, correlations between symptoms and impairment for parent ratings ranged from .41 to .47, whereas correlations for teacher ratings ranged from .67 to .73. Regarding child and family factors, child age and gender were the only factors found to be significantly correlated with ratings of impairment. Specifically, teachers tended to rate younger students as having greater peer impairment. However, the correlation was no longer significant when hyperactive symptoms were included in the analysis, suggesting that hyperactive behavior, which is often more frequent among younger versus older children, rather than child age accounts for this relationship. Teachers also tended to rate boys as having greater levels of peer impairment, whereas parents rated girls as having greater levels of peer impairment as compared to boys.

After accounting for symptoms of ADHD, child and family factors appeared to have minimal associations with teacher ratings of impairment. For both parents and teachers, hyperactive symptoms emerged as a significant predictor of peer impairment. Inattentive symptoms also emerged as a significant predictor of peer impairment for teachers. A trend was noted for gender as a significant predictor of parent ratings of peer impairment ($p = .08$), with girls rated as higher in peer impairment compared to boys. For both parents and teachers, inattentive symptoms emerged as the only significant predictor of academic impairment. For parents, family income approached significance ($p = .06$), such that higher family income was associated with higher ratings of academic impairment. Results of this study indicate that ADHD symptoms have a stronger influence in ratings of ADHD related impairment as compared to child and family factors, particularly regarding teacher ratings of impairment.

Analysis of Findings: Influence of Demographic Variables on Impairment Ratings

Gender

Peer Impairment. Consistent with our hypothesis and the findings of Power et al. (2017), teachers provided higher ratings of peer impairment for boys, relative to girls. This finding is consistent with previous research noting higher levels of peer impairment in boys as compared to girls (Elkins et al., 2011; Evans et al., 2013; Power et al., 2017), with higher rates of hyperactive behaviors in males being viewed as a significant contributor. Considering teacher ratings specifically, child hyperactive behaviors have been found to predict impairment in social interaction, with teachers being more likely to endorse annoying or upsetting behaviors for boys as compared to girls (Graetz et al., 2005; Ohan and Johnston, 2005; Wilcutt et al., 2012). In general, boys with ADHD tend to demonstrate greater physical or overt aggression relative to boys without ADHD. These behaviors (e.g. pushing or hitting) are easily observable in a

structured, classroom setting and are likely to impact a child's functioning and identity within his/her peer group (Solanto et al., 2009). In contrast, relational aggression (e.g. spreading rumors, exclusion) is more likely to be demonstrated by girls with ADHD as compared to boys and may be particularly difficult for teachers to observe and report through behavioral ratings (Soffer et al., 2007. Additionally, physically aggressive behaviors are more likely to result in student complaints, detention/suspension, and referrals for ADHD services (Ohan &Visser, 2009).

DuPaul (2020) suggests that gender differences in ratings among children with ADHD may be contingent on what behaviors the informant views as important in a specific situation. For example, teachers may be more concerned with disruptive behaviors in the classroom that impede the overall learning environment for other children. Although parents may also be concerned with these behaviors, they may be more likely to express concerns with behaviors which impact the overall family and home environment. For instance, parents may prioritize their child's ability to remain engaged in play activities, complete chores without reminders, obey commands, and get along with their siblings (DuPaul et al., 2020). Lastly, differences regarding the reference group between informants may play a role in how teachers view peer impairment, as they tend to rely on their experiences with other children throughout the years. Whereas parents may have fewer opportunities to observe their child's behavior in a large group setting (DuPaul, 2020; Philips & Lonigan, 2010).

Contrary to our predictions and the findings of Power et al. (2017), parents rated girls as demonstrating more peer impairment as compared to boys. It was hypothesized that parents would perceive boys as demonstrating more hyperactive behaviors as compared to girls and greater peer impairment as a result. One explanation for our results is that parents may have a lower threshold for girls as compared to boys when rating difficulties in social relationships. This

finding is consistent with research conducted by Mowlem et al. (2019), who found that girls with ADHD demonstrated greater peer problems and hyperactivity based on clinician observation, relative to girls with subclinical symptoms of ADHD. Mowlem et al. (2019) noted that despite these observed differences, parent-rated impairment did not distinguish between girls with ADHD and those with subclinical symptoms. In contrast, parent-rated impairment was significantly higher for males who met criteria for ADHD as compared to those with subclinical symptoms of ADHD (Mowlem et al., 2019). Our findings provide some support for the lowered threshold hypothesis, suggesting that parents or caregivers may be more likely to provide elevated ratings of impairment for girls displaying any level of ADHD symptoms as compared to boys.

It is possible that parents may perceive certain behaviors as being more likely to result in peer annoyance, isolation, or bullying based on the gender of their child. DuPaul et al. (2020) found parents rated boys higher than girls on ADHD symptoms including "fidgeting" and "running about" on the ADHD-RS-5, whereas girls were rated higher than boys for "talking excessively" and "interrupting others." These gender differences support previous findings observed by Makransky and Bilenberg (2014), who interpreted such findings to indicate that boys and girls may have differing ways of expressing symptoms and informants may be impacted by the gender appropriateness of such concerns. It is possible that parents may view hyper-verbal activity as being both more common and more impairing during peer interactions for girls, whereas fidgeting or running about may be perceived as common and socially appropriate for boys (Makransky & Bilenberg, 2014). Future research may wish to explore the relationship between symptoms and impairment for boys versus girls to determine whether perceptions associated with gender mediate this relationship.

Academic Impairment. Contrary to predictions that teachers would rate boys higher than girls in academic impairment, no gender differences were found for parent or teacher ratings of academic impairment. Although Power et al. (2017) found higher academic impairment for boys, other studies have found no gender differences for ratings of academic impairment (DuPaul et al., 2006; Frazier et al., 2007). In the present study, a strong positive correlation was found between inattentive symptoms and academic impairment for teacher ratings(r = 0.72, p <.01), suggesting that, for teachers, symptoms of inattention are a strong influence on perceptions of academic impairment, whereas the correlation between gender and impairment is much weaker (r = -.07). Owens et al. (2015) suggest that past reports of greater ADHD symptoms and impairment in boys as compared to girls is likely due to gender bias in referral rates. Boys are referred for services at a much higher rate than girls, ranging from a 9:1 ratio in clinical samples, to 2:1 in favor of boys in community-based samples (Sciutto et al., 2004). Previous research may have found greater impairment for boys as compared to girls due to higher prevalence of boys versus girls in the sample. Although boys outnumbered girls by a ratio of 2:1 in the present study, this difference is far less than what has been reported in previous studies using a clinical sample of children.

Age

Peer Impairment. Consistent with our hypothesis, as well as the findings of Power et al. (2017), child age was significantly associated with teacher ratings of peer impairment, with younger children rated as demonstrating more peer impairment. However, the correlation is no longer significant when hyperactive symptoms are entered as a covariate. As mentioned, hyperactivity has been found to be associated with disruptive and aggressive behavior, as well as peer impairment (Power et al., 2017; Willcutt et al., 2012; Zoromski et al., 2015). In addition,

younger children tend to display greater hyperactive behavior as compared to older children (i.e., Lahey & Willcutt, 2010), which was true in the present study also. This negative correlation between age and hyperactivity has been demonstrated to occur independent of pharmacological or psychosocial treatment and suggests that children become better at modulating hyperactive behaviors with age (Leopold et al., 2019; Miner & Clarke-Stewart, 2008). Thus, it appears that hyperactivity is a stronger predictor of peer impairment than age.

Inconsistent with our hypothesis, but consistent with the findings of Power et al. (2017), there was no significant association between child age and ratings of peer impairment for parents. It was expected that parents of younger children would endorse more peer impairment as compared to parents of older children. This was based on research which has found that younger children demonstrate greater levels of global impairment overall, relative to older children (DuPaul et al., 2014; Murray-Close et al., 2010). Parents, unlike teachers, may have less opportunity to observe their children in interactions with peers. It is also possible that children are more likely to exhibit increased assertiveness or appear less shy at home, given that they feel more comfortable to display these behaviors in a familiar environment (Solanto et al., 2009).

De Los Reyes and Kazdin (2005) indicated that sample characteristics and inconsistent assessment methods may contribute to mixed findings regarding the impact of age on parent and teacher ratings of impairment (De Los Reyes & Kazdin, 2005). The present study included children between the ages of 5 to 12. If it were possible to include a wider age range (i.e., middle or high school students) in the current study, our results may have resulted in a greater influence of age on ratings of impairment, in part due to parents and teachers having more contact and opportunity to observe social interactions among younger versus older children. Previous studies have examined age as a categorical variable, whereas the present study

examined age as a continuous variable. For example, Booster et al. (2012 found that parents reported older children (ages 12-16) as demonstrating more peer impairment than younger children (ages 5-11). Watabe et al. (2014) found that older children were rated by both parents and teachers as demonstrating greater levels of peer, academic, and overall impairment as compared to younger children in a population of children from kindergarten- 8th grade (Watabe et al., 2014). Defining age as a categorical variable reduces variability as differences within each group are averaged, resulting in smaller mean differences yielding significant results.

Academic Impairment. Consistent with our hypothesis, child age was not associated with teacher or parent ratings of academic impairment. This was expected due to the reported stability regarding ratings of inattention across development and the consistent relationship between inattentive symptoms and academic impairment across development (Keiley et al., 2000; Sasser et al., 2015; Zoromski et al., 2015). For example, Sasser et al. (2015), found that children who displayed problems with inattention upon school entry continued to demonstrate academic impairment even when attention improvements were noted by their teachers. Their findings highlight the importance of providing early and long-term academic intervention to children who demonstrate difficulties with inattention (Sasser et al., 2015).

Future research could explore the possible interaction between gender and age. Previous research conducted by DuPaul et al. (2016) found that boys in their youngest three age groups (i.e. 5-7, 8-10, 11-13) were rated higher than girls in hyperactivity and total ADHD symptoms by parents. In contrast, girls were rated as higher than boys in the oldest age group (i.e. 14-17) for hyperactivity and total ADHD symptoms. Ragnarsdottir et al. (2018) found that parents rated girls as demonstrating more peer problems than boys during adolescence, while receiving similar ratings of peer problems during early childhood. Research considering the interaction of age and

gender in predicting impairment may provide insight on potential differences in parent and teacher expectations of child behavior for younger/older girls as compared to younger/older boys.

Family Income

Contrary to our hypotheses, family income was not a significant predictor of peer impairment for parents or teachers. Considering academic impairment, a trend was noted for family income (p = .06) as a significant predictor, however this was likely due to the association between parent rating of hyperactivity and family income, such that parents of children living in lower income households tended to report higher level of hyperactive/impulsive behavior compared to parents of children living in higher income households.

It was anticipated that lower family income would be associated with higher informant ratings of peer and academic impairment due to consistent findings regarding the association between lower SES and increased ratings of ADHD symptoms, total behavioral problems, and diagnoses of ADHD and ODD (Achenbach & Howell, 1993; Ackerman et al., 2003; Martel, 2013). Martel (2013) found that lower family income was associated with higher ratings of ADHD symptoms for parents, but not for teachers. Of note, a similar pattern of results was observed when paternal education/employment was considered (i.e., lower education associated with higher symptoms), but failed to find any associations for either informant when maternal education/employment was considered (Martel, 2013). It should be noted that the present study considered family income rather than socioeconomic status. Cirino et al. (2002) describe socioeconomic status as a broad construct that considers family income, parental education, parental occupation, and the level of prestige ascribed to an occupation (Cirino et al., 2002). To this author's knowledge, no research has yet examined the potential impact of SES on ratings of

ADHD-related impairment. Therefore, additional research that considers SES and includes parents/caregivers from a wider range of family income, could help clarify the possible influence of SES on informant ratings of impairment.

Ethnicity

Based on previous research examining ratings of ADHD-related impairment (e.g. Evans et al., 2013), it was predicted that teachers would provide higher ratings of academic and peer impairment for non-Caucasian children relative to Caucasian children, but that this association would no longer be significant when family income was taken into account. Contrary to predictions, no significant differences emerged for teacher ratings of peer or academic impairment based on child ethnicity. One explanation for this finding is the low percentage (9.9%) of ethnically diverse children in the sample. Due to the lack of diversity among children in the sample, ethnicity was analyzed as a dichotomous variable (i.e. Caucasian vs. non-Caucasian children), which may have obscured possible ethnic differences within the non-Caucasian group.

As mentioned, previous research has focused primarily on the association between child ethnicity and ratings of ADHD symptoms, with the majority of prior research indicating higher teacher ratings for ethnic minority children as compared to Caucasian children (Epstein et al., 2005; Miller-Lewis et al., 2006; Piggott & Cowen, 2000; Reid et al., 1998). In addition, both Power et al., (2017) and DuPaul et al. (2014) found that teachers reported higher levels of impairment for African American as compared to Caucasian students. However, Power et al. (2017) found that ethnicity was a significant predictor for only two (academics, behavior problems) of the six types of impairment examined. DuPaul et al. (2014) suggested that the

combination of SES and race may explain higher ratings of impairment for non-Caucasian versus Caucasian students more so than ethnicity alone (DuPaul et al., 2014).

It has been suggested that impairment may be a more culturally universal construct relative to symptomology (Arcia & Fernandez, 2003). Also, impairment may be a more simplistic and unbiased construct, relative to ratings of symptoms and behaviors, and thus less influenced by child characteristics such as ethnicity (Haack et al., 2016). Ratings of impairment as compared to ratings of behaviors or symptoms may also be less susceptible to ethnic/racial differences associated with collectivist versus individualistic beliefs. For example, Gerdes et al. (2013) found that collectivist cultures are more likely to view hyperactive symptoms as developmentally appropriate, resulting in decreased endorsement of ADHD symptoms. However, ratings of ADHD-related impairment were not impacted by these cultural factors (Gerdes et al., 2013). This suggests that parents of ethnic minority children may be less likely to pursue services for ADHD unless behaviors such as hyperactivity begin to interfere with academic performance or contribute to misconduct at school (Haack et al., 2016). Thus, there may be an indirect influence of culture/ethnicity on ratings of impairment stemming from cultural factors that influence informant ratings of ADHD symptoms.

Predictive Value of Demographics After Considering Symptoms

Overall, the results of the present study provided minimal support for child and family factors to predict parent or teacher ratings of impairment after accounting for symptoms of ADHD. However, two non-significant trends for parent ratings were observed in the present study. Child gender approached significance, such that parents rated girls higher in peer impairment, relative to boys. Additionally, family income approached significance, such that higher family income was associated with higher ratings of academic impairment. Our findings

replicate Power et al. (2017), who found parent and teacher ratings of impairment to be strongly correlated with ratings of ADHD symptoms, whereas effect sizes were weak between ratings of impairment and child demographic factors (Power et al., 2017).

Several studies have found ADHD-related impairment to be associated with the various symptom dimensions of ADHD (i.e. ADHD-H, ADHD-I, ADHD-C), and did not find factors such as comorbidity status, gender, age, and SES to be associated with ratings of impairment (Hinshaw, et al., 2006; Lahey & Willcutt, 2010). Impairment in specific domains has also been shown to be associated with specific ADHD subtypes. For instance, children with higher ratings of both inattention and hyperactivity were found to demonstrate greater global, academic, and social impairment relative to children with only elevated hyperactivity. In contrast, children with elevated inattentive and hyperactive symptoms did not demonstrate greater academic impairment relative to children with only elevated inattentive symptoms (Willcutt et al., 2012).

Consideration of Method and Potential Bias in Ratings of Impairment

Given that the present study utilized more than one method and measure of impairment for a subset of parents, supplementary analyses were conducted to examine whether the association between ratings of ADHD symptoms and ADHD-related impairment would be stronger when reported on the same questionnaire (and same page) as compared to ratings of impairment separate from ratings of ADHD symptoms. If the association were significantly greater when symptoms and impairment were rated on the same page, this might suggest a halo effect such that higher symptoms endorsement would contribute to inflated ratings of impairment. It has also been well-established that the amount of shared variance between measures increases when the two measures utilize the same source or the same method.

Results of the supplemental analyses did not support a halo effect and did not appear to reflect shared variance solely due to source and method. Correlations between ADHD symptoms and impairment based on the ADHD-5 Rating scale (i.e., ratings of symptoms and impairment on the same measure) were similar to those observed when impairment ratings were solicited on a different measure and using a different modality (i.e., verbal report of impairment) of assessment. Given the strong relationship between ADHD symptoms and ADHD-related impairment found in this study as well as previous research, these findings are not unexpected. Thus, it appears that there is a strong relationship between ADHD symptoms and ratings of ADHD-related impairment regardless of the method used to assess impairment.

The potential influence of child ODD symptoms on ratings of ADHD impairment was also explored through supplemental analyses. Previous research has suggested that comorbid externalizing diagnoses, particularly ODD, may result in elevated ratings of ADHD due to halo effects (DeVries et al., 2017). Overall, the result of analyses that included ODD symptoms in addition to ADHD symptoms were very similar to the regression analyses that included ADHD symptoms only. However, ODD symptoms, in addition to ADHD symptoms, significantly predicted parent report of peer impairment which resulted in slightly more variance accounted for in the model that included ODD symptoms. However, ODD symptoms were not a significant predictor for parent or teacher ratings of academic impairment. The findings regarding influence of ODD symptoms on parent report of peer impairment are consistent with research which has found ODD, aggression, and rule-breaking to be correlated with parent-rated social impairment, peer impairment, and social problems in children with ADHD (Booster et al., 2012; Bunford et al., 2018; Garner et al., 2013). Symptoms of ODD did not predict academic impairment, which runs counter to research citing more severe academic and social impairment in children with co-

occurring ADHD and ODD (Gaub & Carlson 1997; Ostrander et al., 2006). The influence of ODD symptoms on academic performance may come through difficulty controlling behavior at school, which was not considered in the present study.

Clinical Implications

This study considered the influence of various child and family factors (i.e. age, gender, family income, ethnicity) on informant ratings of peer and academic impairment in a sample of children referred for an ADHD evaluation. Consistent with previous research (i.e., Wilcutt et al. 2012; Power et al., 2017), the present study found ratings of ADHD-related impairment to be correlated with ratings of ADHD symptoms, with stronger correlations observed for teachers versus parents. The amount of variance accounted for by ADHD symptoms ranged from 9% to 51%, with ADHD symptoms accounting for a much higher percent of the variance (i.e., 41-51%) for teacher ratings of impairment as compared to parent ratings of impairment. This reaffirms the notion that ADHD symptoms and functional impairment are interrelated, but not interchangeable. However, as mentioned the type of measure used to assess impairment is likely to influence the association between ADHD symptoms and impairment. Given the range of measures currently available to assess impairment, it is important that clinicians consider cost, time, and other resources while also choosing a measure with adequate psychometric support.

An interesting finding in this study was that parents and teachers differed regarding which gender they viewed as more socially impaired. This finding suggests the possibility that gender related stereotypes may influence parent and/or teacher ratings of impairment. Clinicians may wish to consider how differences in gender expectations can result in over or under reporting of impairment, possibly resulting in misdiagnosis or less effective services. Clinicians should also consider both the type and frequency of social interactions each informant is able to

observe. In general, teachers tend to have more opportunity to observe children in interaction with peers, whereas parents may be more likely to base ratings of peer impairment on generalized expectations based on observations of sibling interactions.

Although gender and age demonstrated an association with ratings of peer impairment, the relationships generally were weak. Neither gender nor age predicted ratings of peer impairment when ADHD symptoms ratings were included in the regression models. Power et al. (2017) noted that the weak association they found between gender and impairment was due to large differences in report of ADHD symptoms, favoring boys, for both parents and teachers. In the present study, teachers tended to rate boys higher on hyperactive and inattentive behavior whereas parents rated girls higher on inattentive behavior but rated boys and girls similarly on hyperactive/impulsive behavior. In line with previous research (Power et al., 2017), it appears that gender differences in impairment ratings are due primarily to gender differences in ratings of ADHD symptoms, particularly inattention. Therefore, when parent and teacher ratings of ADHD symptoms differ significantly, clinicians may assess impairment in more depth, asking follow-up questions if possible, to explore the possible influence of gender related expectations.

Lastly, clinicians should remember that although greater report of ADHD symptoms is likely to predict greater parent and teacher ratings of impairment, higher ratings of impairment are not necessarily due to ADHD symptoms alone and could be due to other factors. For example, academic impairment, which was the most common type of impairment reported by both parents and teachers, could be due to learning difficulties not necessarily associated with ADHD symptoms. Likewise, parents and/or teachers may report minimal or no peer impairment based on not observing the child in conflict with other children, failing to recognize that lack of

interaction with other children can also indicate difficulty in establishing and maintaining good relationships with other children.

Limitations and Future Research

Conclusions based on these findings are limited by several factors. One limitation of the present study is the lack of diversity observed within our population sample for factors such as ethnicity and family income. A larger sample size may have resulted in a better ability to consider a wider range of income and possibly observe differences in ratings for specific racial/ethnic groups (e.g., African American, Hispanic) as well as differences across groups. Also, it is possible that family income may have emerged as a predictor of impairment ratings if the sample included a wider range of income. Future research should utilize a more diverse sample to better understand the influence of ethnicity on ratings of impairment and also to consider whether ethnicity remains a significant predictor when accounting for other variables, such as family income or parental education level.

Another potential limitation of the study is the generalizability of the results given that a clinical rather than community sample was used. Pelham et al. (2005) note that in a clinical setting, the reason for the assessment typically goes beyond diagnosis, and includes aspects such as treatment planning, conceptualization, and monitoring progress. The goal of research based on a community sample may be to maximize homogeneity or evaluate the prognosis associated with an initial diagnosis (Pelham et al., 2005). Although all children in the sample were referred for ADHD testing, our sample included children who did not meet criteria for a diagnosis of ADHD. Therefore, the present results may not generalize to children diagnosed with ADHD. In addition, most children in the present study diagnosed with ADHD had a comorbid diagnosis, primarily ODD. Although both parents and teachers were explicitly asked to rate impairment based on

"difficulties with hyperactivity and inattention," it is likely that behavior associated with comorbid diagnoses (i.e., learning difficulties) may have influenced ratings of impairment. Future research could include the diagnosis of ADHD as a moderating variable, to determine whether the relationship between symptoms and impairment differs between children diagnosed with ADHD versus those who were not.

The use of a single item to assess impairment for each domain of functioning is another possible limitation of the present study. Statistically speaking, single item scales demonstrate several concerns, including low content validity, decreased sensitivity, and the inability to measure internal consistency (Sauro, 2018). Barkley et al. (2006) note that symptoms of ADHD demonstrate a low (but still usually significant) relationship to impairment when a single specific domain is assessed. However, when impairment is defined utilizing multiple questions and domains, the relationship between ADHD symptoms and impairment is almost twice that observed through the examination of a single area of impairment (Barkley et al., 2006). The present study used a single item to assess impairment in several domains and found a moderate relationship between symptoms and impairment for parents and a strong relationship between symptoms and impairment for teachers. Future research may further explore the construct of impairment and association with symptom ratings to better understand why some symptoms of ADHD are strongly related to specific areas of impairment (i.e., hyperactivity and peer impairment) and other areas of impairment are minimally associated with ADHD (i.e., parent academic impairment and hyperactivity).

Additionally, the present study considered perceptions of impairment based on two different methods of assessment (i.e. verbal report, ratings on questionnaire). Therefore, it is possible that the differences between these methods of assessment may unknowingly influence

the data. For instance, examiner effects may have influenced parent verbal report of impairment during the clinical interview. It is possible that some parents may have felt obligated to answer in a certain manner, potentially contributing to over- or under-reporting of impairment. Similarly, parent perceptions that ratings of impairment may reflect parenting abilities may have contributed to under-reporting of symptoms. Future research may explore the potential impact of social desirability on parent ratings of impairment.

An interesting finding of the present study was the much greater amount of variance accounted for by ADHD symptoms in teacher ratings of ADHD-related impairment, relative to parent ratings of impairment. It may be that parents are influenced by a wider range of factors, in addition to ADHD symptoms, when rating impairment. Teachers may be more familiar with and able to detect symptoms of ADHD, as well as the impact of those symptoms on academic and peer impairment. Future research considering parent ratings of impairment may include factors found to predict parent ratings of child behavior including parenting stress and parent psychopathology.

Table 1

Participant Demographics

Variable	*N*	%	*M*	*SD*	Range
Child Gender					
Male	219	68			
Female	103	32			
Child Age (in months)			95.61	20.24	53-153
Child Ethnicity					
Caucasian	290	90			
Non-Caucasian	32	10			
Annual Family Income					
Less than $30,000	147	49			
$30,000-$60,000	99	37			
More than $60,000	56	14			
ADHD Symptom Count					
Parent					
Inattention	322		16.75	6.08	1-27
Hyperactive/Impulsive	322		15.27	7.02	0-27
Teacher					
Inattention	321		16.83	7.38	0-27
Hyperactive/Impulsive	321		13.06	8.55	0-27
Impairment					
Parent: Clinical Interview					
Peer	313		3.11	2.03	1-7
Academic	318		4.76	2.05	1-7
Teacher: IRS					
Peer	321		3.76	1.87	1-7
Academic	321		5.09	1.71	1-7

Note. IRS = Impairment Rating Scale.

Table 2

Correlations Between Primary Research Variables- Parent

Variable	1	2	3	4	5	6	7	8
1. Gender	-							
2. Age	.10	-						
3. Family Income	-.02	-.01	-					
4. Ethnicity	.08	-.06	.01	-				
5. Inattentive Symptoms	.14**	-.02	-.08	-.08	-			
6. Hyperactive/Impulsivity Symptoms	.06	-.31**	-.19**	-.02	.58**	-		
7. Peer Impairment	.13*	-.09	-.07	.00	.30**	.43**	-	
8. Academic Impairment	.06	.08	.08*	-.01	.30**	.12*	.29**	-

*p <.10. ** p < .01.

Table 3

Correlations Between Primary Research Variables- Teachers

Variable	1	2	3	4	5	6	7	8
1. Gender	-							
2. Age	.10	-						
3. Family Income	-.02	-.01	-					
4. Ethnicity	.08	-.06	.01	-				
5. Inattentive Symptoms	-.16**	-.04	-.01	-.03	-			
6.Hyperactive/Impulsivity Symptoms	-.25**	-.28**	.05	.08	.60**	-		
7. Peer Impairment	.13*	.14*	-.08	.02	.51**	.61**	-	
8. Academic Impairment	-.07	-.01	.02	.02	.72**	.42**	.47**	-

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

Table 4

Frequency of Impairment Endorsed by Informant on the ADHD-RS-5 Due to Inattentive Behaviors

Variable	Parent		Teacher	
	N	%	*N*	%
Getting along with adults*				
No Problem	20	22.5	40	44.4
Mild Problem	34	38.2	17	18.9
Moderate Problem	23	25.8	22	24.4
Severe Problem	12	13.5	11	12.2
Getting along with other children				
No Problem	31	34.8	27	30.0
Mild Problem	29	32.6	17	18.9
Moderate Problem	24	27.0	34	37.8
Severe Problem	5	5.6	12	13.3
Completing or returning homework				
No Problem	12	23.6	28	31.8
Mild Problem	16	25.8	19	21.6
Moderate Problem	33	24.7	27	30.7
Severe Problem	28	25.8	14	15.9
Performing academically in school				
No Problem	21	13.5	11	12.4
Mild Problem	23	18.0	15	16.9
Moderate Problem	22	37.1	30	33.7
Severe Problem	23	31.5	33	37.1
Controlling behavior at school				
No Problem	19	21.3	19	21.1
Mild Problem	23	25.8	19	21.1
Moderate Problem	25	28.1	21	23.3
Severe Problem	22	24.7	31	34.4
Thoughts about himself/herself				
No Problem	38	42.7	25	28.1
Mild Problem	22	24.7	30	33.7
Moderate Problem	21	23.6	27	30.3
Severe Problem	8	9.0	7	7.9

*Adults = family members for Home version and school professionals for School version.

Table 4

Frequency of Impairment Endorsed by Informant on the ADHD-RS-5 Due to Hyperactive/ Impulsive Behaviors (Continued)

Variable	Parent		Teacher	
	N	%	*N*	%
Getting along with adults*				
No Problem	25	28.4	34	37.8
Mild Problem	32	36.4	27	30.0
Moderate Problem	22	25.0	18	20.0
Severe Problem	9	10.2	11	12.2
Getting along with other children				
No Problem	29	33.3	29	32.2
Mild Problem	28	32.2	21	23.3
Moderate Problem	24	27.6	29	32.2
Severe Problem	6	6.9	11	12.2
Completing or returning homework				
No Problem	14	19.3	33	37.5
Mild Problem	17	29.5	14	15.9
Moderate Problem	30	26.1	26	29.5
Severe Problem	27	25.0	15	17.0
Performing academically at school				
No Problem	14	15.9	16	17.8
Mild Problem	17	19.3	16	17.8
Moderate Problem	30	34.1	25	27.8
Severe Problem	27	30.7	33	36.7
Controlling behavior at school				
No Problem	17	19.3	19	21.2
Mild Problem	20	22.7	17	18.9
Moderate Problem	28	31.8	24	26.7
Severe Problem	23	26.1	30	33.3
Thoughts about himself/herself				
No Problem	34	38.6	31	34.4
Mild Problem	28	31.8	30	33.3
Moderate Problem	16	18.2	20	22.2
Severe Problem	10	11.4	9	10.0

*Adults = family members for Home version and school professionals for School version.

Table 5

Hierarchical Regression Analyses Predicting Ratings of Impairment-Parent

Variable	R	R^2	β	F	df
Peer Impairment					
Step 1	.43	.18		33.14	2, 291
Inattentive Sx.			.07		
Hyperactive Sx.			.38**		
Step 2	.45	.20		11.85	6, 287
Inattentive Sx.			.05		
Hyperactive Sx.			.41**		
Child Gender			.09		
Child Age (in months)			.05		
Family Income			.02		
Child Ethnicity			.03		
Academic Impairment					
Step 1	.31	.09		15.45	2, 296
Inattentive Sx.			.34**		
Hyperactive Sx.			-.07		
Step 2	.33	.09		6.05	6, 292
Inattentive Sx.			.33**		
Hyperactive Sx.			-.01		
Child Gender			.01		
Child Age (in months)			.08		
Family Income			.11		
Child Ethnicity			.05		

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

Table 5

Hierarchical Regression Analyses Predicting Ratings of Impairment-Teacher (Continued)

Variable	R	R^2	β	F	df
Peer Impairment					
Step 1	.64	.41		104.28	2,298
Inattentive Sx.			.22**		
Hyperactive Sx.			.49**		
Step 2	.65	.40		34.89	6,294
Inattentive Sx.			.21**		
Hyperactive Sx.			.50**		
Child Gender			.02		
Child Age (in months)			.01		
Family Income			-.05		
Child Ethnicity			-.03		
Academic Impairment					
Step 1	.72	.51		158.69	2,298
Inattentive Sx.			.72**		
Hyperactive Sx.			-.01		
Step 2	.72	.51		53.06	6,294
Inattentive Sx.			.72**		
Hyperactive Sx.			.01		
Child Gender			.04		
Child Age (in months)			.04		
Family Income			.02		
Child Ethnicity			.02		

Note. Sx = Symptoms.

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

Table 6

Correlations between ADHD Symptoms and Impairment on the ADHD Ratings Scale- Fifth Edition

Parent	1	2	3	4	5	6
1. Inattentive Sx.	-					
2. Hyperactive Sx.	.58**	-				
3. Peer (IN)	.24*	.30**	-			
4. Peer (HY)	.29**	.42**	.81**	-		
5. ACD (IN)	.47**	.12	.19	.19	-	
6. ACD (HY)	.46**	.21	.18	.25*	.80**	-

Parent	1	2	3	4
1. Inattentive Sx.	-			
2. Hyperactive Sx.	.58**	-		
3. Peer Impairment[a]	.30**	.43**	-	
4. ACD Impairment[a]	.30**	.12*	.30**	-

Teacher	1	2	3	4	5	6
1. Inattentive Sx.	-					
2. Hyperactive Sx.	.60**	-				
3. Peer (IN)	.51**	.62**	-			
4. Peer (HY)	.51**	.72**	.85**	-		
5. ACD (IN)	.67**	.29**	.35**	.31**	-	
6. ACD (HY)	.69**	.55**	.49**	.55**	.78**	-

Teacher	1	2	3	4	5	6
1. Peer (IN)	-					
2. Peer (HY)	.85**	-				
3. ACD (IN)	.35**	.31**	-			
4. ACD (HY)	.49**	.56**	.78**	-		
5. Hyperactivity[b]	.61**	.73**	.32**	.54**	-	
6. Attention Problems[b]	.38**	.38**	.67**	.67**	.59**	-

Note. Sx= Symptoms; ACD= Academic Performance; (IN)= Due to Inattentive Symptoms; (HY)= Due to Hyperactive/Impulsive Symptoms.

[a] Parent verbal rating during clinical interview.

[b] BASC-2 Scale.

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

Table 7

Hierarchical Regressions Predicting the Influence of ADHD and ODD Symptoms on ADHD-Related Impairment- Parent

Variable	R	R^2	β	F	df
Peer Impairment					
Step 1	.47	.21		27.65	3, 290
ODD Sx.			.21**		
Inattentive Sx.			.07		
Hyperactive Sx.			.30**		
Step 2	.49	.22		12.61	7, 286
ODD Sx.			.22**		
Inattentive Sx.			.05		
Hyperactive Sx.			.32**		
Child Gender			.10*		
Child Age (in months)			.02		
Family Income			.05		
Child Ethnicity			.03		
Academic Impairment					
Step 1	.31	.09		10.42	3, 295
ODD Sx.			-.04		
Inattentive Sx.			.34**		
Hyperactive Sx.			-.05		
Step 2	.33	.09			
ODD Sx.			-.04	5.23	7, 291
Inattentive Sx.			.33**		
Hyperactive Sx.			.01		
Child Gender			.01		
Child Age (in months)			.08		
Family Income			.10*		
Child Ethnicity			.05		

Note. ODD = Oppositional Defiant Disorder; Sx = symptoms

* $p < .10$. ** $p < .01$.

Table 8

Hierarchical Regressions Predicting the Influence of ADHD and ODD Symptoms on ADHD-Related Impairment- Teacher

Variable	R	R^2	β	F	df
Peer Impairment					
Step 1	.64	.41		70.32	3, 297
ODD Sx.			.06		
Inattentive Sx.			.23**		
Hyperactive Sx.			.48**		
Step 2	.65	.40		30.11	7, 293
ODD Sx.			.05		
Inattentive Sx.			.22**		
Hyperactive Sx.			.49**		
Child Gender			.02		
Child Age (in months)			.01		
Family Income			-.04		
Child Ethnicity			-.03		
Academic Impairment: Teacher					
Step 1	.72	.52		107.68	3, 297
ODD Sx.			-.07		
Inattentive Sx.			.71**		
Hyperactive Sx.			.01		
Step 2	.73	.51		46.29	7, 293
ODD Sx.			-.08		
Inattentive Sx.			.71**		
Hyperactive Sx.			.03		
Child Gender			.05		
Child Age (in months)			.04		
Family Income			.01		
Child Ethnicity			.02		

Note. ODD = Oppositional Defiant Disorder; Sx = symptoms

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

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Appendix A: Diagnostic Criteria for ADHD (DSM-5)

A. A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development, as characterized by (1) and/or (2):

(1) **Inattention**: Six (or more) of the following symptoms have persisted for at least 6 months…

(a) Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or during other activities (e.g., overlooks or misses details, work is inaccurate)

(b) Often has difficulty sustaining attention in tasks or play activities (e.g., has difficulty remaining focused during lectures, conversations, or lengthy reading).

(c) Often does not seem to listen when spoken to directly (e.g., mind seems elsewhere, even in the absence of any obvious distraction).

(h) Is often easily distracted by extraneous stimuli (for older adolescents and adults, may include unrelated thoughts).

(i) Is often forgetful in daily activities (e.g., doing chores, running errands; for older adolescents and adults, returning calls, paying bills, keeping appointments)

(2) **Hyperactivity and Impulsivity**: Six (or more) of the following symptoms of have persisted for at least 6 months…

(a) Often fidgets with or taps hands or feet or squirms in seat

(e) Is often "on the go" acting as if "driven by a motor" (e.g., is unable to be or uncomfortable being still for extended time, as in restaurants, meetings; may be experienced by others as being restless or difficulty to keep up with)

(f) Often talks excessively

(h) Often has difficulty waiting his or her turn (e.g., while waiting in line)

(i) Often interrupts or intrudes on others (e.g., butts into conversations, games, or activities; may start using other people's things without asking or receiving permission; for adolescents and adults, may intrude into or take over what others are doing)

B. Several inattentive or hyperactive-impulsive symptoms were present prior to the age of 12 years

C. Several inattentive or hyperactive-impulsive symptoms are present in two or more settings (e.g., at home, school, or work; with friends or relatives; in other activities)

D. There is clear evidence that the symptoms interfere with, or reduce the quality of, social, academic, or occupational functioning.

Specify whether:

314.01 (F90.2) Combined presentation: If both Criteria A1 (inattention) and A2 (hyperactivity-impulsivity) are met for the past 6 months

314.00 (F90.0) Predominantly inattentive presentation: If Criterion A1 (inattention) is met but Criterion A2 (hyperactivity-impulsivity) is not met for the past 6 months

314.01 (F90.1) Predominantly hyperactive-impulsive presentation: If Criterion A2 (hyperactivity-impulsivity) is met but Criterion A1 (inattention) is not met for the past 6 months

Note. American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th Edition) (pp. 59-60). Washington, DC: Author.

Appendix B: ADHD Rating Scale- Fourth Edition (ADHD-RS-IV)

Circle the number that **best describes** your child's (student's) home (school) behavior over the past 6 months.

	Never or Rarely	Sometimes	Often	Very Often
1) Fails to give close attention to details or makes careless mistakes in schoolwork.	0	1	2	3
2) Fidgets with hands or feet or squirms in seat	0	1	2	3
3) Has difficulty sustaining attention in tasks or play activities.	0	1	2	3
5) Does not seem to listen when spoken to directly.	0	1	2	3
10) Is "on the go" or acts as if "driven by a motor."	0	1	2	3
12) Talks excessively.	0	1	2	3
15) Is easily distracted.	0	1	2	3
16) Has difficulty awaiting turn.	0	1	2	3
17) Is forgetful in daily activities.	0	1	2	3
18) Interrupts or intrudes on others.	0	1	2	3

Appendix C: ADHD Rating Scale- Fifth Edition (ADHD-RS-5)

Please select the answer that best describes your child's (student's) behavior over the past 6 months (or since the beginning of the school year).

How often does your child display this behavior?	Never or Rarely	Some-times	Often	Very Often
Fails to give close attention to details or makes careless mistakes in schoolwork or during other activities.	0	1	2	3
Has difficulty sustaining attention in tasks or play activities.	0	1	2	3
Does not seem to listen when spoken to directly.	0	1	2	3
Easily distracted.	0	1	2	3
Forgetful in daily activities (e.g. doing chores).	0	1	2	3
Fidgets with or taps hands or feet or squirms in seat.	0	1	2	3
"On the go," acts as if "driven by a motor."	0	1	2	3
Talks excessively.	0	1	2	3
Has difficulty waiting his or her turn (e.g. while waiting in line).	0	1	2	3
Interrupts or intrudes on others.	0	1	2	3

How much do the nine behaviors in the previous question cause problems for your child:	No Problem	Minor Problem	Moderate Problem	Severe Problem
Getting along with family members (school professionals)	0	1	2	3
Getting along with other children	0	1	2	3
Completing or returning homework	0	1	2	3
Performing academically at school	0	1	2	3
Controlling behavior in school	0	1	2	3
Feeling good about himself/herself	0	1	2	3

Note. Measure abbreviated for copyright purposes.