Informant Discrepancies in the Assessment of Adaptive Behavior of High-Functioning Children with Autism Spectrum Disorder

by

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## Table of Contents

<table>
<thead>
<tr>
<th>Description</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgement</td>
<td>III</td>
</tr>
<tr>
<td>Abstract</td>
<td>IV</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Method</td>
<td>15</td>
</tr>
<tr>
<td>Results</td>
<td>25</td>
</tr>
<tr>
<td>Discussion</td>
<td>29</td>
</tr>
<tr>
<td>References</td>
<td>37</td>
</tr>
<tr>
<td>Tables</td>
<td>42</td>
</tr>
<tr>
<td>Figures</td>
<td>47</td>
</tr>
</tbody>
</table>
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Gathering information about adaptive skills is a critical component of comprehensive assessments. When rating these skills, it is recommended that information be gathered from multiple sources. When multiple informants are used, however, discrepancies can arise. These discrepancies may have implications for diagnostic decision-making, as well as intervention development and progress monitoring. The purpose of the current study was to examine informant discrepancies for ratings of adaptive behavior of high-functioning children with autism spectrum disorder (HFASD) using a comprehensive measure of adaptive behavior. A total of 103 children with HFASD were each rated by two informant groups (parents and teachers). Each pair (N = 103 parents and N = 103 teachers) rated the same child using the Adaptive Behavior Assessment System, Third Edition (ABAS-3; Harrison & Oakland, 2015). Scores on the General Adaptive Composite (GAC) and the Practical, Social, and Conceptual domains were examined for level of agreement between raters and mean differences between informant groups. Parent scores and teacher scores were moderately correlated with one another. Teacher scores were significantly higher than parent scores for the GAC and the Practical domain. Bland-Altman plots and regression analyses were used to assess for the presence of systematic differences in parent-teacher agreement across the range of scores. No systematic differences were noted. When examining the role of potential moderators, no demographic variables (e.g., age, parent education, IQ [FSIQ, VCI, and PRI], expressive and receptive language abilities, and ASD symptoms) were significantly correlated with the parent-teacher difference scores. The current study suggests that parents and teachers are generally in agreement with one another when rating the adaptive skills of children with HFASD on a comprehensive measure of adaptive behavior. Keywords: ASD, informant discrepancies, adaptive skills
Introduction

Overview

The prevalence of autism spectrum disorder (ASD) is estimated at one in 68 children and is on the rise, which may be due to the broadening of the definition of ASD in the most recent diagnostic criteria to include various levels of functioning (Centers for Disease Control and Prevention, 2014; Lecavalier, 2014). Individuals diagnosed with ASD display symptoms within two domains including social-interaction/-communication and restricted and repetitive patterns of interests and behaviors (American Psychiatric Association [APA], 2013). There is significant variability in the functional levels of individuals with ASD and this is reflected in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)’s inclusion and use of diagnostic specifiers (APA, 2013). These specifiers include Level 1 (requiring support), Level 2 (requiring substantial support), and Level 3 (requiring very substantial support); the specifiers identify the level of support needed and also serve as an indicator of the severity of symptoms, with individuals at Level 1 having the least impairing symptom presentations (APA, 2013). These three specifier levels are applied to each of the two diagnostic symptom domains (i.e., social/social-communication impairment and circumscribed and repetitive behaviors and interests).

Additional specifiers are also applied and indicate the presence or absence of cognitive and/or language delays (APA, 2013). These cognitive and language factors are often used to differentiate between lower-functioning individuals with ASD (LFASD) and high-functioning individuals with ASD (HFASD). Individuals with HFASD are typically defined as those without intellectual disability. As a result, an IQ score of 70 is often used to distinguish individuals with HFASD from individuals with LFASD (Lecavalier, 2014). Although individuals with HFASD
demonstrate relative cognitive and language strengths, their core diagnostic impairments interfere with daily functioning (APA, 2013) and result in long-term negative outcomes (e.g., limited employment, social isolation, and extended reliance on family for support; Portway & Johnson, 2005; Shattuck, Wagner, Narendorf, Sterzing, & Hensley, 2011).

**Adaptive Functioning and Adaptive Functioning in ASD/HFASD**

Although the term *adaptive functioning* is not included in the ASD diagnostic criteria, the criteria indicate that the symptoms of ASD result in significant impairment in current functioning such as social functioning, occupational functioning, etc. (APA, 2013). These areas of functioning are consistent with the broader conceptualizations of adaptive functioning. Definitions of adaptive functioning/adaptive behaviors have substantial overlap but can also differ based on the specific measure/author. Two comprehensive measures of adaptive functioning commonly used to assess individuals with ASD and other developmental disabilities include the Vineland Adaptive Behavior Scales, 2nd Edition (VABS-II; Sparrow, Cicchetti, & Balla, 2005) and the Adaptive Behavior Assessment System, 2nd Edition (ABAS-II; Harrison & Oakland, 2003). According to Sparrow et al. (2005), adaptive behavior is defined as “the performance of daily activities required for personal and social sufficiency” (p. 6) and includes skills in the areas of communication, daily living skills, socialization, and motor skills (motor skills is only used for individuals from birth to 6 years). The authors posit that adaptive behavior is age related, defined by the expectations and/or standards of others, modifiable, and based on the individual’s typical performance (not her/his ability to perform a certain behavior). Similarly, Harrison and Oakland (2003) defined adaptive behavior to include the functional skills that an individual needs for daily living in her/his environment in order to meet the demands/expectations of that environment. These critical functional skill areas broadly include
ABAS-3 INFORMANT DISCREPANCIES IN HFASD

communication, academics, socialization, daily living skills, and independent living. The authors noted that these behaviors are ones that the individual can perform without assistance. In their revised scale (Adaptive Behavior Assessment System, Third Edition; ABAS-3), Harrison and Oakland (2015) defined adaptive skills as those that an individual needs to “effectively and independently care for oneself, respond to others, and meet environmental demands at home, school, work, and in the community” (p. 1). Their revised scale covers the same critical skill areas as the prior edition. Overall, these definitions share a focus on functional daily skills that the individual can perform independently and that foster self-sufficiency and success in different settings.

Given the significant impairment in functioning required for a diagnosis of ASD (e.g., social functioning, occupational functioning, etc.; APA, 2013), it is not surprising that individuals with ASD have been found to exhibit deficits in adaptive behaviors/skills (Kenworthy, Case, Harms, Martin, & Wallace, 2010; Lee & Park, 2007). These deficits have been reported in individuals with ASD regardless of their level of cognitive functioning. Studies that included functionally-heterogeneous samples have consistently found significant adaptive behavior deficits for children and adolescents with ASD (e.g., Kanne et al., 2011; McDonald et al., 2016; Perry, Flanagan, Geier, & Freeman, 2009). To illustrate, Kanne et al. (2011) examined the parent-rated adaptive behaviors of 4 to 17 year olds with ASD, with IQs ranging from 19 to 167. Results indicated a significant deficit in overall adaptive functioning, with the adaptive domain of socialization being most significantly impaired (nearly two standard deviations below the population mean). Interestingly, when the sample was divided into those with IQs < 70 (intellectual disability) and those with IQs ≥ 70, the pattern of adaptive functioning differed relative to cognitive ability. Specifically, those with IQs < 70 (LFASD) exhibited an overall
adaptive score that exceeded their IQ, whereas those with IQs $\geq 70$ (HFASD) had an overall adaptive score that was far below their IQ level. In a similar study, McDonald et al. (2016) examined the parent-rated adaptive behaviors of a functionally-heterogeneous sample of 6 to 12 year olds with ASD using the ABAS-II. Results indicated that there was no significant difference between IQ scores and overall adaptive performance in individuals with LFASD. Notably, these individuals performed better than expected (based on their estimated IQ scores) on the Conceptual and Social domains. In contrast, individuals with HFASD performed significantly lower than expected (based on their IQ scores) on overall adaptive performance and all three adaptive domains (Conceptual, Practical, and Social). These results support the contention that individuals with HFASD lack the ability to translate their cognitive strengths into functional skill performance (i.e., Kenworthy et al., 2010; Lopata et al., 2012; Perry et al., 2012; Saulnier & Klin, 2007).

Of greater relevance to the current study are prior investigations that examined the adaptive skills of functionally-homogeneous samples of children and adolescents with HFASD, which have also indicated significant deficits. Saulnier and Klin (2007) and Klin et al. (2007) both found parent ratings of adaptive behaviors of 7 to 18 year olds with HFASD to be significantly below population estimates and the cognitive abilities of the sample (generally -1 to -3 SD below), with adaptive social skills most significantly impaired. More recent studies have continued to document adaptive deficits in youth with HFASD (e.g., Lopata et al., 2012; Volker et al., 2010). For example, McDonald et al. (2015) found parent ratings on the VABS-II were significantly lower for a sample of 7 to 12 year olds with HFASD than the general population on all three domains (Communication, Socialization, and Daily Living Skills) and the overall adaptive composite (with adaptive social skills most severely delayed; Cohen’s $d = 1.54$), as well
as relative to the sample’s cognitive ability scores. In another study, Kenworthy et al. (2010) found that parent ratings of overall adaptive behaviors (ABAS-II) of adolescents and young adults, ages 12 to 21 years, with HFASD were significantly lower than matched typically-developing (TD) peers. As expected, individuals with HFASD exhibited a substantial weakness in the social skill area compared to the TD group. While the previous studies found that adaptive behavior deficits are present in individuals with HFASD, it is important to highlight that all of those studies relied on parent reports. A notable exception was a study by McDonald et al. (2016) that included teacher ratings of the adaptive skills of 6 to 11 year olds with HFASD. Results indicated that teachers rated the children’s overall adaptive skills in the at-risk range (approximately one standard deviation below the population mean) on the Behavior Assessment System for Children, Second Edition (BASC-2; Reynolds & Kamphaus, 2004). These findings indicate that teachers are also observing adaptive behavior deficits in the school environment.

**Measurement of Adaptive Functioning**

The symptoms of ASD/HFASD are complex and can have a significant detrimental effect on multiple areas of functioning (APA, 2013). Given the multiple areas that can be affected, it is important to include an assessment of adaptive functioning as part of a comprehensive evaluation for youth with ASD/HFASD (Klin, Sparrow, Marans, Carter, & Volkmar, 2000; McCrimmon & Yule, 2017). As previously noted, adaptive behaviors are generally considered to be context specific (Harrison & Oakland, 2013) and, as such should be assessed across settings. This is especially applicable for individuals with ASD/HFASD because these individuals tend to have difficulties generalizing their behaviors and adaptive skills across settings and to real world situations (Klin, Saulnier, Tsatsanis, & Volkmar, 2005; Volkmar, Booth, McPartland, & Wiesner, 2014).
Rating scales are commonly used and effective assessment tools for measuring the behaviors and adaptive skills of youth with ASD/HFASD (Volkmar et al., 2014). Their frequent use has been associated with several advantages that they offer. For example, rating scales are efficient, easy to administer and score, and inexpensive (Norris & Lecavalier, 2010). In addition, many can be completed independently (Kenworthy et al., 2010; Lopata et al., 2012). Beyond these advantages, rating scales allow for the gathering of ratings by different informants across a number of settings which allows for a more comprehensive understanding of an individual’s adaptive functioning (Harrison & Oakland, 2013; Norris & Lecavalier, 2010). Not only is this information important for diagnostic and assessment purposes, it is also critical for identifying treatment targets and monitoring the efficacy of interventions (Harrison & Oakland, 2013; McCrimmon & Yule, 2017; McDonald et al., 2016; Stratis & Lecavalier, 2015).

Despite these advantages, ratings scales have some limitations. For example, rating scales rely on subjective observations and interpretations of the items by the informants (De Los Reyes & Kazdin, 2005; Norris & Lecavalier, 2010). In addition, rating scales may not be available for certain age ranges or functional levels (Norris & Lecavalier, 2010). Despite these potential drawbacks, rating scales and adaptive behavior rating scales continue to play a major role in comprehensive evaluations for youth with ASD/HFASD (Kenworthy et al., 2010; Lopata et al., 2012).

**Informant Discrepancies in Non-ASD and ASD Studies**

As noted, gathering information about adaptive skills from multiple sources is a critical aspect of comprehensive, evidence-based evaluations (De Los Reyes, 2011; McCrimmon & Yule, 2017). When multiple informants provide ratings of an individual, however, discrepancies can arise. In the past, these discrepancies were often attributed to the psychometric properties of
the individual measure (i.e., measurement error), yet more recently the attribution of these discrepancies to measurement error has been questioned (De Los Reyes, 2011). According to Achenbach (2011), “lumping informant discrepancies together with measurement error may obscure the unique contributions of different informants to identifying different problems that warrant treatment” (p. 81). The notion of considering informant discrepancies as a unique contribution to assessment and intervention is important and clinicians and researchers are encouraged to consider if these differences are meaningful (De Los Reyes, 2011; Stratis & Lecavalier, 2015) and if they contribute more clinically useful information than one informant alone (Lerner, De Los Reyes, Drabick, Gerber, & Gadow, 2017).

In an effort to better understand informant discrepancies, several meta-analyses have examined informant-based differences for behavioral and emotional problems/clinical symptoms in non-ASD and ASD samples and studies. A seminal and widely cited meta-analysis of 119 studies by Achenbach, McConaughy, and Howell (1987) examined the consistency of informant ratings of behavioral and emotional problems in TD youth from 1½ to 19 years of age. Results yielded a mean $r = 0.28$ between different types of informants (parent/teacher) compared to a higher mean $r = 0.60$ for similar types of informants (parent/parent). A second meta-analysis of 74 studies of cross-informant ratings of social competence in TD youth by Renk and Phares (2004) also yielded a somewhat higher but moderate level of agreement (mean $r = 0.43$) between parent and teacher informants. These low-to-moderate correlations between parent and teacher raters across numerous studies support the contention that informant differences are not merely measurement error (Achenbach et al., 1987).

Given the possibility of cross-informant discrepancies, clinicians must consider possible sources of the disparities and their implications. For example, informant discrepancies may
occur because of differences in informants’ perceptions or mindsets about certain behaviors (i.e., how they notice, remember, and/or rate a specific behavior; Achenbach, 2011). Differences may also be a result of the informant’s attribution of the cause of a behavior (i.e., child disposition versus the environment), the presence of different behaviors in different contexts (i.e., different behaviors at home or at school), and/or whether an informant considers a certain behavior as warranting intervention (De Los Reyes, 2011). Additionally, the type of behavior being rated may affect the level of agreement. More specifically, the overt nature of externalizing behaviors may make them easier to observe than internalizing behaviors (Stratis & Lecavalier, 2015). In the case of adaptive behavior, informant discrepancies could also be due to the nature of adaptive behaviors and the definition of adaptive skills may be more abstract or diverse compared to other types of behaviors (McDonald et al., 2016). Further, adaptive behaviors may be less salient to raters compared to other types of behaviors (i.e., problem behaviors) and/or may be contingent on setting-based opportunities (e.g., parents may have fewer opportunities to observe their child in a social situation with peers compared to a teacher). Lastly, clinicians must consider the fact that the discrepancies may reflect true differences in behaviors across contexts resulting from different demands in different settings (McDonald et al., 2016).

Studies have also begun to examine informant discrepancies for ASD samples. Stratis and Lecavalier (2015) conducted a meta-analysis of informant agreement based on ratings of youth with ASD that yielded results that were consistent with Achenbach et al. (1987). A total of 49 studies that included ratings of emotional and behavior problems and social skills in youth with ASD or ID were analyzed. The mean association across all raters and all behaviors indicated a moderate level of agreement ($r = 0.36$). When examined separately, different informant pairs (e.g., parent-teacher) had lower agreement compared to same informant pairs.
(e.g., parent-parent). For different informant pairs, agreement on externalizing behaviors \((r = 0.41)\) was greater than agreement on both internalizing symptoms \((r = 0.21)\) and social skills \((r = 0.31)\). Additional analyses indicated that the level of agreement between raters appeared to be moderated by several factors including age, IQ, and diagnosis. For age, agreement for social skills was significantly higher for ratings of school age youth compared to adolescents, but significantly lower for internalizing behavior ratings of school age youth compared to adolescents. IQ was found to be a significant moderator for all raters when assessing internalizing problems. When considering diagnosis, raters had significantly higher agreement on internalizing behaviors for youth with ASD compared to ID, as well as significantly higher agreement overall when the level of agreement for all behaviors was aggregated for youth with ASD compared to youth with ID (Stratis & Lecavalier, 2015).

The meta-analysis by Stratis and Lecavalier (2015) provided critical information on informant agreement, however the review included studies that utilized ASD samples of various functional levels and it relied on a single statistic for determining agreement. Given the common reliance on the examination of simple linear relationships between informant groups (Pearson \(r\)), Stolarova, Wolf, Rinker, and Brielmann (2014) recommended that informant agreement studies be more comprehensive and include an examination of both intra-class correlation coefficients (ICCs; indicating the variance of ratings of an individual child by two informants and the variance across the entire sample of children) and simple correlations (linear relationships between informant groups). An examination of between-group differences in mean scores also assists in understanding discrepancies (Achenbach, 2011).

To extend the research, recent studies have more comprehensively investigated informant discrepancies between parent and teacher ratings specifically for children with HFASD. For
example, Donnelly et al. (2017) examined the ASD symptom ratings of parents and teachers of 120 children, ages 6 to 12 years with HFASD using the Social Responsiveness Scale, Second Edition (SRS-2; Constantino & Gruber, 2012). Results indicated that parents rated the children’s ASD symptoms significantly higher than teachers for the overall composite score, as well as for four of the five subscale scores. Parent-teacher agreement was found to be significant and of low-to-moderate magnitude overall (total score ICC = 0.36 and Pearson $r = 0.24$). A Bland-Altman (Bland & Altman, 1986) plot of the total scores was also created and results indicated no systematic trends in parent-teacher differences across the range of scores. In a similar study, Lopata et al. (2016) examined parent-teacher discrepancies in ratings of ASD-related symptoms for 120 children, ages 6 to 12 years with HFASD using the Developmental Social Disorders content scale from the BASC-2 (Reynolds & Kamphaus, 2004). Consistent with Donnelly et al. (2017), parent ratings of ASD-related symptoms were significantly higher than teacher ratings and the correlations between ratings were significant and low-to-moderate in magnitude (ICC = 0.30 and Pearson $r = 0.22$). In contrast, analyses using the Bland-Altman plot indicated a significant trend in parent-teacher discrepancies, such that as the mean of the parent-teacher ratings increased, the discrepancy between the two ratings increased. Moderator analyses found that none of the tested variables including age, IQ, language level, parent education, or teacher familiarity were significant moderators of parent-teacher discrepancies. Additional analyses examining rater agreement in terms of cut-point scores and clinical categories indicated that parents and teachers agreed on placing 81% of the individuals at the at-risk cut point or above.

Only one study was identified that examined parent-teacher discrepancies on ratings of adaptive behaviors for individuals with HFASD. That study is of particular relevance to the current study, which comprehensively examined parent-teacher informant discrepancies in
ratings of adaptive skills for children with HFASD. McDonald et al. (2016) analyzed parent and teacher ratings of adaptive skills, as well as externalizing and internalizing symptoms of 118 children, ages 6 to 11 years with HFASD using the BASC-2 (a broad measure of clinical symptoms and adaptive functioning). Only results of the adaptive skills comparisons are summarized here given the focus of the current study. Results indicated that the mean teacher ratings were significantly higher than parent ratings on the Adaptive Behavior Composite (ABC; Cohen’s $d = 0.73$) score, as well as on three of the five constituent scales. The correlations between parent and teacher ratings were significant and low-to-moderate in magnitude for the ABC (ICC = 0.30 and Pearson $r = 0.19$), as well as for the subscales of Leadership (ICC = 0.41 and Pearson $r = 0.28$) and Functional Communication (ICC = 0.43 and Pearson $r = 0.29$). Additionally, based on the Bland-Altman analysis a significant and systematic difference was found across the range of parent and teacher scores such that as the mean of the parent-teacher ratings increased, the disparity between the two ratings also increased. Lastly, no variables (age, IQ, language level, or parent education) were found to be significant moderators of the parent-teacher difference scores on the ABC (McDonald et al., 2016). Although the study by McDonald et al. (2016) was the first to comprehensively examine informant discrepancies in adaptive skills ratings for children with HFASD, it employed a broad measure of clinical symptoms and adaptive functioning (i.e., BASC-2). The BASC-2 was not developed as a specific and comprehensive measure of adaptive functioning and little is known about the agreement between parents and teachers for comprehensive in-depth measures developed specifically to assess adaptive functioning.

Given the scarcity of studies of informant discrepancies specifically in HFASD and for adaptive functioning, it is important to expand this literature. As seen in Lopata et al. (2016)’s
findings where 81% of individuals in a clinical sample had parent and teacher raters agree on being “at-risk” or higher for a developmental/social disorder, discrepancies in informant ratings can have implications for assessment and treatment efforts. For example, conclusions about efficacy of a treatment could differ depending on the informant (McDonald et al., 2016). Given the difficulties individuals with HFASD have with generalizing their skill use across different settings, analyzing informant discrepancies in this population is particularly important (Stratis & Lecavalier, 2015).

Summary and Rationale

Informant discrepancies exist and can influence assessment and diagnostic decisions, and intervention and progress monitoring efforts (De Los Reyes & Kazdin, 2005; McCrimmon & Yule, 2017). To date, very little research has been conducted to examine parent-teacher informant discrepancies, especially when examining the adaptive skills ratings of children with HFASD. In addition, few studies have comprehensively examined informant discrepancies and factors that affect discrepancies, with most relying on a limited examination of simple linear correlations. Only one study was identified that specifically examined informant discrepancies (parent-teacher) in the adaptive skills of children with HFASD and that study relied on a broad measure that included an adaptive skills component (BASC-2; McDonald et al., 2016). No study was identified that examined informant discrepancies using a comprehensive and in-depth adaptive behavior measure, such as the ABAS-3. Additionally, the ABAS-3 was recently published and a comprehensive examination of informant discrepancies and factors that affect (moderate) such discrepancies will provide important information based on this measure. Given the importance of adaptive behavior in comprehensive assessments, characteristic weaknesses in adaptive functioning in individuals with HFASD, and potential impact of informant
discrepancies on assessment and treatment outcomes, additional studies examining informant discrepancies and potential moderators of informant discrepancies are needed using comprehensive and in-depth adaptive behavior measures, and well-characterized and functionally-homogenous samples of individuals with HFASD.

Aims and Hypotheses

The purpose of this study was to conduct a comprehensive examination of informant discrepancies between parent and teacher ratings of adaptive behaviors in a sample of children with HFASD. As noted, Stolarova et al. (2014) recommended that the examination of informant discrepancies be comprehensive and include simple correlations and ICCs. Additionally, mean score comparisons can assist in understanding discrepancies (Achenbach, 2011). Lastly, the use of standard scores has been encouraged to increase the interpretability of results (Achenbach, 2011; De Los Reyes & Kazdin, 2004). For the current study, adaptive behavior ratings were collected using the Adaptive Behavior Assessment System, Third Edition (ABAS-3; Harrison & Oakland, 2015). This study included four specific aims including the examination of: (1) correlations (Pearson $r$s and ICCs) between parent and teacher ratings; (2) mean score differences between parent and teacher ratings; (3) systematic differences between parent and teacher discrepancies across the range of scores; and (4) moderators of parent and teacher discrepancies (aim #4 was exploratory).

(1) **Hypothesis 1:** It was hypothesized that parent and teacher ratings would be significantly correlated and of low-to-moderate magnitude.

a. Parent and teacher ratings would be significantly correlated (ICC and Pearson $r$) and of moderate magnitude (greater than or equal to .30) for the overall Global Adaptive Composite (GAC).
b. Correlations between parent and teacher ratings on the three adaptive domain scores were examined in an exploratory manner (given the lack of an adaptive behavior measure with comparable domains in the prior research).

(2) **Hypothesis 2:** It was hypothesized that parent and teacher ratings of adaptive behavior would be significantly different from one another, with teacher ratings being significantly higher than parent ratings on the Global Adaptive Composite (GAC) and three adaptive domain scores (Practical, Social, and Conceptual). The directionality of this hypothesis was based on the results of McDonald et al. (2016).

(3) **Hypothesis 3:** It was hypothesized that a significant and systematic difference would be observed between parent and teacher ratings of adaptive behaviors across the range of scores (via a Bland-Altman plot and regression analyses using the GAC, Practical, Social, and Conceptual scores). Specifically, as the mean of the parent-teacher ratings increased the disparity between the two ratings would increase.

(4) **Exploratory Moderator Analyses:** Correlations and scatterplots were examined to test the potential moderating effects of age, parent education, IQ (FSIQ, VCI, PRI), expressive and receptive language abilities, and ASD symptoms on the parent-teacher difference scores.
Method

Participants

The sample consisted of ratings by parents and teachers of $N = 103$ children with HFASD. Each parent-teacher pair rated one child with HFASD ($N = 103$ parent ratings and $N = 103$ teacher ratings). The child participants ranged from 6 to 12 years of age and were enrolled in a randomized trial examining the efficacy of a school-based, comprehensive psychosocial treatment.

Eligibility for the treatment trial was determined through a multiple-gate screening procedure. Initially, parents provided written documentation of a prior clinical diagnosis of ASD, along with any other relevant paperwork, such as school reports and/or individualized education plans (IEPs). Two of the senior investigators independently reviewed the records and completed a standardized form documenting the child’s diagnosis and approximate cognitive and language levels. Children with a clinical diagnosis of ASD and cognitive and language levels that were near, in, or above the average range and their parents were invited to participate in a formal two-to-three hour screening. The child and parents were only invited to complete the formal screening (testing) if both senior investigators agreed that the child met the initial diagnostic and cognitive and language parameters based on the submitted reports. During the formal screening, child participants were administered measures to assess their cognitive and language abilities. Cognitive ability was assessed using a short-form of the Wechsler Intelligence Scale for Children, 4th Edition (WISC-IV; Wechsler, 2003); the WISC-IV short-form consisted of the Block Design, Matrix Reasoning, Similarities, and Vocabulary subtests. Each child was required to have a short-form full scale IQ $> 70$ and either a Verbal Comprehension Index (VCI) or Perceptual Reasoning Index (PRI) score $\geq 80$. For the language
screening, each child completed a short form of the Comprehensive Assessment of Spoken Language (CASL; Carrow-Woolfolk, 1999) and was required to have a score ≥ 75 on either the Receptive or Expressive Language portion of the test. The CASL short-form consisted of the Synonyms, Antonyms, Syntax Construction, and Paragraph Comprehension subtests. The child’s ASD diagnosis was confirmed using the Autism Diagnostic Interview-Revised (ADI-R; Rutter, LeCouteur, & Lord, 2003), which was administered with the child’s parent(s). After completion of the formal assessment, the two senior investigators again reviewed the results and independently confirmed that the results met the inclusion criteria; agreement was required for inclusion in the study. For a detailed description of the sample, see Table 1.

Measure

The Adaptive Behavior Assessment System, Third Edition (ABAS-3; Harrison & Oakland, 2015) is a norm-referenced comprehensive measure of adaptive behavior. According to the ABAS-3 manual, adaptive behaviors consist of skills that an individual needs to “effectively and independently care for oneself, respond to others, and meet environmental demands at home, school, work, and in the community” (p. 1). It can be used to assess the adaptive functioning of individuals from birth to 89 years of age in a variety of settings. As part of a comprehensive assessment, results of the ABAS-3 can be used to inform diagnosis/classification of developmental and behavioral disorders, identify functional limitations, document eligibility for services and programs (i.e., special education), plan and monitor interventions, and aid in research (i.e., program evaluations, intervention outcome studies; Harrison & Oakland, 2015).

The ABAS-3 can be completed by informants familiar with the skills and behaviors of the individual being rated. It includes five rating forms that measure adaptive behaviors in
different settings and across age ranges and the forms can be completed in approximately 20 minutes. The Parent/Primary Caregiver Form (Ages 0-5) is used to measure the adaptive functioning of infants, toddlers, and preschoolers in the home and other settings. The Parent Form (Ages 5-21) is used to measure the adaptive functioning of youth in the home and community. Both parent forms can be completed by a parent or primary caregiver. The Teacher/Daycare Provider Form (Ages 2-5) assesses the adaptive functioning of toddlers and preschoolers in daycare (i.e., center- or home-based), preschool, and/or school settings. The Teacher Form (Ages 5-21) measures the adaptive functioning of youth in school settings. Both teacher forms can be completed by a teacher, a teacher’s aide, or another daycare/school-based staff member. The Adult Form (Ages 16-89) assesses adaptive functioning of adults in home and community settings and can be completed by a family member, a supervisor, or another respondent familiar with the adult being rated. It can also be completed as a self-report form, as long as the individual’s functional skills are adequate to provide valid responses to the items.

For the current study, the ABAS-3 Parent Form (Ages 5-21) and Teacher Form (Ages 5-21) were used. Each form consists of 10 different adaptive skill areas including Communication, Community Use, Functional Academics, Health and Safety, Home (Parent Form) or School (Teacher Form) Living, Leisure, Self-Care, Self-Direction, Social, and Work (Work is for individuals ≥ 17 years; given the age of the current sample, Work was not included). Harrison and Oakland (2015) provide descriptions of these adaptive skill areas. The Communication skill area measures speech, language, and listening skills needed for communicating with others (i.e., vocabulary, conversation skills, nonverbal communication skills, etc.). The Community Use skill area assesses skills needed for functioning in the community (i.e., getting around, expressing interest in activities outside the home, etc.). Functional Academics measures
foundational skills in reading, writing, math, and other areas that are important for daily functioning. The Health and Safety area measures skills needed for protecting one’s health and safety (i.e., following safety rules, showing caution, using medicines, etc.). The Home/School Living skill area measures skills needed for basic care in the home or school/classroom settings (i.e., cleaning, helping adults, taking care of one’s possessions, etc.). The Leisure adaptive skill area measures skills needed for engaging in and planning recreational and leisure activities (e.g., playing with others, playing with toys, following the rules of a game, etc.). The Self-Care skill area measures skills needed for personal care (i.e., eating, dressing, bathing, toileting, hygiene, etc.). The Self-Direction area measures independence, responsibility, and self-control skills (i.e., starting and completing tasks, following directions, etc.). The Social adaptive skill area measures social competence and skills needed for successful social interaction (e.g., having friends, recognizing and showing emotions, assisting others, etc.).

These adaptive skill areas are used to generate three adaptive domain scores including the Conceptual domain (consisting of the Communication, Functional Academics, and Self-Direction skill areas), Social domain (consisting of the Leisure and Social skill areas), and Practical domain (consisting of the Community Use, Health and Safety, Home/School Living, and Self-Care skill areas). Additionally, an overall Global Adaptive Composite (GAC) can be generated. Broadly defined, the Conceptual domain assesses behaviors needed to communicate with others, apply academic skills, and manage/accomplish tasks. The Social domain assesses behaviors needed to successfully engage in interpersonal interactions, act socially responsible, and use leisure time. The Practical domain assesses behaviors needed to address personal and health needs, take care of home/classroom/work settings, and function in the community. Lastly, the GAC serves as an indicator of overall adaptive functioning (Harrison & Oakland, 2015).
Items on the ABAS-3 are rated on a 4-point scale from 0 (*Is Not Able*) to 3 (*Always/Almost Always*). Individual items are summed and converted to standard scores. The GAC and adaptive domain scores have a $M = 100$ and $SD = 15$ and the adaptive skill area scores have a $M = 10$ and $SD = 3$. Internal consistency reliability estimates for the adaptive skill areas for children ages 6 to 12 years range from 0.81 to 0.96 for parents and from 0.80 to 0.97 for teachers. For the adaptive domains, estimates range from 0.94 to 0.99 for parents and from 0.93 to 0.99 for teachers for children ages 6 to 12 years. For the GAC for children ages 6 to 12 years, parent and teacher estimates range from 0.98 to 0.99. For the current study’s sample, internal consistency reliability estimates were calculated. For parents, estimates for the adaptive skill areas ranged from 0.83 (Health and Safety) to 0.91 (Self-Care). Additionally, internal consistency for the Practical domain was 0.96, the Social domain was 0.93, the Conceptual domain was 0.94, and the GAC was 0.98. For teachers, internal consistency estimates for the adaptive skill areas ranged from 0.86 (Self-Care) to 0.93 (Social and Functional Academics). Additionally, internal consistency for the Practical domain was 0.95, the Social domain was 0.95, the Conceptual domain was 0.96, and the GAC was 0.98.

Corrected interrater correlations averaged across all adaptive skill area scores is 0.67, ranging from 0.62 (Health and Safety) to 0.78 (Self-Care) for parents and from 0.61 (School Living) to 0.80 (Functional Academics) for teachers. Adaptive domain score interrater correlations range from 0.74 (Social) to 0.82 (Conceptual) for parent ratings and range from 0.76 (Social) to 0.79 (Practical) for teacher ratings. Interrater correlations for the GAC were 0.83 and 0.81 for parents and teacher, respectively. These results indicate moderate-to-high levels of correspondence among same-type raters on the ABAS-3. Cross-form (informant) consistency noted in the manual suggested low-to-moderate correlations between parent and teacher scores,
with adaptive skill area score correlations ranging from 0.31 (Home/School Living) to 0.53 (Social), adaptive domain score correlations ranging from 0.47 (Practical) to 0.56 (Conceptual), and a 0.55 correlation for the GAC (Harrison & Oakland, 2015).

Several forms of validity evidence are also described in the manual. Validity is supported in intercorrelations among adaptive skill areas, adaptive domains, and the GAC. Intercorrelations between the adaptive skill areas range from 0.45 (Community Use and Social skill areas) to 0.73 (Community Use and Functional Academics skill areas) on the Parent Form (Ages 5-21) and from 0.45 (Leisure and Community Use skill areas) to 0.79 (Self-Care and Self-Direction skill areas) on the Teacher Form (Ages 5-21). For both forms, the adaptive domain scores are highly correlated with the overall GAC scores (ranging from 0.88 to 0.95 for the Parent and Teacher Forms).

Concurrent validity is supported in correlations between ABAS-3 scores and scores on established and widely used adaptive behavior measures. For example, the ABAS-3 GAC (Parent Form) correlated 0.80 with parent ratings on the VABS-II (Sparrow et al., 2005) Adaptive Behavior Composite. Corrected correlations between the scores of each measure averaged 0.67, with scores measuring similar constructs being more strongly correlated with one another (i.e., the VABS-II Communication domain and ABAS-3 Communication skill area correlated 0.79 and the VABS-II Socialization domain and ABAS-3 Social domain correlated 0.90; Harrison & Oakland, 2015). Similarly, ratings on the ABAS-3 GAC Teacher Form correlated 0.89 with teacher ratings on the VABS-II Adaptive Behavior Composite; with scores measuring similar constructs being more strongly correlated (i.e., 0.72 for the VABS-II Communication domain and ABAS-3 Communication skill area and 0.91 for the VABS-II Socialization domain and ABAS-3 Social domain; Oakland & Harrison, 2015). Concurrent
validity is also supported in moderate correlations with the Adaptive Skills Composite of the BASC-2. The ABAS-3 GAC (Parent Form) and the BASC-2 Adaptive Skills Composite correlated 0.61 and the ABAS-3 GAC (Teacher Form) and the BASC-2 Adaptive Skills Composite correlated 0.38 (Harrison & Oakland, 2015).

Test items on the ABAS-3 also show sensitivity to age differences. Adaptive behavior skill use is expected to increase with age and this developmental progression is reflected in increased ABAS-3 raw scores as chronological age increases (Harrison & Oakland, 2015). Additionally, the ABAS-3 accurately distinguishes between clinical groups and matched control groups (Harrison & Oakland, 2015). When comparing groups of individuals with Intellectual Disability, ASD, and Attention Deficit/Hyperactivity Disorder to matched control groups, the ABAS-3 accurately discriminated between the clinical and control groups. In the ASD study specifically, significant adaptive behavior skill deficits were documented in individuals with ASD. For example, the mean GAC scores on the Parent Form for the ASD and matched control groups were $M = 74.4$ and $M = 99.2$, respectively. Similarly, for the Teacher Form the mean GAC scores for the ASD and matched control groups were $M = 75.8$ and $M = 102.6$, respectively.

**Procedures**

The study protocol for the school-based psychosocial treatment trial that generated the data for the current study was approved by the Institutional Review Board, and was conducted in compliance with the approved procedures (including attainment of written parental consent and child assent). The ABAS-3 protocols were included in the pre-testing assessment battery distributed to parents and teachers prior to the initiation of the intervention. Each parent-teacher pair completed rating scales for each individual child with HFASD approximately six weeks into
the school year to allow teachers adequate time to observe the children’s adaptive skills/behaviors. Parents and teachers were given one week to complete and return the pre-test forms and all were returned within the prescribed time frame. The completed ABAS-3 protocols were checked for errors (e.g., omissions, multiple endorsements of an item, etc.) and any errors were immediately corrected by the informant (i.e., parent or teacher). Protocols were independently scored by two research assistants using the ABAS-3 Scoring Assistant software. To further ensure accuracy, ABAS-3 scores were first entered into the study database and then checked by a second research assistant, with any discrepancies resolved by a third research assistant. Using the same procedure, all demographic and study-related data were entered into the study database.

**Data Analysis Plan**

A power analysis was conducted to determine statistical power for the mean score comparisons and informant associations. Regarding the mean score comparisons, statistical power was estimated at 1.0 using parameters from the prior study (McDonald et al., 2016; \( d = .73 \), \( \alpha = .05 \) [one-tailed], and \( N = 103 \) pairs; G*Power 3.1, Faul, Erdfelder, Buchner, & Lang, 2009). For the associations between informants, the power to detect a correlation of .30 with \( N = 103 \) pairs and \( \alpha = .05 \) (one-tailed) was estimated to be .93 (G*Power 3.1, Faul et al., 2009). Further, power was estimated at .80 to detect an association as small as 0.24. These values are generally consistent with estimates found in the prior study of adaptive behavior informant discrepancies for children with HFASD, as well as the prior meta-analysis that examined parent-teacher discrepancies in symptoms and social skills of youth with ASD (McDonald et al., 2016; Stratis & Lecavalier, 2015). Prior to performing the analyses, the data were visually inspected (i.e., frequency counts, scatterplots, and histograms) to ensure the assumptions of normality were
Descriptive statistics were calculated in order to characterize the sample demographics (average child age and parent education, and gender and ethnic breakdown) and screening measure results (i.e., IQ [WISC-IV], language [CASL], and diagnostic symptom [ADI-R] scores). Means and standard deviations were also calculated for the ABAS-3 composite and domain scores.

Initially, agreement and consistency between parent and teacher ratings for the GAC and three domain scores (Conceptual, Social, and Practical) were examined using Pearson $r$ correlations and ICCs. Then, in order to assess between-groups differences among mean parent and teacher ratings for the GAC and three domain scores, paired-samples $t$-tests were calculated, along with effect size estimates (Cohen’s $d$) and 95% confidence intervals. In order to examine the presence of systematic differences between parent and teacher ratings of adaptive behaviors across the range of scores, Bland-Altman plots (including regression analyses) were created for the GAC and three domain scores. In this type of plot, two types of data are plotted and their agreement is examined. For the current study, the value of the score difference between each parent-teacher rating pair was plotted along the vertical ($y$) axis and the value of the mean for each parent-teacher rating pair was plotted along the horizontal ($x$) axis for the GAC and three domain scores. Compared to examining Pearson $r$ values alone (which explain the relationship between the two informants’ ratings), plotting these two values (difference against mean) allowed for the examination of systematic differences between raters by looking at exact agreement and considering any relationship that might exist between the true values and the measurement error inherent in testing results (Bland & Altman, 1983). Lastly, scatterplots and correlations were examined to determine whether child age, parent education, WISC-IV (short
form) VCI/PRI/FSIQ scores, CASL (short form) Expressive and Receptive language scores, and/or ASD symptoms (ADI-R) scores moderated the parent-teacher discrepancies.
Results

Reliability Estimates of Parent and Teacher Ratings

Two correlation coefficients were calculated for the composite (GAC) and three adaptive domains to examine the relationship between parent and teacher ratings (Table 2). Intraclass correlation coefficients (ICCs) were calculated to determine the degree of absolute agreement between parents and teachers. All ICC values were statistically significant at the .05 level and showed moderate agreement between parents and teachers for the GAC (0.54) and all three domains (with values of 0.41, 0.42, and 0.65 for Practical, Social, and Conceptual, respectively). Pearson $r$ correlations were calculated for the GAC and three adaptive domains to examine the linear relationship between parent and teacher ratings. All Pearson $r$ correlations were significant and of moderate magnitude (0.38 for the GAC, 0.30 for the Practical domain, and 0.48 for the Conceptual domain), with only one correlation coefficient falling below 0.30 (0.27 for the Social domain). Overall, these results showed that parents’ and teachers’ ratings move in the same direction and have moderate agreement when characterizing the adaptive behaviors of children with HFASD. Based on these results, Hypothesis 1 was supported.

Cross-Informant Comparisons

Cross-informant comparisons were conducted to compare parent and teacher means on the GAC and the three adaptive domains (Table 3). Results indicated significant differences on the GAC, $t(102) = -2.19, p = .031, d = .24$ and on the Practical domain, $t(102) = -4.67, p < .001, d = .55$. For both the GAC and the Practical domain, the mean score for teachers exceeded the mean score for parents. No significant differences were found for the Social domain, $t(102) = - .54, p = .588, d = .07$ or the Conceptual domain, $t(102) = 1.47, p = .144, d = -.15$. These results indicated that parents and teachers differed from one another when rating some, but not all,
aspects of adaptive behavior for children with HFASD. Hypothesis 2 was partially supported, with teacher ratings significantly higher than parents on two of the four scales (GAC and Practical).

**Examination of Parent-Teacher Agreement Across the Range of Scores**

Bland-Altman plots were created to examine whether there were any systematic differences between parent and teacher ratings across the range of scores. For each, the vertical (y) axis is the difference between the parent and teacher ratings and the horizontal (x) axis is the mean of the parent-teacher pairs of ratings. The solid line represents the mean difference score, with the 95% confidence interval for the difference represented by the dotted lines above and below the mean score line. A positive difference score represents a parent-teacher pair where the parent’s rating is higher than the teacher’s rating.

For the GAC (Figure 1), the mean parent-teacher difference was -2.50 (SD = 11.54), with the largest differences being +28 and -35. The GAC score parent-teacher means averaged 81.96 (SD = 8.56). Regression analysis was conducted to examine the possibility of systematic trends across the range of scores by regressing the mean onto the difference score (as recommended by Bland & Altman, 1986). No significant relationship between the difference scores and means was shown (B = .131, t = .978, p = .330).

For the Practical domain (Figure 2), the mean parent-teacher difference was -6.26 (SD = 13.62), with the largest differences being +21 and -44. The Practical domain score parent-teacher means averaged 85.47 (SD = 9.22). Results of the regression analysis showed no significant relationship between the difference scores and means for the Practical domain (B = .139, t = .951, p = .344).
For the Social domain (Figure 3), the mean parent-teacher difference was -.67 (SD = 12.50), with the largest differences being +41 and -42. The Social domain score parent-teacher means averaged 80.62 (SD = 8.18). The results of the regression analysis showed no significant relationship between the difference scores and means for the Social domain (B = .210, t = 1.397, p = .165).

For the Conceptual domain (Figure 4), the mean parent-teacher difference was 1.58 (SD = 10.90), with the largest differences being +33 and -21. The Conceptual domain score parent-teacher means averaged 82.97 (SD = 9.18). Results of the regression analysis showed no significant relationship between the difference scores and means for the Conceptual domain (B = -.013, t = -.107, p = .915). Overall, no significant and systematic differences were found for the GAC or the three adaptive domains (Practical, Social, or Conceptual). Based on these results, Hypothesis 3 was not supported.

**Exploratory Moderator Analyses**

Several variables were analyzed for their possible association with parent-teacher rating differences for the GAC and three adaptive domains (Practical, Social, and Conceptual). Correlations and scatterplots were examined in order to determine the variables’ relationships with the parent-teacher difference values. The variables included were age, parent education, IQ (WISC-IV short form FSIQ, VCI, and PRI), expressive and receptive language abilities (CASL), and ASD symptoms (ADI-R). As seen in Table 4, there were no significant correlations between any of the potential moderating variables and any of the parent-teacher difference scores on the adaptive behavior scales. Additionally, scatterplots did not indicate any nonlinear relationships for any of the variables nor nonnormal distributions or outliers that might impact the correlations. While gender and ethnicity data were collected, their role as moderators could not
be examined due to the skewed sample of the current study (i.e., predominantly Caucasian and male). Overall, results revealed that none of the included variables moderated the mean differences between parents’ and teachers’ ratings of adaptive behavior.
Discussion

Given the significant impairment in functioning in individuals with HFASD, there is a need for ongoing studies of adaptive skills/behaviors in this population. Studies have repeatedly found that individuals with HFASD display adaptive skill deficits across many areas (i.e., communication, socialization, daily living skills, etc.; Lopata et al., 2012; McDonald et al., 2015; Volker et al., 2010). Studies have also shown that individuals with HFASD exhibit significantly lower adaptive skills relative to their IQ. This indicates that children with HFASD are not able to translate their cognitive strengths into functional skill performance (e.g., Kenworthy et al., 2010; Lopata et al., 2012; Perry et al., 2012; Saulnier & Klin, 2007). When assessing adaptive behaviors and skills, it is imperative to consider the source of the information (informant) as behaviors may be context-specific and/or not generalizable across settings, as is often the case with children with ASD (Harrison & Oakland, 2013; Klin et al., 2005; Volkmar et al., 2014). While the collection of data from multiple raters is encouraged because of this, discrepancies may arise (De Los Reyes, 2011; McCrimmon & Yule, 2017). In ASD samples, informant discrepancies have been documented and the correlations between raters have tended to be of low-to-moderate magnitude (Stratis & Lecavalier, 2015). Recently, informant discrepancies in HFASD samples have been noted between parent and teacher ratings of ASD-related symptoms (Donnelly et al., 2017; Lopata et al., 2016), as well as between parent and teacher ratings of adaptive behaviors using a broad clinical measure (McDonald et al., 2016). The current study aimed to expand this literature by examining informant discrepancies between parent and teacher ratings of adaptive behaviors in children with HFASD using a comprehensive and in-depth measure of adaptive behavior (ABAS-3).
Previous studies have reported a low-to-moderate level of agreement between teachers and parents when rating the behaviors and symptoms of children with ASD. For example, Stratis and Lecavalier (2015) found a mean level of agreement of $r = 0.36$ among raters across various types of behaviors, with agreement between parents and teachers ranging from $r = 0.21$ (internalizing behaviors) to $r = 0.41$ (externalizing behaviors). In studies with functionally-homogeneous samples of children with HFASD, parent-teacher agreement was similar when rating ASD symptoms (total score ICC = 0.36 and Pearson $r = 0.24$; Donnelly et al., 2017) and ASD-related impairments (ICC = 0.30 and Pearson $r = 0.22$; Lopata et al., 2016). A summary of the level of agreement between parents’ and teachers’ ratings in selected informant discrepancy literature and how the current study’s results compare is provided in Table 5.

As noted, this study was conducted to examine informant discrepancies between parent and teacher ratings of adaptive behaviors in children with HFASD using a comprehensive and in-depth measure of adaptive behavior (ABAS-3). Mean score comparisons, associations, and potential moderators of parent-teacher differences were examined. Given the similarity of the current study to that of McDonald et al. (2016; age range, functionally-homogeneous sample with HFASD, use of parent and teacher ratings, similar data analysis plan, etc.), attention was directed toward examining the comparability of findings across these studies.

Descriptively, both types of raters reported substantial deficits in the adaptive skills of the children with HFASD in the sample, with adaptive social skills being most severely impaired (ABAS-3 parent Social = 80.28 and teacher Social = 80.95). These results are consistent with prior studies that have reported significant adaptive deficits in children with HFASD (e.g., Kenworthy et al., 2010; Lopata et al., 2012). Although these results indicate that both informant groups perceive adaptive behavior deficits and functional impairment across settings in children
with HFASD, there was some variability in the differences by informant group. For the overall adaptive behavior (GAC) and practical skills (Practical) scores, teachers rated the children’s adaptive skills significantly higher than parents, with much of the difference in the overall scores owing to the Practical domain score ($d = .55$). Neither the Social domain nor the Conceptual domain significantly differed between parent and teacher mean scores and the effect sizes were negligible. The finding of significantly higher teacher ratings than parent ratings in overall adaptive and daily practical skills is consistent with McDonald et al. (2016). In their study, the largest discrepancy between informant groups was for activities of daily living which most closely parallels the practical skills domain of the ABAS-3. Consistent with the current study, McDonald et al. (2016) also found no significant difference between parent and teacher ratings of adaptive social skills. The lack of discrepancies between parent and teacher mean ratings in the areas of adaptive social and conceptual skills may be attributed to the easily observable social, pragmatic communication, and academic impairments of children with HFASD across settings. In contrast, the practical skills domain involves a broad array of daily living tasks that may differ in terms of their opportunities for the students to demonstrate these skills in different settings. For example, children with HFASD may have more demands and opportunities to demonstrate self-care skills (i.e., dressing, bathing, hygiene) at home compared to school.

Although some discrepancies were observed when comparing mean score ratings, the current study yielded moderate and significant positive associations between parent and teacher ratings. Specifically, moderate positive associations indicated that higher ratings of adaptive behaviors by parent informants were associated with higher ratings by teacher informants. This pattern was observed for all the scales including the overall adaptive score and the practical skills domain (Practical) upon which significant differences in mean scores were found. McDonald et
al. (2016) also reported positive associations between informants’ ratings for children with HFASD, however the current study yielded somewhat higher correlations between the informant groups; this pattern was evident in the overall adaptive scores (i.e., ABAS-3 GAC ICC = 0.54 and $r = 0.38$ compared to BASC-2 Adaptive Skills Composite ICC = 0.30 and $r = 0.19$) and among the domain scores from the ABAS-3 and their associated BASC-2 scales. In a related study, Dickson, Suhrheinrich, Rieth, and Stahmer (2018) found moderate-to-high correlations between parent and teacher ratings of adaptive behaviors for a functionally-heterogeneous sample of children with ASD on a comprehensive measure of adaptive behavior (VABS-II; $r$s from 0.44 to 0.66). Taken together, the pattern of scores across these studies suggests that the measure used to assess the adaptive skills of children with HFASD/ASD may play an important role in the association of rater scores. For example, stronger associations were found for both studies that used comprehensive adaptive behavior measures (ABAS-3 and VABS-II) compared to the study that used a broad measure of clinical and adaptive skills (BASC-2). This was evident despite the fact that the current study and McDonald et al. (2016) included only children with HFASD and the study by Dickson et al. (2018) utilized a functionally-heterogeneous sample with ASD. It is possible that the larger number of items and more detailed assessment of adaptive skills on the comprehensive adaptive behavior measures allows for more consistency between informants.

The current study also assessed whether informant discrepancies differed across the range of scores using Bland-Altman plots and regression analyses. No significant or systematic differences were found for the overall adaptive behavior score or the three adaptive domain scores. This finding lends further support for the consistency of the associations between parent and teacher raters across the range of scores. While collection of additional information to
supplement rating scale results is always useful (Achenbach, 2011; De Los Reyes, 2011), the lack of systematic differences across the range of scores supports the overall pattern of findings indicating that, on the whole, parents and teachers largely agree with one another when rating the adaptive behaviors of children with HFASD and in their patterns of ratings on the ABAS-3. Interestingly, the lack of systematic differences in informant ratings across the range of scores in this study differed from McDonald et al. (2016) who found that as the mean of the parent-teacher ratings increased on the BASC-2 overall adaptive skills score, the disparity between the two ratings also increased. The reason(s) for the inconsistency is unknown but may be a function of differences in the comprehensiveness of the two adaptive behavior measures.

Lastly, this study examined whether child or parent characteristics moderated differences between parent and teacher ratings. Specifically, correlations were examined between child age, cognitive and language levels, and ASD symptoms, and parent education level, and differences between parent and teacher ratings on the overall adaptive skills score and the three adaptive domain scores. None of the tested variables moderated differences between parent and teacher adaptive behavior ratings. These results are consistent with McDonald et al. (2016) who also found that child age, cognitive level and language level, and parent education did not moderate parent-teacher differences in adaptive behavior ratings using the BASC-2. A meta-analysis of informant discrepancies by Stratis and Lecavalier (2015) suggested that factors such as child age and/or IQ may moderate differences when assessing emotional-behavioral and social problems in youth with ASD, however that study was not examining adaptive behaviors specifically and it included studies with samples of functionally-heterogeneous youth with ASD. Although ongoing studies are needed of potential moderators of informant discrepancies, the consistency in findings regarding adaptive behavior ratings for children with HFASD suggests that such
characteristics may be less influential than when assessing other areas of functioning (emotional-behavioral and social) for youth with ASD.

As previously noted, the assessment of adaptive behaviors is an important component of comprehensive evaluations for children with HFASD and results of the current study have potential clinical implications. These implications primarily involve measure selection and the likelihood of informant discrepancies between parent and teacher ratings of adaptive skills. Findings from the current study suggest that clinicians should select a comprehensive adaptive behavior measure when gathering information from multiple raters as these appear to yield a more detailed assessment and higher levels of agreement than rating scales that focus on broader clinical symptoms and adaptive skills. Although previous literature has suggested that discrepancies are likely between parents and teachers when rating behavior problems and symptoms, the current study suggests that clinicians may anticipate more consistency and agreement in ratings when using a comprehensive measure of adaptive behavior. If differences do arise, the current study suggests that the greatest likelihood would be in the area of practical/daily living skills as the demands for these skills may differ substantially across settings (home versus school). Should discrepancies in ratings occur, clinicians should be prepared to collect additional information to better understand the differences (e.g., clarifying test items for raters, examining the opportunities and expectations for different skills across settings, etc.). As noted by Mayes and Lockridge (2018), future work should focus on the best and “most valid way to combine parent and teacher information,” when conducting comprehensive assessments with children with ASD (p. 1838).

**Strengths and Limitations**
The current study had a number of strengths including a rigorous screening procedure for inclusion, a well-characterized and homogeneous sample of children with HFASD, examination of discrepancies in a narrowly-defined age range, use of a recently updated and respected adaptive behavior measure, and use of standard scores to aid in the interpretability of findings (De Los Reyes & Kazdin, 2004). Despite these strengths, the study had several limitations. One limitation involved the characteristics of the sample, which was predominantly male, Caucasian, and included only high-functioning individuals with ASD between the ages of 6 and 12 years. These factors limit the generalizability of the study results to others, such as lower-functioning individuals with ASD, others with HFASD/ASD outside this age range, and/or more racially/ethnically diverse individuals with ASD. Another limitation involved the examination of only parent-teacher discrepancies. The inclusion and examination of other rater pairs, such as parent-parent, parent-child, teacher-teacher, and teacher-child could illuminate the extent to which other informant discrepancies might be present in ratings of adaptive behaviors for these children. Lastly, the current study only assessed informant discrepancies using the ABAS-3. Future studies might consider examining informant discrepancies using multiple adaptive behavior measures for the same sample with HFASD/ASD.

Summary

The present study aimed to expand upon the available literature by examining parent-teacher informant discrepancies using a comprehensive measure of adaptive behavior in a well-characterized sample of youth with HFASD. Overall, parents and teacher tended to agree with one another when rating the adaptive behaviors of children with HFASD. No moderating effects of child or parent variables (i.e., child age, IQ, language abilities, ASD symptoms, or parent education) were found. When placed in the context of the broader literature, it appears that this
agreement among raters may be due to the comprehensive nature of the measure used (i.e., ABAS-3 used in the current study). While clinicians should be prepared to gather more information about setting opportunities and demands should discrepancies arise between raters, it seems likely (based on the current results) that parents and teachers will generally be in agreement with one another when rating the adaptive behaviors of children with HFASD using a comprehensive measure of adaptive behavior.
References


Table 1

Demographic Characteristics of Child Sample (N=103).

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<td>Caucasian</td>
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<td>96.1</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>3</td>
<td>2.9</td>
</tr>
<tr>
<td>African American</td>
<td>1</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Note. WISC-IV = Wechsler Intelligence Scale for Children-4th Edition; VCI = Verbal Comprehension Index; PRI = Perceptual Reasoning Index; CASL = Comprehensive Assessment of Spoken Language; ADI-R = Autism Diagnostic Interview-Revised.
Table 2

*Correlations Between Parent and Teacher ABAS-3 Ratings.*

<table>
<thead>
<tr>
<th>Composite/Domain</th>
<th>Intraclass Correlations</th>
<th>Pearson r Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>p</td>
</tr>
<tr>
<td>GAC</td>
<td>.54</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Practical</td>
<td>.41</td>
<td>.001</td>
</tr>
<tr>
<td>Social</td>
<td>.42</td>
<td>.004</td>
</tr>
<tr>
<td>Conceptual</td>
<td>.65</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*Note.* All calculations based on parent and teacher ratings of *N* = 103 children with high-functioning autism spectrum disorder (HFASD). Intraclass correlation coefficients calculated in SPSS 24 as two-way mixed effects model using absolute agreement definition of reliability (Shrout & Fleiss, 1979).
Table 3

*Parent and Teacher ABAS-3 Scores, Tests of Significance, Effect Sizes, and Confidence Intervals.*

<table>
<thead>
<tr>
<th>Composite/Domain</th>
<th>Parent</th>
<th>Teacher</th>
<th>t(102)</th>
<th>p</th>
<th>Cohen’s d [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>GAC</td>
<td>80.71</td>
<td>10.78</td>
<td>83.20</td>
<td>9.85</td>
<td>-2.19</td>
</tr>
<tr>
<td>Practical</td>
<td>82.34</td>
<td>11.97</td>
<td>88.60</td>
<td>10.94</td>
<td>-4.67</td>
</tr>
<tr>
<td>Social</td>
<td>80.28</td>
<td>10.96</td>
<td>80.95</td>
<td>9.59</td>
<td>-.54</td>
</tr>
<tr>
<td>Conceptual</td>
<td>83.76</td>
<td>10.63</td>
<td>82.17</td>
<td>10.73</td>
<td>1.47</td>
</tr>
</tbody>
</table>

*Note.* GAC and Domain scores have a $M = 100$, $SD = 15$. Paired-samples $t$-tests were calculated as two-tailed tests. All comparisons based on parent and teacher ratings of $N = 103$ children with high-functioning autism spectrum disorder (HFASD). Standards for Cohen’s $d$: small = 0.20, medium = 0.50, large = 0.80 (Cohen, 1988).
Table 4

*Correlations Between Parent-Teacher Mean Differences and Moderating Variables.*

<table>
<thead>
<tr>
<th>Composite/Domain</th>
<th>Age</th>
<th>Parent Education</th>
<th>WISC-IV</th>
<th>CASL</th>
<th>ADI-R</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>FSIQ</td>
<td>VCI</td>
<td>PRI</td>
</tr>
<tr>
<td>GAC</td>
<td>.00</td>
<td>.05</td>
<td>.05</td>
<td>.10</td>
<td>-.02</td>
</tr>
<tr>
<td>Practical</td>
<td>.01</td>
<td>.05</td>
<td>.07</td>
<td>.12</td>
<td>-.01</td>
</tr>
<tr>
<td>Social</td>
<td>-.06</td>
<td>.07</td>
<td>.10</td>
<td>.10</td>
<td>.06</td>
</tr>
<tr>
<td>Conceptual</td>
<td>-.03</td>
<td>.03</td>
<td>-.05</td>
<td>.02</td>
<td>-.10</td>
</tr>
</tbody>
</table>

*Note.* GAC = Global Adaptive Composite; WISC-IV = Wechsler Intelligence Scale for Children-4th Edition; CASL = Comprehensive Assessment of Spoken Language; ADI-R = Autism Diagnostic Interview-Revised; FSIQ = Full Scale IQ (short form); VCI = Verbal Comprehension Index; PRI = Perceptual Reasoning Index; SI = Impairment in Social Interaction; CI = Impairment in Communication; RRB = Restricted Repetitive Behavior.
Table 5

*Overview of Selected Informant Discrepancy Literature.*

<table>
<thead>
<tr>
<th>Study</th>
<th>Type of Sample</th>
<th>Behaviors Measured</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achenbach, McConaughy, &amp; Howell, 1987</td>
<td>Typically-developing</td>
<td>Behavioral &amp; emotional problems</td>
<td>Low-to-moderate (Mean r = 0.28)</td>
</tr>
<tr>
<td>Renk &amp; Phares, 2004</td>
<td>Typically-developing</td>
<td>Social competence</td>
<td>Low-to-moderate (Mean r = 0.43)</td>
</tr>
<tr>
<td>Stratis &amp; Lecavalier, 2015</td>
<td>Heterogeneous ASD</td>
<td>Externalizing, Internalizing &amp; Social behaviors</td>
<td>Low-to-moderate (e.g., Social Skills r = 0.31)</td>
</tr>
<tr>
<td>Donnelly et al., 2017</td>
<td>Homogeneous HFASD</td>
<td>ASD symptoms</td>
<td>Low-to-moderate (rs range: 0.13 - 0.33; ICCs range: 0.22 - 0.47)</td>
</tr>
<tr>
<td>Lopata et al., 2016</td>
<td>Homogeneous HFASD</td>
<td>ASD-related impairments</td>
<td>Low-to-moderate (r = 0.22; ICC = 0.30)</td>
</tr>
<tr>
<td>McDonald et al., 2016</td>
<td>Homogeneous HFASD</td>
<td>Overall behavioral functioning, including adaptive skills</td>
<td>Low-to-moderate (e.g., Adaptive Skills r = 0.19; ICC = 0.30)</td>
</tr>
<tr>
<td>The Current Study</td>
<td>Homogeneous HFASD</td>
<td>Adaptive behavior skills</td>
<td>Moderate (rs range: 0.27 - 0.48; ICCs range: 0.41 - 0.65)</td>
</tr>
</tbody>
</table>
Figure 1

Bland-Altman Plot of Parent-Teacher Differences on the GAC.

R² Linear = 0.009
Figure 2

*Bland-Altman Plot of Parent-Teacher Differences on the Practical Domain.*
Figure 3

Bland-Altman Plot of Parent-Teacher Differences on the Social Domain.
Figure 4

_Bland-Altman Plot of Parent-Teacher Differences on the Conceptual Domain._