Examining self-perceptions of competence in children with Attention-Deficit/Hyperactivity Disorder

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Abstract

Children with Attention Deficit/Hyperactivity Disorder (ADHD) often overestimate their competence related to their social and behavioral abilities when compared to ratings of their actual competence as assessed by adults (Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007). The inflation of child self-report of competence is known as Positive Illusory Bias (PIB). PIB is larger in children with ADHD than in typically-developing (TD) children. Previous research has only calculated PIB using rankings of child competence using explicit measures. Large explicit PIB has been found to be negatively correlated with depression (Hoza et al., 2010), but positively correlated with aggression (Hoza, et al., 2004) in children with and without ADHD. However, to the researchers' knowledge, PIB has not been assessed using implicit measures, making one important goal of the current study to evaluate whether the perceptions of competence that reside outside of a child's conscious control or awareness, or implicitly, also suggest the existence of PIB related to social and behavioral competence in children with ADHD. Additionally, the current study examined whether implicit PIB incrementally predicted symptoms of psychopathology after controlling for explicit PIB in children with and without ADHD.

Children, parents, and teachers reported on the child's social competence (social PIB) and behavioral competence (behavioral PIB) using explicit measures. Children evaluated their social and behavioral competencies compared to peers on an implicit measure. The mean score of parent and teacher reports of a child's competence was used as the adult indicator of a child's actual ability. PIB was conceptualized as the discrepancy between a child's self-report of ability and the adult ranking of a child's actual ability. Results suggested that children with ADHD have larger explicit PIB and also larger implicit PIB relative to TD children. Moreover, after statistical control of child ADHD diagnostic status, social PIB assessed using an implicit measure (implicit

social PIB) was positively associated with child-rated symptoms of anxiety, but social PIB assessed using an explicit measure (explicit social PIB) was not associated with child-rated symptoms of anxiety. Also, explicit social PIB (but not implicit social PIB) was negatively associated with child-rated symptoms of depression. In turn, explicit behavioral PIB was negatively associated with child-rated symptoms of depression, but implicit behavioral PIB was positively associated with depression. The statistical interaction of implicit behavioral PIB and explicit behavioral PIB significantly predicted adult-rated externalizing symptoms, such that explicit PIB and externalizing symptoms were positively associated in children with large implicit PIB, but no relation between externalizing symptoms and explicit behavioral PIB was found for children with small implicit PIB.

Overall, the current findings advance the PIB literature through examining the existence of inflated self-perceptions of competence on a controllable, explicit measure and an uncontrollable, implicit measure within children with ADHD and TD children. Moreover, the results also examine the relation between explicit PIB and implicit PIB predicting symptoms of psychopathology and suggested that both measures of competence are associated with symptoms of psychopathology in children with and without ADHD.

Examining self-perceptions of competence in children with Attention-Deficit/Hyperactivity Disorder

Attention-Deficit/Hyperactivity Disorder (ADHD) is a behavioral disorder characterized by developmentally inappropriate inattentive and/or hyperactive/impulsive symptoms (American Psychological Association, 2000). It is well-established that children with ADHD often experience social difficulties with peers and adults (Gentschel & McLaughlin, 2000), and are viewed by their teachers and parents as having more behavioral problems than are children without ADHD (Hoza et al., 2004). Owing to their deficits in social skills and difficulty engaging in age appropriate behaviors, children with ADHD are often rejected by their typically-developing (TD) peers (Pelham & Bender, 1982; Ronk, Hund, & Landau, 2011). Despite pronounced deficits in their social and behavioral abilities, when children with ADHD rate their popularity and ability to behave appropriately on explicit self-report measures of competence, they rate their competence as being similar to the ability of their peers. The positive discrepancy between a child's explicit self-report of competence and objective measures of actual ability is known as the Positive Illusory Bias (PIB).

The purpose of the current study is to understand the inflated and inaccurate self-competence ratings in children with ADHD and the relationship of PIB to symptoms of psychopathology. A gap currently exists in the PIB literature, such that it is unclear whether the inflated self-perceptions of competence found in children with ADHD are automatic or strategic. Thus, through comparing a child's implicit and explicit self-perceptions of competence, potential explanations for PIB were examined. Additionally, the incremental contribution of implicit and explicit PIB to symptoms of psychopathology in children with and without ADHD was explored. Implicit self-competence refers to a child's automatic or uncontrollable associations about

his/her perceived abilities; while explicit self-competence is considered a more deliberate self-report of perceived competence that is made within the child's control.

Positive Illusory Bias

PIB has been documented among children with ADHD in multiple areas of competence, including academic, athletic, social, and behavioral abilities (Owens, et al., 2007). In studies examining inflated self-perceptions, social competence usually refers to a child's perception of his or her general competence in being socially accepted and skilled in interpersonal interaction. Behavioral competence usually refers to a child's perceptions of his or her ability to engage in age-appropriate behavioral conduct. To date, there has not been a meta-analysis examining effect sizes of PIB in children with ADHD. However, Hoza and colleagues (2004) used a sample of 744 children with ADHD and TD children to calculate the effect sizes of PIB in children (when teachers were used as the informants of ability). The calculated effect sizes of children with ADHD compared to TD youth were d = .63 in the social domain and d = .61 in the behavioral domain.

Children's self-perceptions of competence are often assessed via self-report, by asking children to rate the way their performance compares to "other children my age" on a questionnaire (Harter, 1985). Interestingly, on average, children with and without ADHD do not significantly differ in their self-reports of competence, with both groups rating themselves as being similarly competent as their peers (Owens et al., 2007). However, when children's self-reports are compared to indicators of their actual competence, the children with ADHD, but not TD children, tend to have substantially more positive explicit self-reports than what is found on the measures of their actual competence.

Notably, over-inflated self-perceptions of competence among children with ADHD have been consistently found regardless of the criterion measure used to assess the child's actual competence. Hoza and colleagues (2004) used a large sample (N = 744) of clinically diagnosed children with ADHD and age- and gender-matched TD children between the ages of 7 and 9.9 years to determine differences in PIB based on the rater of child ability (mother, father, teacher). Results indicated that children with ADHD displayed similarly high levels of PIB in multiple areas of competence regardless of which informant was used. Moreover, PIB related to the social and behavioral domain was found within both genders, but the interaction of ADHD and gender was not significant (Hoza et al., 2004).

It is important to note that because the calculation of PIB often relies on reports of child ability made by others (e.g., peers, teachers, and parents) it is possible that the rater could possess a bias that might influence his or her perception of the child's ability. However, children with ADHD have also been found to display large PIB in studies where children were asked to rate their competence on a task that was related to social ability and that rating was compared to their actual task performance (Diener & Milich, 1997; Hoza, Waschbusch, Pelham, Molina, & Milich, 2000). Thus, it is likely that PIB reflects inaccurate self-ratings of competence made by the child, as opposed to negatively biased assessments of a child's ability made by others.

Differences in ratings by informants have been found to exist based on the type of psychopathology examined (Achenbach, McConaughy, & Howell, 1987) and the race/ethnicity of the child (Lau et al., 2004). Some researchers have attempted to reduce rater bias by utilizing unbiased reports as measures of child ability, such as using a computerized task of social interactions to assess an adolescent's social competence (Ohan & Johnston, 2011). Another method of determining a child's ability could be by using ratings from multiple informants to

create a child ability score. As children with ADHD are suggested to have larger PIB than TD children regardless of the informant used (Hoza et al., 2004; Ohan & Johnston), creating a composite score of ability using subjective reports from multiple informants could provide a useful, convergent measure.

Self-Perceptions in Typically-Developing Children

Studies examining self-perceptions of competence in TD children have found that TD children also have slightly inflated self-reports of behavioral competence relative to indicators of their actual ability (Hoza et al., 2010). However, the magnitude of over-inflation (e.g. the size of PIB) is much smaller for TD children relative to children with ADHD. This may be because TD children are generally objectively determined to be more competent than their ADHD peers.

Research by Hoza and colleagues (2004) found that PIB related to social and behavioral competence in TD boys and girls ranged from 0.07 to 0.17 standard deviations above the mean, while PIB related to social and behavioral competence in children with ADHD ranged from 0.29 to 0.84 standard deviations above the mean when teachers were used as the raters of actual ability. Ohan and Johnston (2011) found that, depending on whether parent, teacher, or child task performance was used as the informant of child ability, PIB related to social competence in girls with ADHD ranged from 0.26 to 0.49 standard deviations above the mean, while PIB in TD girls ranged from -0.45 to -0.39 standard deviations below the mean. The small PIB found in some studies among TD children and TD adults is often referred to as the "better-than-average" effect (Taylor & Brown, 1988).

Taylor and Brown (1988) suggest that "better-than-average" self-reports are beneficial for TD individuals because of their association with psychological well-being. Specifically, a small amount of PIB is positively correlated with happiness and optimism among TD adults, as

well as popularity among TD children (Taylor & Brown). Milich and Okazaki (1991) found that small PIB in TD children was associated with greater persistence during a challenging task. However, as discussed in the "PIB and Psychopathology" section below, PIB does not appear to serve positive functions in children with ADHD and is associated with poorer performance in this population (see Owens et al., 2007).

Developmental Trajectory of PIB

The vast majority of studies of ADHD (including studies of PIB in ADHD) have involved elementary school-age children. Therefore, the developmental trajectory of PIB among children with ADHD into adolescence and adulthood is relatively unknown. In one study, Hoza and colleagues (2010) found that PIB related to social and behavioral abilities in youth with ADHD became more similar to TD youth during late adolescence. Specifically, PIB related to social competence remained large in late adolescents with ADHD and increased in TD late adolescents, so that both groups exhibited large PIB. In contrast, as children with ADHD aged, their PIB related to behavioral competence decreased and PIB in TD children remained low so that both groups had comparably low levels of PIB related to behavioral competence in late adolescence. Additionally, Friedman and colleagues (2003) found that self-reports given by adults with ADHD regarding their ability to engage and fit-in with different groups of people were lower, and therefore more accurate, than TD adults. Thus, the adults with ADHD had lower PIB related to social competence than would be expected based on the literature documenting PIB in children with ADHD.

However, additional research suggests that PIB continues to exist in areas of competence in which adults with ADHD experience significant deficits. With regard to their driving abilities, adults with ADHD have larger PIB related to the safety of their driving than TD adults when a

person's driving record and his or her performance on an experimentally-manipulated simulated driving game were used to determine the person's actual ability (Knouse, Bagwell, Barkley, & Murphy, 2005). College students with ADHD also exhibit larger PIB in their ability to gauge time (Prevatt, Proctor, Baker, Garrett, & Yelland, 2011) and their ability to accurately self-report their competence related to their work performance when compared to TD college students (Prevatt et al., 2012). Adults with a diagnosis of ADHD and high levels of hyperactivity tend to overestimate their positive parenting techniques on self-reports as compared to adults without an ADHD diagnosis (Lui, Johnston, Lee, & Lee-Flynn, 2013). Thus, the ability to accurately self-report performance and ability may remain impaired among adults with ADHD in multiple domains.

PIB and Psychopathology

Researchers wonder what purpose PIB serves in the ADHD population. Although slightly inflated self-perceptions are associated with greater coping strategies in TD adults (Taylor & Brown, 1988), greater popularity in TD children (Bohrnstedt, & Felson, 1983), and less aggression in TD girls (Ohan & Johnston, 2011), PIB in girls with ADHD is associated with being less socially well-adjusted (Ohan & Johnston). PIB is also associated with greater aggression in boys and girls with ADHD (Hoza et al., 2004). It appears that the magnitude of inflated self-perceptions is an important predictor of outcomes in children with ADHD and TD children. Slightly inflated self-perceptions may serve as a protective factor in children, but largely inflated self-perceptions appear to function more negatively and are mostly found in children with ADHD.

Moreover, variation exists in the presence of PIB in children with ADHD based on comorbidity with other psychopathology. For example, children with ADHD and comorbid

depression often have less inflated, more accurate, self-reports of competence in multiple domains than do children with ADHD without depression (Hoza et al., 2004; Hoza, Pelham, Dobbs, Owens, & Pillow. 2002). Additionally, depressive symptoms (not reaching clinical cut-offs) are negatively associated with PIB in children with ADHD and TD children (Hoza et al., 2010). In contrast, Oppositional Defiant Disorder (ODD) appears to have an additive effect on PIB in children with ADHD such that a comorbid ODD diagnosis is associated with larger PIB related to social skills (Ohan & Johnston, 2011). Conduct Disorder (CD) is also associated with greater PIB related to behavioral competence in children with ADHD when compared to children with ADHD without comorbid CD and TD children (Hoza et al., 2004). Similarly, symptoms of aggression are associated with larger PIB related to social acceptance and behavioral conduct in children with and without ADHD (Hoza et al., 2002). As it appears that comorbid pathologies may be associated with PIB in children above and beyond an ADHD diagnosis, exploring the relationship between PIB and symptoms of psychopathology is of interest.

Explanations for PIB

A few competing hypotheses attempt to explain the PIB phenomenon within the population with ADHD. Some hypotheses have not been supported, such as the ignorance of incompetence hypothesis, which suggests that children with ADHD are unable to accurately rate their competences because they are truly unaware of what appropriate social and behavior competence means (Owens et al., 2007). The ignorance of incompetence hypothesis has been refuted based on research suggesting that children with ADHD are able to accurately rate the social and behavioral competences of same-aged peers (Evangelista, Owens, Golden, & Pelham, 2008), despite not being able to accurately self-rate their competence, suggesting that children with ADHD have an awareness of social and behavioral competencies, but are unable to report

their own competence accurately. Another hypothesis that has received modest support is the cognitive immaturity hypothesis which states that children with ADHD have cognitive deficits, owing to their developmental delays, which prevent them from accurately assessing their own competence (Milich, 1994). The cognitive immaturity hypothesis suggests that inflated self-perceptions may not be easily controlled by children with ADHD.

The hypothesis that has received the most empirical support for explaining PIB is the self-protective hypothesis. The self-protective hypothesis states that inflated self-ratings of competence reflect the desire of children with ADHD to protect their ego through hiding their social and behavioral deficits from others. Moreover, this hypothesis suggests that when children with ADHD do not believe they need to hide their deficits and protect their ego, they are able to self-report more accurate competence (Diener & Milich, 1997). Evidence for the self-protective hypothesis comes from studies examining the ways in which self-ratings of competence in children vary based on feedback received. Specifically, when children with ADHD receive praise or positive feedback following completion of a task, they deflate their self-report of competence, making their new self-reports closer to the reports given by adults and peers than the initial self-reports of competence (Diener & Milich; Ohan & Johnston, 2002). This pattern of results suggests that children with ADHD may report inflated self-ratings of competence to appear more capable to others; but, when praise is given and the threat of not appearing competent is reduced, they are able to report their competence more accurately. Importantly, the negative association between praise and PIB in children with ADHD has been supported regardless of whether positive feedback was delivered by a research assistant with whom the child was previously unacquainted (Diener & Milich; Ohan & Johnston), or by similar aged peers (Hoza et al., 2000). Although no study to date has given experimentally manipulated criticism or negative feedback

to children with ADHD, the self-protective hypothesis holds that children with ADHD would inflate their ratings of self-competence following negative feedback. Indeed, Emeh and Mikami (in press) found that critical feedback given by parents in a naturalistic observation was associated with larger PIB related to social competence in children with ADHD, but not in TD children.

The self-protective hypothesis suggests that large PIB is not found in TD children because, in contrast to children with ADHD, TD children often have adequate social skills and behave appropriately in most situations and therefore are not as defensive about their abilities (Ohan & Johnston, 2002). In support of the self-protective hypothesis, when TD children receive praise or positive feedback regarding their social and behavioral performance on a task, they have the opposite response of children with ADHD and inflate their ratings of self-competence relative to TD children who receive neutral feedback about their task performance (Diener & Milich, 1997; Ohan & Johnston). Thus, whereas positive feedback appears to be associated with lower PIB in children with ADHD, it may be associated with greater PIB in TD children. To date, the relationship between experimentally manipulated negative feedback and PIB in children without ADHD has not been explored. Results suggest that environments that manipulate feedback given to children with ADHD and TD children could potentially influence their PIB.

Self-presentation

The self-protective hypothesis suggests that children with ADHD might strategically present their self-ratings of competence inaccurately to protect their egos (Owens et al., 2007). Thus, there is a possibility that explicit self-perceptions of children with ADHD might be influenced by children's desire to report socially acceptable competence to others. To date, *all* research examining PIB in children with ADHD has utilized only explicit self-reports of

competence. However, respondents typically have more control over their self-reports of competence when using explicit measures. In contrast, implicit measures assess relatively more uncontrollable associations, so it is harder for respondents to deliberately present themselves in a more positive light. Thus, in line with the self-protective hypothesis, it would be expected that explicit self-perceptions might be more vulnerable to social desirability, but implicit self-perceptions may not be as vulnerable.

Evidence for socially desirable presentations has been examined in boys with ADHD (Ohan & Johnston, 2002). Specifically, when boys with ADHD were asked to rate whether an adult with whom the boys were previously unacquainted would like them, their PIB was positively associated with their scores on a scale of social desirability. However, there was no relationship between PIB related to liking and social desirability scores in TD children. This pattern of results lends support to the idea that PIB might result from the desire to appear competent to others.

The relationship between PIB and social desirability has also been examined in girls with and without ADHD. Ohan and Johnston (2011) found that PIB related to social skills was positively associated with social desirability scores in girls with ADHD. The correlation existed regardless of whether the girl's parent, teacher, or her performance on a social skills task was used as the criterion for actual social skills. No relationship between PIB and social desirability was found in TD girls. Thus, it is possible that the relationship between social desirability and inflated self-reports of social ability is unique to the population with ADHD and exists across genders.

Taken together, this research suggests that children with ADHD may feel the need to present themselves as more competent than they are in social and behavioral abilities, and this

may contribute, in part, to their inflated ratings of self-competence on explicit self-report measures. The extent to which children with ADHD truly believe themselves to be as competent as they explicitly report remains unknown. Importantly, Nosek (2005) suggests that implicit measures might be a way to assess associations between the self and others while minimizing the interference of self-presentation desires. Through comparing children's automatic, implicit self-perceptions of competence relative to their explicit reports of competence, it could be possible to further evaluate whether the self-protective hypothesis, which suggests that children with ADHD desire to present socially acceptable self-ratings of competence, could offer a better understanding of PIB.

Implicit Associations in Children

The Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) measures the strength of a person's relatively uncontrollable associations between a target concept and an evaluative concept. The IAT is based on the premise that people will connect two concepts faster when the concepts are compatible with their automatic associations in memory. Participants typically respond more slowly when pairing target and evaluative concepts that are incompatible with their automatic associations in memory. Therefore, the difference between reaction time for participants sorting items into pairings that are relatively more compatible versus pairings that are relatively less compatible is of interest, and a large difference in reaction time would indicate relatively stronger automatic associations between one pairing of concepts versus the other pairing.

Research using the IAT to measure self-esteem suggests that adults tend to have implicit self-esteem that is positively biased, such that the association between the self and positive concepts (and others with negative concepts) is stronger than the association between the self and

negative concepts (and others with positive concepts; Bosson, Swann, & Pennebaker, 2000). This pattern is comparable to the trend of positively inflated self-esteem found using explicit measures (Taylor & Brown, 1988).

The IAT was created to evaluate implicit associations in adults, but has been validated for use in children as young as age 3 (e.g., Thomas, Smith, & Ball, 2007). Baron and Banaji (2006) compared implicit and explicit reports of racial bias in groups of White TD children ages 6 and 10, and in White TD adults. Importantly, to create a valid measure for child participants, the researchers modified the standard IAT by reducing the total time it took to complete the task, using audio recordings to help child participants respond to the evaluative concepts, and having research assistants read the instructions to ensure participant understanding. The adults participating in the Baron and Banaji study were also tested using the modified version of the IAT.

Interestingly, on the measure of implicit racial bias, all age groups exhibited comparable levels of pro-White/anti-Black bias (Baron & Banaji, 2006). However, participant results differed on the explicit measure of racial bias, such that the 6 year old and 10 year old groups exhibited pro-White explicit bias, but adults did not show a racial bias on the explicit, self-report measure. Variable age differences in level of bias on the implicit versus explicit reports of the socially-sensitive topic of racial bias suggests that social desirability may have differentially influenced the adults' report of explicit bias, relative to the children's report (though social desirability is not the only reason the different bias levels could have occurred). Indeed, a negative relationship between age and explicit racial bias has been observed in White children (Rutland, Cameron, Milne, & McGeorge, 2005). To the extent that the IAT is less vulnerable to the effect of social desirability, the IAT could be a useful means of measuring a child with

ADHD's beliefs about his or her competence in areas where he or she would normally be tempted to present socially desirable ratings of ability, such as in the social or behavioral competence domains, making it a useful measure for the current study.

In an effort to extend use of the IAT with younger children, Thomas and colleagues (2007) modified the IAT to investigate automatic associations of female body shapes among children ages 3 to 7 years. The primary modification of the standard IAT that researchers made was including images (instead of words) to represent both the target and evaluative stimuli, which allowed them to test a very young population. The majority of the participants completed the IAT with acceptable accuracy (75% of trials answered correctly) and no significant age differences in implicit associations were found. Younger children, however, had longer response times than older children. Results support the validity of pictorial versions of the IAT in addition to modifications of the tasks to suit target populations. It could be inferred that, with age-appropriate modifications, it might be possible to test the IAT in children who have difficulty reading.

IAT and Psychopathology

The IAT has also been used to measure implicit associations in participants diagnosed with mental illnesses, such as alcohol use (Pieters, van der Vorst, Engels, & Wiers, 2010; Thush & Wiers, 2007), mixed anxiety disorders (Glashouwer, de Jong, & Pennix, 2011), panic disorder (Teachman, Smith-Janik, & Saporito, 2007), and suicidal ideation and attempt (Glashouwer et al., 2010), among numerous others. To the investigators' knowledge, the IAT has not been used in ADHD populations, though children with ADHD have been included in studies of implicit learning (Vloet et al., 2010), suggesting that it is possible to utilize implicit theories and measures in persons with ADHD.

Explicit versus implicit measurements. A few studies have examined the relationship between implicit and explicit self-esteem in individuals with psychopathology symptoms. While most studies use the IAT to assess implicit self-esteem (Roefs et al., 2011), studies measuring explicit self-esteem use a variety of self-report measures that ask a person to report his or her feelings toward the self (Baumeister, Campbell, Krueger, & Vohs, 2003). With regard to externalizing psychopathology, Bosson, Brown, Zeigler-Hill, and Swann (2003) found that implicit self-esteem moderated the relationship between explicit self-esteem and psychopathology, such that individuals with high explicit self-esteem, but low implicit self-esteem had greater symptoms of narcissism and were more aggressive than individuals who had high explicit and implicit self-esteem.

De Jong (2002) found that women with low levels of social anxiety exhibited relatively positive self-esteem on both implicit and explicit measures, but women with high levels of anxiety reported low self-esteem on the explicit measure, but positive (i.e., stronger self with positive vs. negative associations) self-esteem on the implicit measure. Importantly, the mean level of implicit self-esteem in women with high anxiety symptoms was lower than the implicit self-esteem found in women with low anxiety symptoms. Thus, results suggest the possibility that mean levels of implicit and explicit self-esteem may differ based on the presence of pathology.

Similar patterns for implicit and explicit self-esteem were found in adults with depression. Franck, De Raedt, Dereu, and Van den Abbeele (2007) found a negative relationship between depressive symptoms and explicit self-esteem in TD adults. Again, both TD adults and adults with depression showed a relatively positive implicit self-esteem bias (relative to negative), but adults high in depression symptoms had lower implicit self-esteem than TD adults.

Interestingly, implicit self-esteem within the group with depression differed based on the severity of symptoms, such that individuals diagnosed with depression with suicidal ideation had relatively higher implicit self-esteem than depressed individuals without suicidal ideation. Additionally, TD adults had higher implicit self-esteem than depressed adults without suicidal ideation, but not higher than those with suicidal ideation (Franck et al.). While the pattern of low explicit and low implicit self-esteem found in adults with depression without suicidal ideation was expected, the low explicit, but high implicit self-esteem pattern found in depressed adults with suicidal ideation was surprising because it might not be expected that individuals with suicidal ideation would have similar self-esteem patterns as TD adults. Results demonstrate that the relationship between symptomology and implicit self-esteem may differ within the same disorder based on features, or presentations, of the disorder.

In a study examining implicit self-esteem in adults with Social Anxiety Disorder and Panic Disorder, Glashouwer, Vroling, de Jong, Lange, and de Keijser (2013) found that adults with Social Anxiety Disorder had lower implicit self-esteem than TD adults, and that those with Panic Disorder had implicit self-esteem that was in between the other groups. Thus, in a clinical anxiety group, implicit self-esteem was related to symptom severity. It is possible that a similar pattern between implicit and explicit self-esteem measures and symptoms of pathology could be found in other clinical populations (i.e., the relationship between symptoms severity and implicit self-esteem was also found in individuals with Body Dysmorphic Disorder (BDD); Buhlmann, Teachman, Gerbershagen, Kikul, & Rief, 2008; Buhlmann, Teachman, Naumann, Fehlinger, & Rief, 2009).

Results of the previous studies suggest that differences in the relationship between implicit scores and psychopathology might vary based on the total number of symptoms,

subtype, and features of the pathology. Thus, when analyzing implicit scores in children for the current study, a continuous measure of psychopathology symptoms (as opposed to examining psychopathology as being present vs. not present) were examined.

Correlates of implicit and explicit measures. Researchers have assessed the differential ability of implicit and explicit measures to predict behaviors in children and adults. For example, Spalding and Hardin (1999) investigated explicit and implicit self-esteem as predictors of a variety of anxious behaviors in adults. Results suggested that explicit self-esteem was a better predictor of self-reported verbal behavior above and beyond the predictive ability of implicit self-esteem. However, implicit self-esteem was a stronger predictor of the person's non-verbal anxious behaviors than explicit self-esteem, as assessed by an interviewer with whom the participant was previously unacquainted. Thus, results suggest that the predictive validity of implicit and explicit self-esteem may vary based on the informant.

Spalding and Hardin's (1999) study supports the possibility that implicit measures may be a better predictor of some aspects of a person's behaviors (e.g., those rated by observers that may not be socially desirable), and that his or her explicit self-reports might better predict other behaviors. Notably, the double dissociation hypothesis refers to the phenomenon that implicit measures are often stronger predictors of a person's uncontrollable or automatic behaviors while explicit measures are often stronger predictors of a person's controllable or verbal behaviors (see Asendorpf, Banse, & Mucke, 2002; Roefs et al., 2011). Support for the double dissociation hypothesis was found in a number of studies where a person's relatively uncontrollable and controlled behaviors were measured (Rudolph, Schroder-Abe, Riketta, & Schutz, 2010; Teachman & Allen, 2007).

Interestingly, implicit and explicit indicators of self-esteem were weakly correlated in the majority of the aforementioned studies (de Jong, 2002; Egloff & Schmukle, 2002; Franck et al., 2007; Grumm et al., 2011; Spalding & Hardin, 1999; Teubel, Asendorpf, Banse, & Schnabel, 2011), which suggests the possibility that the implicit and explicit measures may actually examine partially different constructs (Bosson, et al., 2000; Nosek & Smyth, 2007), or are different components of the same construct. The pattern of results suggests that automatic, or implicit, self-esteem in people with depression, aggression, and anxiety may somewhat differ from their more controlled, or explicit self-reports of self-esteem. In contrast, Buhlmann and colleagues (2008) found a moderate, positive correlation between implicit and explicit self-esteem in the study sample. A small, positive correlation between implicit and explicit measures was found in a follow-up study using the same measures to assess implicit and explicit self-esteem in a different population with BDD (Buhlmann et al., 2009). The authors suggest that the associations between the implicit and explicit variables in the study sample could support the idea that persons with BDD or similar disorders may have automatic associations that are aligned with constructs that are central to their disorder (Buhlmann et al., 2009).

The interaction of explicit self-esteem and implicit self-esteem differentially predicting psychopathology has been replicated in a number of studies. In a review of the relationship between self-esteem and psychopathology, Zeigler-Hill (2011) describes different profiles related to a person's explicit and implicit self-esteem. Secure self-esteem, which has also been referred to as stable and genuine self-esteem, is the term used for individuals who report high self-esteem on explicit measures and have high implicit self-esteem. Defensive self-esteem has also been referred to as unstable and fragile self-esteem in the research literature, and is the term used for individuals who report high self-esteem on explicit measures, but have low implicit self-

esteem. Uncertain self-esteem has also been referred to as damaged self-esteem, and refers to individuals who report low explicit self-esteem, but have high implicit self-esteem. Finally, true low self-esteem refers to people who report low explicit self-esteem and have low implicit self-esteem (Zeigler-Hill).

Defensive self-esteem is associated with an increased vulnerability to psychopathology when compared to the other self-esteem profiles (Zeigler-Hill, 2011). Baumeister, Smart, and Boden (1996) suggest that one reason people with defensive self-esteem profiles have greater symptoms of psychopathology is because they hold negative automatic thoughts and need more positive feedback to feel validated than people with secure self-esteem require. However, because people with defensive profiles inflate their explicit self-esteem, much of the feedback they receive challenges their inflated self-esteem (Baumeister et al., 1996). Negative feedback and average feedback given by others challenge the positive explicit views that a person with a defensive profile presents to others while confirming the negative implicit self-esteem that the individual possesses. When people with defensive self-esteem try to protect their egos from being threatened by negative feedback, they tend to respond more aggressively than people with other self-esteem profiles. In contrast, individuals with secure self-esteem are able to accept their personal strengths and weaknesses and are not threatened by negative feedback from others.

Uncertain low self-esteem patterns appear to be associated with more internalizing symptoms (Creemers, Scholte, Engels, Prinstein, & Wiers, 2012). De Jong (2002) found that women with low levels of social anxiety exhibited relatively more secure self-esteem patterns (positive self-esteem on both implicit and explicit measures), but women with high levels of anxiety displayed uncertain self-esteem patterns (low self-esteem on the explicit measure, but strong, positive self-esteem on the implicit measure). Importantly, although the two groups

differed in their explicit self-esteem, both low and high anxiety women had similarly positive implicit self-esteem. Thus, results suggest the possibility that mean levels of implicit and explicit self-esteem may differ based on the presence of pathology.

Self-perceptions versus self-esteem. The current project investigates the ways in which explicit and implicit self-perceptions are differentially associated with symptoms of psychopathology in children. We acknowledge that most implicit research examines implicit self-esteem which is different from implicit self-concept or implicit self-perceptions of actual ability. However, because explicit self-perceptions of competence are a person's self-report of ability in a specific domain and self-esteem is a person's self-perception of general ability, we believe the two concepts are similar. Moreover, Bohrnstedt and Felson (1983) found that explicit self-esteem and explicit self-perceptions of social competence in middle school children were positively correlated. Thus, it is possible that self-esteem and self-perceptions of ability are related constructs and the implicit self-esteem literature could be used to inform hypotheses related to implicit PIB.

PIB differs from self-esteem because PIB is the discrepancy between a child's ranking of self-competence compared to peers and adult rankings of the child's actual competence compared to peers. Self-esteem does not take the rankings of others into consideration. A child with high implicit self-esteem has a stronger positive association between the self and positive words when compared to his or her association between positive words and others. A child with large, implicit PIB has a stronger association between the self and positive words, relative to the association between others and positive words than what would be expected given adult rankings.

Explicit PIB differs from explicit self-esteem because PIB is the discrepancy between a child's ranking of explicit self-competence compared to peers and adult rankings of the child's actual competence compared to peers. Explicit self-esteem does not take the rankings of others into consideration. A child with high explicit self-esteem reports a larger number of positive traits toward the self than do people with low explicit self-esteem. A child with large, explicit PIB ranks his or her competence as higher than what would be expected given adult rankings. Similarly, a child with low explicit self-esteem does not associate positive traits with the self. A child with low explicit illusory bias ranks himself as having less competence than what would be expected based on adult rankings of the child's ability.

Although self-esteem profiles and the PIB construct are not exactly the same, it is possible to use the self-esteem literature as a foundation for explaining the adaptive and maladaptive relationships between PIB and psychopathology. It is plausible that having accurate self-perceptions of competence on both implicit and explicit measures, suggesting that the child is aware of his or her abilities, may predict low levels of psychopathology in the same way that secure self-esteem is referred to as the optimal self-esteem profile because it is related to relatively few symptoms of psychopathology (Kernis, 2003). That is, although children might have accurate, but low, implicit and explicit self-perceptions of competence, these children might have fewer symptoms of psychopathology because they are better able to respond to feedback to improve their abilities when compared to children with differences in their implicit and explicit self-perceptions. The current study tested how implicit PIB and explicit PIB, and the interaction of the two terms, are differentially associated with symptoms of various psychopathologies.

Summary

The current study expands the understanding of PIB in children with ADHD. Although the relationship between explicit PIB within the social and behavioral domains and psychopathology has been examined (Hoza et al., 2004; for review see Owens et al., 2007), the same relationship, to the investiagtor's knowledge, has not been examined using an implicit measure of competence. Investigating differences between implicit and explicit self-perceptions of competence may be especially useful in the population with ADHD given the previously observed negative association between inflated explicit self-perceptions and performance in the ADHD group. As most treatments for children with ADHD focus on reducing their problem behaviors or improving their social skills, understanding the implicit self-perceptions of their social and behavioral competence is crucial. Moreover, the study will add to the existing PIB literature by examining the relationship between symptoms of pathology and self-perceptions of competence in children.

To accomplish these goals, the child's explicit and implicit social and behavioral competence were assessed and compared to teachers' reports of child behavioral and social functioning. Parents and children also reported on child psychopathology symptoms.

Hypotheses

Hypothesis 1a. The aim of the first hypothesis was to investigate differences in the implicit and explicit perceptions of self-competence in children with ADHD and TD children. It was predicted that the self-ratings of social and behavioral competence on explicit measures in children with ADHD would not differ from the ratings by TD children, which would be consistent with previous research examining self-ratings of competence in children with ADHD (for review, see Owens et al., 2007). However, it was hypothesized that the two groups *would* differ significantly in their self-perceptions of competence when using an implicit measure, such

that the ADHD group will have lower social and behavioral self-competence relative to the TD group on the *implicit* measure (the IAT), which is less controllable. This prediction was based on the ability of implicit measures to capture associations that reside outside of conscious control. As the IAT is more resistant to social desirability effects than explicit measures, results of the IAT might reflect associations of self-competence that children with ADHD might not readily admit to.

Hypothesis 1b. To advance the understanding of PIB in children by determining whether inflated self-reports of social and behavioral competence exist at both a consciously controlled and/or a more automatic level, the investigators examined whether the standardized discrepancy between adult explicit report of ability and a child's self-perception of competence on the explicit measure (explicit PIB) and the standardized discrepancy between adult explicit report of ability and a child's self-perception of competence on the implicit measure (implicit PIB) varied based on the child's diagnostic status.

It was predicted that children with ADHD would display a larger explicit PIB than TD children. This would be consistent with previous research examining self-ratings of competence in children with ADHD (Owens et al., 2007). However, it was also predicted that implicit PIB will not differ based on child diagnostic status. Specifically, the magnitude of the difference in PIB between the two child groups would be smaller when comparing the implicit measure of perceived self-competence to adult rankings of child ability. This pattern of results would be consistent with the self-protective hypothesis for PIB, which suggests that children will have more accurate ratings of self-competence on measures that are less controllable.

Hypothesis 2. The final aim of the current study was to determine whether implicit PIB, above and beyond explicit PIB, would incrementally predict symptoms of psychopathology, after

controlling for child ADHD status. As an exploratory question, the interaction of explicit PIB and implicit PIB predicting symptoms of psychopathology was also examined. Hypotheses tied to prediction by explicit and implicit PIB in each symptom domain are outlined below. Hypotheses for the interaction term are not listed, given that this aspect was exploratory.

PIB predicting externalizing symptoms. Externalizing psychopathology refers to child symptoms of aggression and delinquent behavior. Overall, it was hypothesized that explicit PIB and implicit PIB would be unique predictors of the variance in symptoms of externalizing psychopathology. Specifically, it was hypothesized that a positive relationship would exist between explicit PIB and externalizing symptoms, but a negative relationship would exist between implicit PIB and externalizing symptoms. The prior literatures and rationale that lead to these predictions for explicit and implicit PIB were reviewed separately.

Prediction by explicit PIB. Previous research has suggested a positive association between externalizing disorders and explicit PIB regardless of whether the child also has a diagnosis of ADHD (Hoza et al., 2004; Hoza et al., 2002; Ohan & Johnston, 2011). One explanation may be that children who are high in externalizing symptoms receive more negative feedback from parents, teachers, and others than children low in externalizing symptoms (Wells et al., 2006) and, in an attempt to protect their ego, overcompensate for their deficits by reporting inflated competence on explicit measures (Diener & Milich, 1997). Adults typically rate children high in externalizing symptoms as having less social and behavioral competence than children low in externalizing symptoms (Hoza et al., 2004). Therefore, the discrepancy between explicit self-competence and adult-ranked ability is expected to be larger in children high in externalizing symptoms when compared to children low in externalizing symptoms. It was hypothesized that a

positive relationship would be found between explicit PIB and externalizing symptoms in children, regardless of ADHD diagnostic status.

Prediction by implicit PIB. It is possible that children high in externalizing symptoms will not be able to maintain an overconfident self-perception of their competence on less controllable measures. For instance, less controllable measures may capture self-competence that is less defensive than self-competence reported on explicit, controllable measures. Along these lines, Bosson and colleagues (2003) found that adults with greater aggressive symptoms (a component of the externalizing symptoms subscale) had lower implicit self-esteem when compared to adults who had fewer aggressive symptoms. Thus, children high in externalizing symptoms may report implicit competencies that reflect the critical feedback that they receive from others, resulting in no or minimal PIB, or perhaps even a negative implicit illusory bias if children high in externalizing symptoms report themselves as being less competent on implicit measures than adults rank them. In contrast, children with fewer externalizing symptoms are expected to show normative self-enhancement biases, resulting in slightly exaggerated positive self-associations (i.e., implicit PIB). Therefore, it was hypothesized that implicit PIB would be negatively related to externalizing symptoms in both children with ADHD and TD children.

PIB predicting internalizing symptoms. Internalizing psychopathology will refer to anxiety and depression symptoms in the following sections. Although anxiety symptoms and depression symptoms were examined separately in study analyses, it was hypothesized that PIB would relate to anxiety and depression symptoms in a similar pattern. Overall, it was hypothesized that explicit PIB and implicit PIB would be unique predictors of the variance in symptoms of internalizing psychopathology and the direction of the association would be negative for both explicit and implicit PIB. While the predictions are similar in direction for both

explicit and implicit PIB, the unique prior literatures and rationale that lead to these predictions for explicit and implicit PIB were reviewed separately. It should be noted that there have been different associations reported between explicit PIB and anxiety relative to explicit PIB and depression in the existing literature.

Prediction by explicit PIB. There are consistent findings that children high in anxiety symptoms (Karustis, Power, Rescorla, Eiraldi, & Gallagher, 2000; Mikami, Ransone, & Calhoun, 2011) as well as children high in depression symptoms (Karustis et al., 2000) are rated by adults as having poorer social and behavioral competence when compared to children with few anxiety or depressive symptoms. However, the self-esteem literature has suggested that children high in depression symptoms (Franck et al., 2007) and children high in social anxiety symptoms (Stopa & Clark, 1993; Tanner, Stopa, & de Houwer, 2006) tend to have a negative distortion of their ability and self-rate their abilities on explicit measures as even lower than others rate them. Taken together, these patterns would result in a small, negative discrepancy between adult rankings of child competencies and child explicit self-competence for children high in symptoms of depression and anxiety. In contrast, children low in internalizing psychopathology symptoms might be more likely to rank themselves as having average to above average competence, resulting in either no PIB (given adults will also likely rank these kids as above average) or a slight PIB, given normative self-enhancement biases. Given the limited magnitude of the negative or positive illusory bias expected for high and low symptom groups respectively, it was hypothesized that there might be a small, negative correlation between symptoms of anxiety and explicit PIB, and a small, negative correlation between symptoms of depression and explicit PIB, but the magnitude of the relationships will be small.

To the investigators' knowledge, only one study has examined the relationship between explicit PIB and anxiety symptoms in TD children (Ohan & Johnston, 2011), as opposed to when anxiety symptoms are comorbid with ADHD or Conduct Disorder (March et al., 2000; Ohan & Johnston). Ohan and Johnston (2011) found a significant, negative correlation between anxiety symptoms and explicit PIB in typically-developing children, but no significant relationship was supported between anxiety symptoms and explicit PIB in children with ADHD. In contrast, a significant, negative correlation has been found in both children with ADHD and comorbid depression (Owens et al., 2007) and in TD children with high symptoms of depression (Hoza et al., 2010).

One possible explanation for the findings that explicit PIB may be negatively correlated with anxiety among TD children, but not among children with ADHD could be that children with comorbid anxiety tend to be ranked by adults as having similar (low) competence as children with ADHD (Mikami et al., 2011; March et al., 2000), whereas children high in anxiety symptoms (but not ADHD) are ranked having more social and behavioral competence than the ADHD groups (Karustis et al., 2000). TD children are ranked as the most competent by adults (Ohan & Johnston, 2011). In contrast, children with comorbid anxiety, ADHD only, and TD may rank themselves as having greater competence than children with anxiety alone (Ohan & Johnston). Taken together, this pattern of rankings would lead to different PIB magnitudes among the groups, such that children with ADHD alone and children with comorbid ADHD and anxiety would have large explicit PIB, followed by TD children who would have small PIB, and then children with anxiety who would have a negative illusory bias (consistent with the findings in Ohan and Johnson that PIB was negatively associated with anxiety only for TD children). Of course, other differences between children with anxiety alone versus the children with comorbid

anxiety in the sample could also account for the effects (e.g., the comorbid group could be more heterogeneous, introducing noise that weakened the PIB-anxiety correlation).

The consistent findings of a negative correlation between explicit PIB and depression regardless of ADHD diagnostic status may be attributable to a different pattern of rankings. In contrast to the pattern found for anxiety, it may be that adults rank children with ADHD alone, children with ADHD and comorbid depression (Hoza et al., 2004), as well as children with depression (but not ADHD; Bornstein, Hahn, & Haynes, 2010) as similarly low in competence compared to TD children. However, children with ADHD and TD children rank themselves as being more competent than their peers (Hoza et al., 2004), followed by children with comorbid ADHD and depression (Hoza et al.) and depression alone (Franck et al., 2007) who rank themselves as having lower competence than peers. This pattern of rankings would suggest that children with ADHD alone would have large explicit PIB, TD children would have slight PIB, and children with comorbid ADHD and depression and children with depression alone would have a negative illusory bias.

Prediction by implicit PIB. Although previous research has often found that both individuals with high as well as low levels of internalizing psychopathology tend to exhibit positive (relative to negative) self-esteem on implicit measures (de Jong, 2002; Franck et al., 2007), the scores on implicit measures of self-esteem are more positive for people with fewer symptoms of internalizing psychopathology compared to people with greater internalizing symptoms (de Jong, 2002; Franck et al., 2007). Assuming the same pattern occurs in children, it is expected that children with fewer internalizing psychopathology symptoms will show more positive implicit self-competence when compared to children high in internalizing symptoms. Again, on average, we expect that children high in internalizing symptoms will be ranked as

having lower competence than children low in internalizing symptoms. Therefore, when using an implicit measure, children high in symptoms of internalizing psychopathology will rank their self-competence as lower than adults rank their abilities. This parallels the expectation for explicit self-competence ratings (i.e., lower self-ratings for children with internalizing symptoms, resulting in no PIB or even a negative illusory bias for anxious and depressed children). Thus, as with explicit PIB, it was hypothesized that a small, negative correlation between PIB and anxiety or depression symptoms would be found.

Method

Participants

The current study utilized data from a larger investigation enrolling 137 children (ages 6-9; 66 boys, 71 girls) testing a teacher-delivered intervention to alter peers' perceptions of children with ADHD (see Mikami et al., 2013). Twenty-four children met diagnostic criteria for ADHD and the remainder were age- and sex-matched TD youth. To maximize the statistical power for the ADHD-TD comparisons in the current study, we aimed to enroll all participants with ADHD and only half of the TD children. The TD children selected were those in the same classrooms of the children with ADHD, who were age- and gender-matched to the ADHD sample. Thus, the final sample for the current investigation included 79 children (38 boys, 41 girls; 23 with ADHD) because one of the 24 enrolled children with ADHD was absent the day that the IAT was administered.

Children with ADHD were recruited from pediatricians and school psychologists. Both TD children and children with ADHD were recruited through flyers and community organizations. Each child participated with the parent or legal guardian who was most involved in the child's social life. The ethnic breakdown of child participants was as follows: 81.0%

identified as White, 3.8% identified as African-American, 3.8% identified as Pacific Islander/Asian, 2.5% identified as Latino, and 7.6% identified as more than one race (1.3% did not respond). Most children were accompanied by their biological mothers (83.3%). Children were also accompanied by their biological fathers (10.1%), adoptive mother (5.1%), and grandfathers (1.3%; 1.3% did not respond). Each child's primary school teacher provided information regarding the child's classroom performance. Parents and teachers provided informed consent, and children assented to study procedures. Consent and assent forms can be found in Appendix A.

Procedure

Parents and teachers completed the ADHD symptoms subscale on the Child Symptom Inventory (CSI; Gadow & Sprafkin, 1994) as a screener measure for child study inclusion. Candidates for the ADHD group were required to meet clinical criteria using parent and teacher responses to the CSI. Parents and teachers had to endorse at least six of nine symptoms of hyperactivity/impulsivity or inattention as occurring "often" or "very often" on the CSI for the child to be included in the study. Children with four or five symptoms endorsed by one informant remained candidates for inclusion if, in accordance with DSM-IV field trials, where a symptom is counted as present if it is endorsed by either the parent or the teacher as occurring "often" or "very often," they met at least six symptoms (Lahey et al., 1994). Parents and teachers also had to endorse three of seven items of peer impairment and report that fewer than 50% of the child's peers liked them before a child with ADHD could be included in the study. Candidates for the TD group could not have more than three ADHD symptoms endorsed by either the parent or teacher, could not have more than one symptom of peer impairment endorsed by either the parent or teacher, and had to be rated as having at least 50% of peers liking them.

Once children met study inclusion criteria, families attended a lab visit where parents/guardians were administered the Schedule for Affective Disorders and Schizophrenia for School-Aged Children (K-SADS; Kaufman et al., 1997) to confirm ADHD diagnosis and to assess comorbid disorders. Children with ADHD were allowed to meet criteria for comorbid anxious, depressive, or disruptive disorders; however, TD children could not meet diagnostic criteria for any disorder. Parents completed measures assessing child externalizing symptoms and internalizing symptoms. Parents and teachers also completed a questionnaire packet that included the Teacher's Rating Scale of Child's Actual Behavior (TRS; Harter, 1985) to assess a child's competence in the social acceptance and behavioral conduct domains. Children were administered the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) by trained research assistants. Children also completed the social acceptance subscale, which assessed a child's popularity, and the behavioral conduct subscale, a measure of a child's ability to behave appropriately, of the Self-Perception Profile for Children (SPPC; Harter) in addition to the Multidimensional Anxiety Scale for Children (MASC; March, 1997) and Children's Depression Inventory (CDI; Kovacs et al., 2003).

If children with ADHD were receiving medication for their ADHD symptoms, they were allowed to continue their regimen for the duration of the study as medication does not consistently improve peer functioning (Hoza et al., 2005) or the ability to accurately self-rate competence (Ialongo, Lopez, Horn, Pascoe, & Greenberg, 1994; Milich, Licht, Murphy, & Pelham, 1989). However, it was requested that children remain on the same dosage and schedule for the entire study. Exclusionary criteria for study participation for both the ADHD and TD groups were a diagnosis of Pervasive Developmental Disorder or a Full Scale IQ of below 80 on the WASI (for further details, see Mikami et al., 2013).

Study intervention. Children included in the current study were participants in a larger intervention that was aimed toward understanding and increasing the teacher practices that foster the inclusion of children who are normally socially rejected by peers. Children were grouped into single-gender classrooms that contained an average of 10.1 children [3.0 children with ADHD (*SD* = 0.52), 7.1 TD children (*SD* = 1.00)] that were within a 1 year age span. Each classroom was led by two teachers who were aware that children with ADHD were in their class, but were blind to which children were diagnosed and the total number of children with ADHD.

The intervention took place over 4 weeks at a summer day camp which was broken into two independent, 2-week sessions. Two treatment programs were created for use in the intervention. TD children and teachers participated in one of two sessions and were only assigned to one treatment program. Children with ADHD participated in both sessions and were randomly assigned to either the Contingency Management Training (COMET) or Making Socially-Accepting Inclusive Classrooms (MOSAIC) program during the first session and received the other intervention during the second session.

The COMET treatment attempted to increase children's socially-appropriate behaviors by outlining explicit rules that children in the class should follow to help them behave better. Children could earn and lose points throughout the day for following or disobeying the rules. Those children with the most points at the end of each day were given privileges during the next day, such as being chosen as team leader during games, being the first person to line up, and helping the teacher during various activities. Children were always aware of how many points they had because the teachers made public announcements of point totals throughout the day.

In contrast, the MOSAIC treatment attempted to increase peer inclusion through training teachers to highlight the strengths of children to their classmates (such as publicly announcing a

child's artistic abilities or willingness to share), develop positive relationships with every child in the classroom, and discourage the development of social hierarchies. While children in the MOSAIC treatment also earned and lost points for their behaviors throughout the day, classroom privileges were not associated with point totals and teachers informed children of their point totals privately (for review see Mikami et al., 2013).

Implicit Association Test (IAT; Greenwald et al., 1998). Research assistants administered the IAT to each child throughout different sessions of the summer program. Three IATs were created for the current study. The first IAT tested the validity of the measure (and provided practice on the task) and the second and third IATs paralleled the social and behavioral subscales of the explicit PIB measure (Harter, 1985) completed by teachers and children during intake. The majority of the child participants were able to complete the IAT with acceptable accuracy rates of at least 70% (Greenwald, Nosek, & Banaji, 2003); however, four children (one TD, three ADHD) responded to more than 30% of the trials on the IAT incorrectly. Owing to the small size of the ADHD group in the current study, it was decided to re-test the children who had unacceptable response accuracy. To reduce the total amount of time that the children had to attend to the IAT, the length of the entire test was shortened by removing the IAT that assessed the validity of the measure. Therefore only two out of three IATs were re-administered to the children with unacceptable accuracy percentages. Children were given as many breaks as they requested during the second IAT session.

A program malfunction had occurred during the original administration of the IAT to the TD child with the high error rate, and it is possible that this malfunction was responsible for the inaccurate response accuracy obtained on the first administration because the TD child responded with acceptable accuracy the second time the test was given. This differed from the

children with ADHD who, for the most part, continued to have difficulty completing the IAT despite modifications. Only one out of the three boys with ADHD was able to respond with acceptable response rates during the second IAT administration. Finally, another modification was made in order to increase the probability of obtaining accuracy rates of at least 70% in the remaining two boys with ADHD, which involved administering only the social IAT during one testing session and then the behavioral IAT during another session. Therefore, the final two boys were administered various sections of the IAT a total of four times. Despite the final modification, the two children were unable to obtain the accuracy rates that were required. However, because this was the first study to examine children with ADHD using implicit measures, the responses of the two children were not automatically excluded from analyses. Instead, all analyses were run twice, once removing the two children who were unable to achieve an accuracy rate of at least 70% and the second time including the responses from the testing session that produced the most accurate results in those two children. When data were examined with those participants' scores included, incorrect responses were assigned an error penalty (i.e., mean response time for each block of trials plus 600ms) as suggested by Greenwald and colleagues (2003).

It is possible that administering the IAT multiple times could influence child responses, as Nosek, Greenwald, and Banaji (2007) suggest that previous experience with the IAT is associated with reduced magnitudes of associations. However, it has also been suggested that the scoring used to measure the association between two concepts slightly corrects for the influence of multiple administrations. It seems unlikely that re-administering the IAT would change the direction of children's results because previous literature has demonstrated that most adults find

it difficult to deceive the IAT without being instructed on how to do so (Cvencek, Greenwald, Brown, Gray, & Snowden, 2010; Kim, 2003).

Measures

Child-completed measures.

Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II; Wechsler, 1999). The WASI is a well-validated, widely used measure of intelligence for people ages 6 through 89 years. Trained research assistants administered the WASI to children at intake. The Full Scale Intelligence Quotient (FSIQ) was used as a screener for child study inclusion. Alpha values range from .84 to .94 for the subscales comprising the FSIQ for the children in the standardized age group for the current study. The alpha values for the FSIQ for the children in the current study sample range from .95 to .96.

Self-Perception Profile for Children (SPPC; Harter, 1985). The SPPC measures perceived child self-competence in six domains: social acceptance, athletic competence, physical appearance, behavioral conduct, scholastic competence, and global self-worth. It is often used to determine PIB in the ADHD literature. Each subscale consists of six items. Items on the SPPC describe two different children and ask respondents to rate which description they most identify with ("some kids find it hard to make friends; but other kids find it's pretty easy to make friends"). Next, the child reports whether the description is "really true" or "sort of true" of him, resulting in a score on a four-point metric. For the current study, trained research assistants administered the social acceptance and behavioral conduct subscales to child participants, as those domains are the two major areas of impairment in children with ADHD. The SPPC was used to create a measure of explicit self-perceptions (Appendix B). Although the SPPC was

intended to be used in children age 8 and older, previous literature has utilized the measure in children as young as age 7 (Ohan & Johnston, 2002).

The SPPC has acceptable reliability and validity (Harter, 1985). Alpha values for the subscales range .71 to .86 (Harter, 1985). In t sample, the alpha values were .70 for the social acceptance subscale and .85 for the behavioral conduct subscale.

Implicit Association Test (IAT; Greenwald et al., 1998). The IAT is a response time task that measures the strength of a person's implicit association between two concepts. Participants are presented with images or words, which they are then required to classify into more general level categories. The IATs for the current study were created using the Inquisit software program (Millisecond Software). To account for difficulty with attending to detail for extended periods of time, a characteristic of the ADHD population, the Preschool Implicit Association Test (PIAT; Cvencek, Greenwald, & Meltzoff, 2011), a modified version of the IAT, was used for the current study. The PIAT reduces the number of response trials from 180 per IAT to 144 and was created for children age 4 years. Trials are combined into blocks. Table 1 demonstrates the block design of the IATs used in the current study.

Children completed three IATs, each aimed at evaluating the child's implicit attitudes towards himself/herself versus other people. The three tasks examined associations about the self versus others with (a) being adults versus kids; (b) being well-behaved versus naughty; and (c) being likeable versus unpopular. For each IAT, the child responded to a set of images which represented one of the target categories. Images represented the categories of age (adult/child), social acceptance (likeable/unpopular), and behavioral conduct (well-behaved/naughty). The first IAT condition (age) was a neutral paradigm which was included to ensure that, if significant differences were not found in the experimental IATs, the investigators could be sure that this was

not due to the measure being invalid in this population. As previously mentioned, the other two IATs were created to parallel the social acceptance and behavioral conduct subscales of the SPPC.

To measure the implicit association between concepts, participants place stimuli into combined categories (e.g., self + behaved; self + likeable). In one condition, the category labels are presented in a pair that is hypothesized to be incompatible with automatic associations in memory (e.g., self + naughty; self + unpopular) for children with adequate social skills and behaviors. In the other condition, category labels stimuli are presented in a pair that is hypothesized to be compatible with automatic associations in memory (e.g., self + behaved; self + likeable) for children with adequate social skills and behaviors. Participants typically respond more slowly when they have to place stimuli into a category pairing that is incompatible with their automatic associations in memory, so differences between reaction time for participants in the two experimental conditions are of interest.

The three IATs were partially randomized such that the adult/kid IAT was administered first and then each child was randomly presented with either the well-behaved/naughty or the likeable/unpopular IAT. The order of the associatively congruent and incongruent category pairings was also randomized for each IAT. To ensure that the images used in the study accurately represented the social and behavioral concepts, two children and 15 adults from a pilot sample were given 29 images and asked to select the four images they felt best represented each category within each paradigm (e.g., naughty and well-behaved categories in the behavioral acceptance paradigm). The three images that were chosen most frequently for each category by the pilot participants were included in the IAT, resulting in six images in the social acceptance

paradigm and six images representing the behavioral conduct paradigm. Target stimuli can be found in Appendix C.

To assist with reaction speed required for the IAT, response keys were labeled with stickers (the left response key, "A" key, with a red sticker; the right response key, ";" key, with a green sticker). Additionally, the task stimuli (images in this case representing the social and behavioral domains) were placed at each participant's side along with the words used to represent the evaluative (self/other) categories. The evaluative categories for each IAT were words relating to the self (me, I, self) and others (them, him, her). Each IAT lasted between 3 to 5 minutes, and children were allowed a break that could last a maximum of 3 minutes between each IAT.

Multidimensional Anxiety Scale for Children-10 (MASC; March, 1997). The MASC is widely used to assess the severity of anxiety symptoms in children and was administered during intake. The MASC consists of ten questions which ask respondents to rate how often they fear certain situations ("I am afraid of dogs") on a 4-point scale (0 = *never true about me*; 3 = *often true about me*). The alpha value for the normed sample on the MASC-10 is .90.

Children's Depression Inventory – Short Form (CDI:S; Kovacs, 2003). The CDI:S was used to assess depressive symptoms in the current study. The measure consists of ten items. Respondents are asked to read three sentences and choose which sentence best describes him or her within the past two weeks ("I am sad once in a while," "I am sad many times," "I am sad all the time"). The CDI:S has acceptable reliability and validity. The alpha reliability coefficient for the normed sample of the CDI:S is .80.

Adult-completed measures.

Developmental History. Parents reported on their child's developmental history, including demographic information, diagnostic history, and medication status.

Child Symptom Inventory (CSI; Gadow & Sprafkin, 1994). Parents and teachers completed the ADHD symptom subscale on this measure as a screener for child eligibility.

Schedule for Affective Disorders and Schizophrenia for School-Aged Children (K-SADS; Kauffman et al., 1997). The K-SADS is a measure that assesses the presence and severity of symptoms in 32 child and adolescent disorders. Parents rated child symptoms on a 4-point metric (0 = *no information available*, 1 = *not present*, 2 = *subthreshold*, 3 = *threshold*). For the current study, parents completed the ADHD subscale to confirm the ADHD diagnosis, in addition to the ODD, CD, and Anxiety disorders subscales to examine comorbidity. The K-SADS has acceptable reliability and validity.

Child Behavior Checklist/6-18 (CBCL; Achenbach, 2001). The CBCL was used to measure child psychopathology symptoms. The broadband externalizing symptoms subscale, narrow-band anxious/depressed subscale, and narrow-band withdrawn/depressed subscale on the CBCL were used as dependent variables in study analyses. Parents and teachers were given statements and asked to rate how well the statement applied to their children within the last six months. Ratings were given on a 3-point scale (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*). Alpha values for parent and teacher responses on the normed sample are .94 and .95 for the externalizing subscale, .84 and .86 for the anxious/depressed subscale, and .80 and .81 for the withdrawn/depressed subscale, respectively.

It should be noted that the anxious/depressed narrow-band scale was used to represent adult ratings of child anxiety symptoms and the withdrawn/depressed narrow-band scale was used to represent adult ratings of child depression symptoms. The empirical based scales were

used to represent psychopathology symptoms based on the scale's loadings onto DSM-oriented scale (de Wolff, Vogels, Reijneveld, 2014). Also, it has been suggested that the empirical scales more accurately represent the manifestations of anxiety and depression symptoms in young children who do not meet clinical cut-offs for anxiety and depression as compared to the DSM-oriented scales (Wadsworth, Hudziak, Heath, & Achenbach, 2001). As the majority of the sample used in the current study did not meet clinical cut-offs for anxiety or depression, use of the empirical scales was supported.

Teacher's Rating Scale of Child's Actual Behavior (TRS; Harter, 1985). The TRS is the parallel form to the SPPC and it is used to determine adult perceptions of a child's competence relative to peers. Teachers and parents completed the social acceptance and behavioral conduct subscales. Each subscale consisted of three items. Items on the TRS describe two different children and the respondent selects the statement which best fits the target child ("This child finds it hard to make friends; but for this child it's pretty easy"). Next, the adult rates whether the description is "really true" or "sort of true" of the child; thereby resulting in a score on a 4-point metric (Appendix D). The TRS has acceptable reliability and validity (Harter, 1985). In the current study sample, the alpha values were .96 for the social acceptance subscale and .91 for the behavioral conduct subscale.

Data Analytic Plan

Rating of child ability and psychopathology. To account for potential bias in ratings of child abilities based on informant, the mean score of parent and teacher ratings of child ability on social acceptance and behavioral conduct subscales of the TRS was calculated. Additionally, a mean score of teacher and parent ratings of child psychopathology symptoms on the CBCL was

calculated. The mean scores were then standardized and represented the adult ranking of children's abilities.

Calculation of PIB. Historically in the PIB literature, PIB has typically been calculated using the standardized discrepancy model as proposed by De Los Reyes and Kazdin (2005), whereby the standardized score of adult rankings of child ability is subtracted from the standardized score of child ratings of competence[1]. A child with a positive discrepancy score is considered to exhibit PIB. Explicit PIB with regard to social self-competence (explicit social PIB) was obtained by subtracting the adult's standardized score on the social acceptance subscale of the TRS from the child's standardized score on the social acceptance subscale of the SPPC. Explicit PIB with regard to behavioral self-competence (explicit behavioral PIB) was calculated in the same manner, but used standardized scores from the behavioral conduct subscale of the TRS and SPPC.

Implicit PIB with regard to social competence (implicit social PIB) was obtained by subtracting the adult's standardized score on the social acceptance subscale of the TRS from the child's standardized score on the likeable/unpopular IAT. Implicit PIB with regard to behavioral self-competence (implicit behavioral PIB) was calculated in the same way, but standardized scores from the behavioral conduct subscale of the TRS and the well-behaved/naughty IAT were used. Thus, a positive PIB score represents a child whose self-ranking of competence is more positive, or larger, than an adult's ranking of the child's ability when compared to peers.

[1] As an alternative, Laird and Weems (2011) suggest using a regression model to calculate group differences in the relationship between the informant's assessment of ability and a criterion variable as an indicator of PIB. The interaction terms created in the regression model can discern whether the relationship between two variables differs across levels of the variables. Results of the regression model can be interpreted in the same way as the standardized discrepancy model. As the current project examines a novel type of PIB, using an implicit measure, and conceptualizes PIB as both independent and dependent variables, we decided to use the standardized discrepancy model in the analyses for a more parsimonious interpretation of results.

Implicit Association Test scoring. Prior to conducting analyses for the primary research questions, the frequency and latency values on the IAT were calculated for each child to ensure that each child's scores met IAT scoring requirements. To determine a child's implicit self-perception of social and behavioral competence, a *D* score was created for each child using the procedure outlined by Greenwald et al. (2003). First, trials that took longer than 10,000ms were deleted and then participants' IAT data were deleted if they responded to more than 10% of trials in fewer than 300ms. To account for differences in response latencies and error rates based on speed (i.e., children with ADHD having a higher rate of impulsive, inaccurate responses than TD children), a 600ms penalty score was added to the response latency of all incorrect responses (Greenwald et al., 2003). A *D* score was calculated that represented the mean response times for the critical blocks divided by the standard deviations for all blocks. Larger *D* values indicate more positive self-perceptions[2].

All analyses were run with the inclusion of penalty scores for incorrect responses in the entire sample and then re-analyzed excluding children with large error response rates (more than 30% of responses were incorrect). The majority of the results remained in the same direction and significance regardless of whether children with a high error response rate were included in the analyses. The only exceptions were that social explicit PIB predicting adult-rated anxiety symptoms, and the interaction of behavioral explicit PIB and behavioral implicit PIB predicting adult-rated depression symptoms became significant when children with a high error response rate were not included in analyses. We chose to retain the entire sample in the final analysis because of the small size of the group with ADHD and because it was possible that the

[2] It is also possible that a larger *D* score could represent larger variability in response time for children with ADHD relative to TD children. Therefore, group differences in the standard deviations of the response times within blocks on the IAT were examined.

significant results found with a smaller sample size might have been unstable. Therefore, all children were included in study analyses.

Data Transformations. IAT data were truncated such that response latencies that were less than 300ms were changed to 300ms and response latencies that were greater than 5,000ms were changed to 5,000ms, because lower and upper tail response latency truncations have been suggested to improve IAT performance (Greenwald et al., 2003). Moreover, examination of the response time latencies suggested that the current sample responded with more variability than typical samples (Sriram, personal communication, February 22, 2013), which is not altogether surprising for a sample with attention difficulties. Further, split-half reliability analyses revealed that the first and second halves of the behavioral IAT were not significantly correlated (behavioral IAT $r = .14$, $p = .22$; social IAT $r = .30$, $p = .01$). Therefore, to maximize the psychometric properties of the IAT, two data transformations were performed to determine which transformation would best reduce the potential biases resulting from the large variance in this sample (Sriram, Nosek, & Greewald, unpublished manuscript). Data were log transformed and rank transformed (to normalize the distribution; Sriram et al.). Follow-up split-half reliability calculations suggested that the rank transformation was the most effective transformation in reducing bias related to response time for the current sample (split-half reliability calculations: behavioral IAT $r = .31$, $p = .01$; social IAT $r = .33$, $p < .01$).

Note, given this kind of transformation is not typically applied to IAT data, data were also analyzed using the raw IAT scores (generated before the response latencies were truncated) and the IAT scores that were generated after the response latencies were truncated (but not transformed). Results were in the same direction regardless of the IAT scores used as predictors; however, there were a few analyses that became significant when the raw and truncated IAT

scores were used in analyses that were not significant when the rank transformed IAT scores were used[3]. Because the findings were only significant in analyses with the IAT data that had low reliability, it was decided that the rank transformed IAT scores would be used in the current study.

Potential influence of interventions on implicit results. The impact of treatment on IAT scores was considered, as it was possible that the intervention to which the child was assigned prior to administration of the IAT may have influenced his or her responses on the measure. For example, a child who was administered the IAT while in the MOSIAC intervention aimed towards social inclusion might have more positive associations between the self and being socially competent than a child who was administered the IAT while in the COMET intervention, which was aimed towards behavior management. Research examining the influence of treatment on automatic associations suggests that implicit associations are sensitive to treatment effects. Teachman and Woody (2003) found that changes in automatic associations of panic (as assessed by the IAT) were associated with the reduction of panic symptoms in participants. Gollwitzer, Banse, Eisenbach, and Naumann (2007) investigated the effect of a 13-week social competence intervention on adolescents' explicit and implicit aggression. While no changes in explicit or implicit measures were found during the course of the intervention, reductions were found in implicit and explicit aggression during the time period from the end of

[3] Specifically, when the raw IAT scores were used, implicit social PIB positively predicted scores on the CDI (β = .34, p = .01) and the interaction of explicit behavioral PIB and implicit behavioral PIB predicted adult-rated depression symptoms (at p = .05), such that there was a trend for explicit PIB to be positively associated with adult-rated depression symptoms in children with low implicit social PIB (β = .35, p = .06), but the relationship was not significant for children with high implicit social PIB (β = -.19, p = .20). When the truncated IAT scores were used, a positive relationship between implicit social PIB and scores on the CDI was supported. The interaction term of explicit social PIB and implicit social PIB also predicted scores on the CDI, such that a negative relationship between explicit social PIB and CDI scores was suggested for children with low implicit social PIB (β = -.45, p < .01), but no relationship was suggested for children with high implicit social PIB (β = -.06, p = .69). Additionally, the interaction term of explicit behavioral PIB and implicit behavioral PIB predicted adult-rated depression symptoms, such that a significant association was supported between depression symptoms and explicit behavioral PIB in children with low implicit social PIB (β = .38, p = .05), but no relationship was supported in children with high implicit social PIB (β = .16, p = .28).

the training to the 4 month follow-up. In the current study, at the time that the IAT was administered, TD children had received an intervention for between 0-2 weeks, and children with ADHD had received an intervention from anywhere between 0-4 weeks. Given the results of the research previously mentioned, it was possible that the brief intervention influenced the implicit associations of children in the current study. The results of adding the length of time each participant had received treatment before the IAT was administered as well as the intervention condition in which he or she was participating at the time of IAT administration to the regression model as covariates is explained in the "Covariates" section.

Covariates. In order to isolate the relationship between PIB and symptoms of psychopathology in Hypothesis 2, child ADHD status was included as a covariate in all regression models. The influence of co-morbid pathology on PIB was also considered. Data were reanalyzed to include child depression symptoms and aggressive symptoms as covariates on Step 1 because those variables may influence self-perceptions of competence in children (Hoza et al., 2010; Owens et al., 2007). Additionally, as the intervention and the length of time (measured in days) that a child was in a given intervention when the IAT was administered could influence IAT results, the variables were also entered as covariates in Step 1. However, depression symptoms were not included as a covariate in models where adult-reported or child-reported depression symptoms was the criterion variable, and child aggressive symptoms were not included as a covariate in models where externalizing symptoms was the criterion variable. Results did not change appreciably when multiple covariates were added; therefore the results presented only include child ADHD status as a covariate.

Multicollinearity. Children with ADHD were allowed to meet criteria for comorbid psychopathology, but TD children were not included in the larger study if they met diagnostic

criteria for any disorder. Also, there was a large overlap between the items used to endorse a diagnosis of ADHD and to endorse externalizing symptoms on the CBCL. Therefore, it was expected that child ADHD status would be significantly correlated with psychopathology symptoms. The variance inflation factor (VIF) was calculated for each regression model in Hypothesis 2 to assess the presence of multicollinearity. The VIF provides a measure of how much of the variance between regression coefficients is increased owing to the collinearity between the variables (Cohen, Cohen, West, & Aiken, 2003). The independent and dependent variables in the regression model are used to determine the VIF. We considered multicollinarity to be present if the VIF value was greater than three, which is considered to be a conservative criterion (O'Brien, 2007).

The VIF statistic suggested that there was evidence for multicollinearity between the regression coefficients in the social PIB and behavioral PIB analyses. Specifically, child ADHD status and adult-rated externalizing symptoms were intercorrelated with explicit social PIB (VIF = 3.76 and 3.82, respectively), implicit social PIB (VIF = 4.05 and 3.68, respectively), the interaction of implicit and explicit social PIB (VIF = 4.07 and 3.83, respectively), explicit behavioral PIB (VIF = 3.99 and 3.98, respectively), implicit behavioral PIB (VIF = 4.25 and 3.97, respectively), and the interaction of implicit and explicit behavioral PIB (VIF = 4.46 and 3.73, respectively). When adult-rated depression symptoms was the psychopathology outcome examined, child ADHD status was intercorrelated with the interaction term of explicit behavioral PIB and implicit behavioral PIB (VIF = 3.12). It should be noted that no VIF was larger than the traditional threshold value of 10, the value that suggests severe multicollinearity, but a value this extreme is rare in science research (Cohen et al., 2003).

Although evidence was suggested for multicollinearity in the current study, we decided to retain the externalizing and depression symptoms in study analyses. The decision was based on a number of factors. First, the statistical assumptions of a few solutions for multicollinearity were not met by the current study data (Cohen et al., 2003) [4], making the solutions inappropriate for the study. Second, literature suggests a significant relationship between explicit PIB and externalizing symptoms, explicit PIB and depression symptoms (Hoza et al., 2004), and child depression and implicit self-esteem (Franck et al., 2007), so it was theoretically important to retain the variables in the current study. Finally, as strong support exists for the effect of child ADHD status on explicit PIB, dropping that variable from the model, another option for remedying multicollinearity (Cohen et al.), would not be theoretically supported[5].

Analyses

Hypothesis 1a. The first research question involved identifying explicit and implicit self-perceptions of competence in children with ADHD and TD children. An independent samples *t*-tests was conducted comparing the ADHD and TD groups on the SPPC and then on the IATs.

Hypothesis 1b. To expand on the first research question, the presence of PIB in children with ADHD and TD children when using implicit versus explicit measures of competence was

[4] Cohen and colleagues (2003) suggested conducting a principal components regression to understand the strength of the relationship between the principle components of the predictor variables and the outcome variable. However, the assumptions of the principal components regression failed in our sample (Hadi & Ling, 1998). Ridge regression analyses are also used with large VIFs; however, the VIFs in the current sample were too low for that regression technique to be considered.

[5] As an exploratory step, we decided to reanalyze the VIFs for the models that included externalizing symptoms and adult-rated depression symptoms with TD children only. When children with ADHD were removed from the model, the VIFs were no longer greater than three. Additionally, neither social nor behavioral PIB predicted child externalizing symptoms when only TD children were included in the model. Children with ADHD were also excluded from the model where behavioral PIB predicted child depression symptoms. The VIFs were no longer significant when children with ADHD were no longer in the model and the results of the regression model were not significant.

examined. An independent samples *t*-test was conducted between the ADHD and TD groups on explicit PIB and implicit PIB related to social and behavioral competence.

Hypothesis 2. The aim of the second research question was to examine the incremental predictive power of implicit PIB and explicit PIB in predicting symptoms of child psychopathology. To understand the contribution of PIB to symptoms of psychopathology, we included both children with ADHD and TD children in the analyses. Child ADHD status was included as a covariate in the model. It was hypothesized that implicit PIB would explain incremental variance in psychopathology symptoms beyond the variance accounted for by explicit PIB. A hierarchical linear regression was used. Social and behavioral competencies were examined in separate models. It was expected that PIB might be differentially associated with child and adult reports of psychopathology symptoms. Therefore, child self-reports and adult reports of child psychopathology symptoms were examined in separate models, when possible. The regression model included explicit and implicit PIB to predict the given psychopathology criterion variable.

In the current study, the criterion variables were adult-ratings of the child's externalizing symptoms, anxiety symptoms, or depression symptoms on the CBCL; child-reported depressive symptoms on the CDI; or child-rated anxiety symptoms on the MASC. Child diagnostic status was entered in Step 1. Explicit PIB was entered in Step 2, implicit PIB was included in Step 3, and the interaction of explicit and implicit PIB was included in Step 4.

Hypothesis 2 required ten regression models to be conducted (five models examining social competence and five models examining behavioral competence). Although there was a potential for Type I error to be inflated using this approach, the investigators were hesitant to apply a Bonferroni correction because this was an exploratory study.

Data were also examined with regard to the presence of outliers and the distribution of continuous variables.

Power Considerations

Power analyses were calculated at $\alpha = .05$ with $n = 79$ participants using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). Effect sizes derived from previous literature suggest, on average, medium to large effects when examining explicit self-perceptions in children with and without ADHD (Hoza et al., 2004). It is more difficult to determine estimates of effect sizes for implicit self-perceptions in children with ADHD, as this is the first study to utilize the preschool version of the Implicit Association Test for this population. However, Cvencek and colleagues (2011) had significant results in their study examining gender differences in children using the PIAT, despite having a calculated power of .64. The calculated power for the current study sample at a medium effect size is .64 and for a large effect size it is .94. Thus, the current sample size of 23 children with ADHD and 56 typically developing children was considered to be adequate for the purposes of this investigation, as this is an exploratory study. For Hypothesis 2, the calculated power estimate for a hierarchical regression analysis for one group with four predictors and a medium effect size is .77 and .99 for a large effect size.

Results

Missing Data

Data were incomplete for two children whose teachers did not return ratings of the child's competence and psychopathology symptoms. To prevent the reduction of power in analyses involving adult ratings, parent ratings of child competence and psychopathology symptoms were substituted in place of adult ratings for those two children only.

Descriptive Statistics

Children with ADHD and TD children did not significantly differ from each other in their self-ratings of anxiety symptoms ($t(76) = -0.81$, $p = .42$), but children with ADHD self-reported more depression symptoms than TD children ($t(76) = -3.01$, $p < .01$; Table 2). Parents and teachers did not significantly differ from each other in their ratings of child symptoms of withdrawal/depression or aggression (Table 3). However, teachers rated children higher in anxiety symptoms ($t(76) = -2.35$, $p = 0.22$) and externalizing symptoms ($t(76) = -4.25$, $p < 0.01$) relative to parents. A strong, positive correlation was found between parent and teacher ratings of psychopathology symptoms on all measures (Table 4). A mean score of parent and teacher ratings of child psychopathology symptoms was created to reduce the total number of analyses conducted with highly correlated variables (i.e., a mean score of adult-rated anxiety symptoms was created, a mean score of adult-rated depression symptoms was created, etc.). Adults rated children with ADHD as having significantly greater anxiety ($t(76) = -8.00$, $p < .01$), depression ($t(76) = -8.27$, $p < .01$), externalizing ($t(76) = -14.07$, $p < .01$), and aggressive($t(76) = -13.91$, $p < .01$) symptoms than TD children[6] (Table 2).

Table 5 displays the correlations between child measures of implicit and explicit self-perceptions of competence, and adult measures of child competence. Results suggest a medium, positive relationship between adult ratings of child behavioral competence on the TRS and child self-report of behavioral competence on the SPPC. Additionally, a large, positive correspondence was found between adult ratings of child behavioral competence on the TRS and adult ratings of child social competence on the TRS. Although non-significant, a medium, positive relationship was found between child scores on the social IAT and the behavioral IAT. A non-significant,

[6] IQ scores of children with ADHD were significantly lower than the IQ scores of TD children ($t(76) = 3.79$, $p < 0.01$). Child IQ was examined as a covariate in regression analyses predicting psychopathology symptoms, but results did not suggest that IQ was significantly associated with symptoms of psychopathology.

medium, positive relationship was also suggested between child score on the social SPPC and behavioral SPPC. Finally, the weak, negative correlation found between child scores on the IAT and the SPPC in both the social and behavioral domains was also non-significant.

Child response latencies on the IAT. After adding a 600ms penalty score to incorrect responses, as was mentioned in the Data Analytic Plan, response latencies of children with ADHD (M = 2332.99, SD = 911.84) did not differ from the response latencies of TD children (M = 2073.70, SD = 730.92; $t(75) = -1.29$, $p = .20$)[7]. However, TD children classified a greater percentage of stimuli accurately (M = .95, SD = .04) than did children with ADHD (M = .91, SD = .07; $t(75) = 2.74$, $p = .01$).

Hypothesis 1a

The means and standard deviations of children's implicit and explicit self-perceptions of competence can be found in Table 6. Independent samples t-tests revealed that, as predicted, children with ADHD and TD children did not differ in their explicit self-reports of social competence ($t(77) = .61$, $p = .54$; $d = .18$), or their explicit self-reports of behavioral competence ($t(77) = 1.21$, $p = .23$; $d = .34$). However, contrary to the study hypothesis, children with ADHD and TD children did not differ in their implicit scores of social competence ($t(77) = 1.14$, $p = .26$; $d = .30$) or behavioral competence ($t(77) = -.21$, $p = .84$; $d = .04$).

Hypothesis 1b

Table 6 also displays the means and standard deviations of children's implicit and explicit PIB scores. Independent samples t-tests suggested that children with ADHD had larger explicit social PIB scores ($t(76) = -6.08$, $p < 0.01$; $d = 1.52$) and explicit behavioral PIB scores ($t(76) = -5.75$, $p < .01$; $d = 1.34$) than TD children. Additionally, children with ADHD had larger

[7] Differences between the two groups remained non-significant when the 600ms error penalty was not added to inaccurate responses ($t(76) = -0.19$, $p = .85$)

implicit social PIB scores ($t(76) = -5.56$, $p < .01$; $d = 1.39$) and implicit behavioral PIB scores ($t(76) = -6.73$, $p < .01$; $d = 1.53$) than TD children. Thus, the differences between explicit PIB in children with ADHD and TD children were consistent with study hypotheses, but the difference between implicit PIB in the two child groups were inconsistent with study hypotheses.

Hypothesis 2

The regression analyses for social PIB and behavioral PIB predicting symptoms of psychopathology are displayed in Table 7 and Table 8, respectively.

PIB predicting externalizing symptoms. Contrary to study hypotheses, neither the main effect of explicit behavioral PIB nor the main effect of implicit behavioral PIB significantly predicted adult-rated externalizing symptoms on the CBCL. However, adult-rated externalizing symptoms were significantly predicted by the interaction term of explicit behavioral PIB and implicit behavioral PIB (see Table 8). Probing of the interaction revealed a significant, positive relationship between explicit behavioral PIB and externalizing symptoms for children with high implicit behavioral PIB (PIB that was one standard deviation above the mean; $\beta = .45$, $p < .01$). No relationship between explicit behavioral PIB and externalizing symptoms was found in children with low implicit PIB (one standard deviation below the mean; $\beta = -.04$, $p = .78$; see Figure 1).

PIB predicting anxiety symptoms. Contrary to study hypotheses, a positive association was suggested between implicit social PIB and child-rated symptoms of anxiety on the MASC ($\beta = .40$; $p < .01$), such that children with larger implicit social PIB tended to have greater self-reported anxiety symptoms. The main effect of explicit social PIB and the interaction of explicit social PIB and implicit social PIB were not significant (see Table 7). Behavioral PIB did not

significantly predict anxiety symptoms on the MASC. Neither social PIB nor behavioral PIB significantly predicted adult-rated anxiety symptoms on the CBCL[8].

PIB predicting depression symptoms.

Social PIB. When child diagnostic status was included as a covariate, a negative association was found between child explicit social PIB and child-reported symptoms of depression on the CDI (β = -.31, p = .02), such that children with larger explicit social PIB tended to have lower self-reported depressive symptoms. The negative association supported study hypotheses; however, neither the main effect of implicit PIB nor the interaction terms of explicit PIB and implicit PIB were significant.

Behavioral PIB. When child diagnostic status was included as a covariate, a negative relationship was found between child explicit behavioral PIB and child-rated depression symptoms on the CDI (β = -.44; p < .01), such that children with larger explicit behavioral PIB self-reported fewer symptoms of depression. In contrast, results indicated a positive relation between implicit PIB and depression symptoms on the CDI (β = .30; p = .02), such that children with larger implicit behavioral PIB self-reported greater depression symptoms. Thus, the relationship between explicit behavioral PIB and depression symptoms supported study hypotheses, but the relationship between implicit behavioral PIB and depression contradicted study hypotheses. The interaction between explicit and implicit behavioral PIB was not a significant predictor of child-reported depression symptoms on the CDI. Moreover, neither

[8] The interaction of child ADHD diagnostic status and explicit PIB, as well as the interaction of child ADHD diagnostic status and implicit PIB predicting anxiety symptoms on the MASC and the CBCL was examined. Results were that explicit behavioral PIB was negatively associated with anxiety symptoms on the MASC in children with ADHD (β = -.41, p = .05), but there was no relationship for TD children (β = 01, p = .96). The interaction of PIB and child diagnostic status did not significantly predict anxiety symptoms on the CBCL.

behavioral PIB nor social PIB were significant predictors of adult-rated depression symptoms on the CBCL[9].

Discussion

The current study examined the discrepancy between children's self-perceptions of competence (as assessed via explicit and implicit measures) and adult ratings of ability in children with ADHD and TD children. As expected, children with ADHD had significantly larger explicit PIB related to social and behavioral competence (i.e., more inflated self-perceptions of competence relative to adult rankings of child ability) when compared to TD children. Contrary to study hypotheses, children with ADHD also had significantly larger implicit PIB related to social and behavioral competence when compared to TD children.

Moreover, findings indicated that implicit PIB and explicit PIB each incrementally predicted symptoms of psychopathology with the magnitude and direction of the effects depending on the type of psychopathology examined, the informant, and the PIB domain. After statistical control of child ADHD diagnostic status, results suggested that implicit social PIB (but not explicit social PIB) was positively associated with child-rated symptoms of anxiety. By contrast, explicit social PIB (but not implicit social PIB) was negatively associated with child-rated symptoms of depression. When behavioral PIB measures were examined as predictors, child-rated symptoms of depression were negatively associated with explicit behavioral PIB, but positively associated with implicit behavioral PIB. Adult-rated externalizing symptoms were not significantly predicted by either implicit or explicit PIB (social or behavioral) as main effects.

[9] The interaction of child ADHD diagnostic status and explicit PIB, as well as the interaction of child ADHD diagnostic status and implicit PIB predicting child-rated and adult-rated depression symptoms was examined. The interaction of child ADHD diagnostic status and implicit social PIB predicting child-rated depression was significant. Probing of the interaction revealed a positive association between implicit social PIB and child-rated symptoms of depression for children with ADHD ($\beta = .64$, $p = .01$), but no relationship for TD children ($\beta = .04$, $p = .81$). Adult-rated depression symptoms were not associated with the interaction of child ADHD diagnostic status and PIB.

However, there was a significant interaction term of implicit behavioral PIB and explicit behavioral PIB predicting adult-rated externalizing symptoms, such that explicit PIB and externalizing symptoms were positively associated in children with large implicit PIB, but no relation between externalizing symptoms and explicit behavioral PIB was suggested for children with small implicit PIB.

Implications of Implicit PIB Found in Children with ADHD

The self-protective hypothesis has been the leading explanation for PIB, supported by experimental studies finding that social desirability and ego protection are positively associated with explicit PIB (Ohan & Johnston, 2002). However, results of the current study were that children with ADHD had larger PIB than TD children on both implicit and explicit measures, suggesting that inflated self-competence is less likely to be a result of social desirability than was posited by the self-protective hypothesis (Owens et al., 2007). The first assumption of the cognitive immaturity hypothesis, which has been postulated as another explanation for explicit PIB found in children with ADHD, is that the inability to accurately self-report competence stems from delays in the development of metacognition in children (Bjorklund & Green, 1992). It would be expected that the delays would influence the child's PIB at both the explicit and implicit levels because children would be unable to accurately evaluate their self-ratings of competence.

Limited empirical support exists for the cognitive immaturity hypothesis as an explanation for explicit PIB in children with ADHD. McQuade, Tomb, and colleagues (2011) compared cognitive abilities in children with ADHD who exhibited explicit PIB, children with ADHD who did not exhibit explicit PIB, and TD children. As expected, TD children had greater cognitive ability relative to children with ADHD with and without PIB. Importantly, children

with ADHD and large PIB in the social domain had poorer executive functioning, cognitive fluency, and working memory than children with ADHD and small PIB in the social domain. Thus, an examination of cognitive maturation revealed that cognitive abilities were negatively associated with explicitly-measured social PIB, consistent with the cognitive immaturity hypothesis.

It is important to note that a relationship between cognitive functioning and explicit PIB in children with ADHD within the behavioral domain was not supported in the study by McQuade, Tomb, and colleagues (2011). However, the second assumption made by the cognitive immaturity hypothesis, that children with ADHD might report less inflated self-competence as their cognitive abilities develop, has received indirect support. On average, cognitive abilities related to executive functioning in children with ADHD tend to develop later than do similar abilities in TD children. Specifically, the prefrontal cortex, which is associated with working memory, forethought, and sense of time, matures slower and is underactive in children with ADHD (Barkley, 1997). It is possible that differences in executive functioning or differences in the maturation of the prefrontal cortex could potentially explain implicit PIB in children with ADHD. That is, it would be equally difficult for children with ADHD to rate their competencies when compared to TD children on implicit and explicit measures because they do not have the cognitive abilities to rate themselves accurately.

Results suggest that inflated implicit self-competence occurs at an automatic level and could be at least partly explained by cognitive immaturity; however, it is also possible that child implicit PIB could also have been affected by child self-protection. Although speculative, an alternative explanation for implicit PIB could be that children with ADHD may inflate their explicit self-reports of competence frequently in an attempt to appear more competent to others

and, as a result, their implicit self-competence eventually becomes inflated. In other words, the self-protection which initially occurred at the conscious level begins to influence child competence at an automatic level. Indirect support for this explanation comes from research using training of implicit association to change adult explicit anxiety behaviors (Clerkin & Teachman, 2010). Clerkin and Teachman (2010) found that adults who were trained to attend to less threatening information using an implicit measure were more likely to complete an anxiety provoking task when compared to individuals who participated in a control version of the training. The investigators speculate that influence in the reverse direction might also be possible, and that explicit self-competence could influence the child's implicit self-competence. The data used in the current study is cross-sectional, making the direction of the relationship between explicit and implicit PIB unknown; however it is possible that both cognitive immaturity and self-protection could explain PIB in children with ADHD.

Future research related to implicit PIB. Although the current study did not examine participants' executive functioning or brain development, it could be possible to examine differences in explicit and implicit PIB within the population with ADHD based on the maturation of their prefrontal cortex. In accordance with the cognitive immaturity hypothesis, it would be expected that children with ADHD and well-developed prefrontal cortices would have less explicit and implicit PIB than children with ADHD and poorly-developed prefrontal cortices. A similarly negative relationship between brain maturation and explicit and implicit PIB would be expected in TD children. If the social and behavioral domains were examined separately, it might be possible to determine which areas of the brain were associated with implicit PIB and target interventions toward improving cognitive abilities in the area that is least developed.

A longitudinal study would also help differentiate whether the self-protective hypothesis or the cognitive immaturity hypothesis is a more accurate explanation for implicit PIB found in children with ADHD. If implicit PIB is related to a child's cognitive development, then it would be expected that implicit PIB would decrease as the child ages, independent of the child's explicit PIB. However, if implicit PIB is related to self-protection, then it would be expected that child implicit PIB would vary based on child explicit PIB. We might expect changes in child implicit PIB to lag behind changes in child explicit PIB, if we assume that implicit PIB is influenced by repeated explicit inflations of competence.

PIB Predicting Psychopathology Symptoms

It is important to note that the study results of explicit PIB predicting symptoms of psychopathology were consistent with previous explicit PIB literature (for review, see Owens et al., 2007). Specifically, child-rated depression symptoms were negatively associated with explicit PIB in the social and behavioral domains, no relation between anxiety symptoms and explicit PIB was found in the social or the behavioral domains, and a positive relation between explicit PIB and adult-rated externalizing symptoms was found in children with large implicit PIB in the behavioral domain (a main effect for explicit PIB predicting externalizing symptoms was not supported). These associations between explicit PIB and symptoms of psychopathology suggest that the current study sample is representative of the population of children with ADHD. With regard to implicit PIB, results suggest that the majority of child participants in the study were able to attend to the items presented on the IAT, therefore the IAT used in the current study is believed to be developmentally appropriate for the sample.

Unlike explicit PIB, which tends to be positively correlated with externalizing symptoms and negatively correlated with depression symptoms, a positive relationship was found between

implicit PIB and symptoms of psychopathology regardless of the symptom domain examined. That is, a positive association was supported between implicit PIB and child-reported depression symptoms in the behavioral domain, implicit PIB and child-reported anxiety symptoms in the social domain, and a positive association between implicit PIB and adult-rated externalizing symptoms among children with large explicit PIB in the behavioral domain (a main effect for implicit PIB predicting externalizing symptoms was not supported). The positive relationship between implicit PIB and psychopathology symptoms was contrary to study hypotheses.

Although self-esteem and PIB are not equivalent constructs, and are not fully comparable, the self-esteem literature is the primary area that examines the association between implicit and explicit self-perceptions. Results of the current study suggest that, unlike implicit self-esteem which is often negatively associated with symptoms of psychopathology (Bosson et al., 2003; De Jong, 2002), having inflated implicit self-competence was positively associated with symptoms of psychopathology. Therefore, the self-esteem profiles that were associated with symptoms of psychopathology in adults (Zeigler-Hill, 2011) might not be as applicable when describing PIB. Specifically, high PIB on implicit and explicit measures, which would correspond to the secure self-esteem profile (see p. 24 for description of this profile), was associated with greater symptoms of externalizing psychopathology in the current study. In contrast, in prior work on self-esteem, secure self-esteem was associated with fewer symptoms of psychopathology (Zeigler-Hill). However, similar to the discrepancy between implicit and explicit self-esteem, the discrepancy between implicit and explicit PIB was also associated with greater symptoms of psychopathology.

Despite differences between implicit self-esteem and implicit PIB, the self-esteem literature could provide a possible explanation for understanding the important relationship

between implicit PIB and internalizing symptoms. The dual-attitudes hypothesis suggests that people can hold an implicit attitude toward an object that differs from their explicit attitude toward that object (Wilson, Lindsey, & Schooler, 2000), and that both attitudes influence a person's behaviors. Similarly, the dual-process framework suggests that individuals might experience greater levels of psychopathology because their implicit self-goals do not match their explicit ability to accomplish those goals (Franck et al., 2007). Results of the current study suggest the possibility that children high in anxiety and depression symptoms hold two contrasting perceptions of their competence. That is, their implicit perception is that they have similar social and behavioral competence as compared to their peers, but their explicit self-perception is that they are unable to perform as well as their peers. The differences in their explicit PIB and implicit PIB might create a tension that presents as symptoms of psychopathology.

An examination of the relation between symptoms of psychopathology and explicit versus implicit PIB adds to the PIB literature because it provides a better understanding of the contribution of inaccurate self-competence to psychopathology symptoms and confirms the importance of using multiple measures to examine self-competence. Specifically, results of the current study suggest that regardless of the accuracy of a child's explicit self-competence when compared to adult rankings of child ability, children who inflate their implicit self-competence relative to adult-rankings of their ability tend to have greater symptoms of self-reported psychopathology symptoms than children with more accurate implicit self-competence.

It should be noted that child self-reports of depression and anxiety were significantly associated with PIB in the current study, but adult scores of depression and anxiety symptoms were not associated with PIB. The relation between child ratings of psychopathology symptoms

and PIB was consistent with previous research suggesting that school-aged children's self-reports of internalizing psychopathology symptoms were more often correlated with the child's later-developing depressive psychopathology and other developmental outcomes when compared to the predictive ability of adult reports of child psychopathology (Ialongo, Edelsohn, & Kellam, 2001). Therefore, it is possible that child self-reports of internalizing psychopathology symptoms might be more sensitive to detecting "at-risk" levels of psychopathology when compared to adult ratings of similar symptoms.

Externalizing symptoms were the only significant adult-rated psychopathology associated with PIB in the current study. Child-rated externalizing symptoms were not measured in the current study, so it was not possible to determine whether the relation between PIB and clinical symptoms of externalizing psychopathology would differ based on informant. It is possible that children might underreport their externalizing symptoms because of their desire to appear more competent to others, which might make the relationship between child-reported externalizing symptoms and PIB non-significant.

Future research examining psychopathology and implicit PIB. To the investigators' knowledge, only a couple of longitudinal studies exist that examine explicit PIB in the behavioral and social domains in children with ADHD and TD children (Hoza et al., 2010; McQuade, Hoza, et al., 2011). McQuade, Hoza, and colleagues (2011) found that decreased PIB in children with ADHD was associated with increased symptoms of depression and negative attributions. As was previously mentioned, the developmental trajectory of PIB differed between the ADHD and TD child groups and both groups developed similar levels of PIB in adolescence (Hoza et al.). Hoza and colleagues (2010) found that depression symptoms were more strongly negatively associated with explicit PIB in the ADHD group when compared to the TD group.

PIB symptoms were also more positively associated with aggression in the ADHD group when compared to the TD group. Therefore, results suggest that the relation between explicit PIB and psychopathology changes over time, with symptoms of psychopathology preceding the change in explicit PIB. It would be interesting to determine whether implicit PIB could also be examined longitudinally. Specifically, it would be important to determine whether inflated implicit self-competence remains stable over time in children high in symptoms of psychopathology or whether changes in implicit and explicit PIB both occur after an increase in symptoms of psychopathology. If implicit PIB remains larger in the group with more symptoms of psychopathology, then it would support the dual-process hypothesis that psychopathology symptoms increase as a child's implicit PIB and explicit PIB become more discrepant.

A longitudinal study would also provide information regarding the relationship between explicit and implicit PIB in children who develop symptoms of psychopathology that meet clinical thresholds versus those whose psychopathology symptoms remain at subclinical levels. Evidence for differences in implicit and explicit self-esteem based on subthreshold and clinical threshold symptoms have been found in adults with depression and BDD (Buhlmann et al., 2008), therefore suggesting the possibility that the same relation might be found in other psychopathology. Determining the relationship between explicit and implicit PIB in children who are in the subclinical range and meet criteria for disorder might help advance the understanding of ways that implicit and explicit PIB interact to influence psychopathology symptoms in children.

Study Strengths

The current study contributes to the existing literature in several ways. First, it expands knowledge on the phenomenon of PIB in children with ADHD through using a novel measure to

examine less controlled self-perceptions of competence. Results challenge the leading hypothesis for PIB as children with ADHD had larger PIB scores than TD children on an automatic, implicit measure and on a controlled, explicit measure. Second, previous research has used explicit and implicit measures to examine the relationship between self-esteem and psychopathology (for review see Zeigler-Hill, 2011); however, only explicit measures have been used to calculate PIB. Thus, results integrate the self-esteem and PIB literatures.

Additionally, the current study has a number of methodological strengths, such as using the mean score of parent and teacher ratings of child ability and symptoms of psychopathology in order to minimize the potential rater bias that might result from obtaining ratings from one informant (Cai, Kaiser, & Hancock, 2004; Grietens et al., 2004). As previous research suggests that the relationship between implicit and explicit reports of ability predicting psychopathology may differ based on informant (Spalding & Hardin, 1999), study analyses included adult ratings and child self-report of psychopathology symptoms when possible.

Study Limitations

Owing to the cross-sectional design of this study, the predictive relationship between PIB and symptoms of psychopathology could not be determined. It is possible that child PIB predicts psychopathology symptoms; psychopathology symptoms predict PIB; or a third variable influences the relation. The investigators speculate that explicit child PIB most likely predicts symptoms of psychopathology, as previous research suggests that children with ADHD who experience a decrease in explicit PIB develop comorbid depression symptoms 6 years later (Hoza et al., 2010). However, it is also possible that a third variable, such as a child's cognitive abilities, may influence the association between PIB and symptoms of psychopathology. As previously mentioned, there is only one study, to the investigators' knowledge, that examines

PIB longitudinally (McQuade, Hoza, et al., 2011). As previous research has suggested that implicit self-esteem is resistant to change (DeHart, Pelham, & Tennen, 2006), it would be interesting to determine whether changes in cognitive ability predict change in implicit PIB.

Another limitation of the study relates to the measure used to assess implicit self-perceptions. A few children with ADHD had difficulty completing the IAT during the first administration and the test was modified to increase the accuracy in their responses. It is possible that the nature of ADHD makes completing the IAT difficult for children with greater symptoms of ADHD or that the combination of ADHD symptoms and cognitive deficits also led to difficulties with IAT completion. Because the majority of the study sample was able to complete the measure, we believe that the IAT could continue to be used to assess implicit attitudes in the population with ADHD; however, future studies should examine the variables that might have contributed to children having low accuracy rates on the IAT and also consider using different measures to assess implicit self-competence. Moreover, owing to the design of the larger intervention from which the study sample was chosen, the population with ADHD was relatively small. All children with ADHD in the larger intervention and only half of the TD children in the larger intervention were selected for inclusion in this study, but that still resulted in more than three times the number of TD children than children with ADHD. A larger ADHD sample would allow for a better understanding of the factors that contributed to the children with ADHD who were unable to complete the IAT.

Another potential limitation of using the IAT to measure implicit self-perceptions in the current study is the possibility that implicit self-perceptions might not be fully formed in young children. Therefore, although previous research has attributed the low correlation between explicit and implicit measures in adults to differences in the constructs assessed by the two

measures (Nosek & Smyth, 2007), it is also possible that the low correlation between the explicit and implicit measures found in the current study could be explained by poorly formed implicit self-perceptions in children between age 6 and 9 years old. Harter (1985) suggested that children younger than 6 years old might not be accurate reporters of their explicit general competence and, therefore, the general competence domain was not included in the explicit measure of competence for younger children. Although speculative, it is possible that a child's ability to assess implicit self-competence also varies by age, such that an IAT could be an appropriate measure to determine more concrete constructs or attitudes, such as racial bias in young children (Baron & Banaji, 2006), but that examining more abstract self-evaluations, such as social and behavioral self-competence, might be developmentally inappropriate for children.

Finally, although the current study used the self-protection and cognitive immaturity hypotheses as explanations for the presence of PIB in children, the mechanisms that explain those hypotheses were not measured. Specifically, self-presentation desires or differences in cognitive abilities between children that exhibited PIB and the children that did not exhibit PIB were not assessed. Previous research found a negative association between explicit PIB and various areas of brain functioning (McQuade, Tomb et al., 2011), and research suggests that children with ADHD will improve the accuracy of their self-perceptions of competence as the sections of their brain that are related to executive functioning (e.g., the prefrontal cortex) mature (Barkley, 1997; Nigg, 2006). It is also possible that cognitive differences influenced the response times on the IAT (Lambert, 2011). Therefore, differences at either the cognitive or self-protective levels could have influenced PIB.

Clinical Implications

The majority of interventions that have been found to affect explicit PIB in children with ADHD involved adults providing positive feedback to children with ADHD, which caused the children to deflate their explicit PIB (for review, see Owens et al., 2007). However, children with ADHD who are aggressive and receive more positive than negative feedback from adults in front of their TD peers are often less popular with peers (Jack, Mikami, & Calhoun, 2011), so it would be advantageous to find a way to influence their PIB without increasing their peer problems. PIB is also a tricky concept to treat in children with ADHD because low explicit PIB is associated with greater symptoms of depression (Hoza et al., 2010), suggesting that future research would need to focus on methods that decrease a child's PIB without also increasing depression symptoms.

As a method of reducing the magnitude of children's PIB, it might be advantageous to increase the abilities of children with ADHD as opposed to attempting to reduce their positive self-perceptions. Therefore, the size of the discrepancy between child self-perceptions of competence with adult-rankings of their competence would be reduced because children with ADHD would be ranked by adults as being more competent than they were before being given an intervention. Increasing competencies in children with ADHD has been difficult because improvements made through interventions do not always generalize to other settings (Shipstead, Redick, & Engle, 2012). For example, a major critique of working memory trainings in children with ADHD is that programs that use the same structure throughout the working memory training produce results that do not generalize to other settings (Shipstead et al.).

Rutledge, van den Bos, McClure, and Schweitzer (2012) outline various cognitive trainings that have been used with the ADHD population. Cognitive training refers to interventions that attempt to improve different areas of the child's cognitive abilities. The ideal

cognitive training to improve child abilities would be tailored toward the area with which the child has the least competence. For example, children with large PIB related to social ability might receive an intervention which strengthens their cognitive fluency in order to improve their actual social competence, indirectly. Therefore, social PIB would be reduced by increasing the child's social competence as opposed to reducing PIB through attempting to change the child's implicit or explicit self-perception. The intervention would increase with difficulty as the child mastered each level. It would also be important to ensure that the programs vary in structure to help results generalize across settings.

We anticipate that children with ADHD who receive cognitive trainings targeted toward improving their abilities will have lower PIB than generally exists in children with ADHD, but will continue to have slightly larger PIB than is present in TD children. As a result, children with ADHD and TD children would continue to self-report similar competence, but adults would rank the children with ADHD as more competent after receiving interventions. Thus, the discrepancy between self-perceptions of competence and adult rankings of their competence would be similar between the two child groups.

Although the effects of social skills trainings and behavioral modification trainings rarely generalize to outside of the treatment setting (Antshel & Barkley, 2008), trainings to improve a child's cognitive abilities have been found to generalize to improvements in other areas of the child's abilities (Beck, Hason, Puffenberger, Benninger, & Benninger, 2010; Rutledge et al., 2012). Specifically, computerized programs aimed toward improving working memory in children with ADHD have been found to decrease symptoms of ADHD as rated by teachers and parents (Miranda, Presentacion, Siegenthaler, & Jara, 2011). Therefore, it is possible that

children with ADHD would benefit more from cognitive trainings to improve their abilities than from typically utilized behavioral trainings.

Conclusions

In conclusion, the current study found that children with ADHD had larger explicit PIB and implicit PIB in the social and behavioral domains when compared to TD children. Results also suggest a positive association with child-rated symptoms of anxiety and implicit social PIB; a negative relation between child-rated symptoms of depression and explicit social PIB; and a negative association between child-rated symptoms of depression and explicit behavioral PIB, but a positive association with implicit behavioral PIB. The relation between adult-rated externalizing symptoms and the interaction term of implicit behavioral PIB and explicit behavioral PIB was significant, such that explicit PIB and externalizing symptoms were positively associated in children with large implicit PIB, but no relation between externalizing symptoms and explicit behavioral PIB was suggested for children with small implicit PIB.

Further research is needed to determine the most accurate explanation for PIB in children with ADHD, but current findings have implications for treatment of PIB in terms of providing a basis for the design of child-specific and domain-specific treatments aimed at improving cognitive abilities in children with ADHD. Through this work, researchers can determine whether PIB interventions that do not involve the participation of an adult or peer could increase the accuracy of self-perceptions of competence and implicit self-competence in children with ADHD. Thus, researchers might find a reason to replace the standard method of reducing PIB through providing ample praise to children with ADHD and might also recognize the need for treating PIB in children with high externalizing, depression, and anxiety symptoms. Developing alternate methods for the treatment of children with ADHD is important because parents and

teachers have personal characteristics (adult's level of commitment to the intervention, mental health status, education level) and outside stressors that affect their ability to effectively implement current behavioral interventions (DuPaul & Weydant, 2009), potentially making a cognitive intervention to improve the child's ability easier to implement. A need also exists for treatment that could influence implicit self-competence in children who are at-risk for developing, or meet diagnostic criteria for, depression or anxiety.

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Table 1

Sample Sequence of Trial Blocks for the Three IAT Tasks

IAT Task	Block	No. of trials	Function	Items assigned to left-key response	Items assigned to right-key response
Age	**1**	16	Practice	Others	Self
	2	14	Practice	Kid	Adult
	3	7	Practice	Others + Kid	Self + Adult
	4	12	Test	Others + Kid	Self + Adult
	5	14	Practice	Adult	Kid
	6	7	Practice	Others + Adult	Self + Kid
	7	12	Test	Others + Adult	Self + Kid
Behavioral	**8**	16	Practice	Behaved	Naughty
	9	10	Practice	Others + Behaved	Self + Naughty
	10	16	Test	Others + Behaved	Self + Naughty
	11	26	Practice	Naughty	Behaved
	12	10	Practice	Others + Naughty	Self + Behaved
	13	16	Test	Others + Naughty	Self + Behaved
Social	**14**	16	Practice	Likeable	Unpopular
	15	10	Practice	Others + Likeable	Self + Unpopular
	16	16	Test	Others + Likeable	Self + Unpopular
	17	26	Practice	Unpopular	Likeable
	18	10	Practice	Others + Unpopular	Self + Likeable
	19	16	Test	Others + Unpopular	Self + Likeable

Table 2

Demographic Characteristics of ADHD and TD Children

Variable	ADHD (*n* = 23) Mean (SD)	TD (*n* = 55) Mean (SD)	*p*
Child age (years)	7.22 (.95)	7.34 (.90)	.59
Grade	1.96 (.88)	1.93 (.81)	.89
Family income	$76,789.47 (31,250.92)	$110,031.28 (73,208.96)	.06
Full scale IQ	109.70 (15.95)	122.39 (13.47)	< .01
Male (*n*)	13	26	.42
White (*n*)	17	47	.13
Comorbid ODD (*n*)	5	--	--
Comorbid internalizing (*n*)	4	--	--
Psychotropic medication (*n*)	10	--	--
Aggression symptoms (CBCL)	65.33 (6.61)	51.48 (2.20)	< .01
Externalizing symptoms (CBCL)	63.89 (6.05)	44.27 (5.43)	< .01
Anxious/depressed symptoms (CBCL)	61.83 (6.29)	52.44 (3.92)	< .01
Withdrawn/depressed symtpoms (CBCL)	60.24 (6.00)	51.78 (3.05)	< .01
Depression symptoms (CDI)	50.17 (7.67)	45.79 (5.98)	.01
Anxiety symptoms (MASC)	54.22 (12.16)	52.07 (8.77)	.38

Note. If a child was missing information from one adult, the ratings from the other adult were used. Scores from the Child Behavior Checklist/6-18 (CBCL; Achenbach, 2001) are standardized t-scores. Scores from the Children's Depression Inventory (CDI; Kovacs, 2003) and Multidimensional Anxiety Scale for Children-10 (MASC; March, 1997) are standardized based on age and gender norms.

Table 3
Differences in Parent and Teacher Ratings of Child Psychopathology Symptoms

Variable	Parent Mean (SD)	Teacher Mean (SD)	*P*
Anxiety symptoms	54.49 (6.97)	56.20 (7.32)	.02
Depression symptoms	53.70 (6.00)	54.64 (6.56)	.16
Externalizing behaviors	47.36 (12.96)	52.61 (10.54)	< .01
Aggression	54.97 (8.46)	56.00 (8.33)	.25

Note. Teachers of two children did not return the psychopathology measures. All scores are standardized t-scores.

Table 4

Correlations Between Parent and Teacher Ratings of Child Psychopathology Symptoms and Competence

Variable	Teacher TRS social score	Teacher TRS behavioral score	TRF withdrawn/depressed	TRF externalizing	TRF anxious/depressed
Parent TRS social score	.52**	.47**	-.48**	-.52**	-.46**
Parent TRS behavioral score	.64**	.68**	-.55**	-.63**	-.46**
CBCL withdrawn/depressed	-.48**	-.31**	.59**	.33**	.43**
CBCL externalizing	-.59**	-.56**	.60**	.60**	.54**
CBCL anxious/depressed	-.64**	-.42**	.49**	.44**	.61**

Note. All scores from the Child Behavior Checklist/6-18 (CBCL; Achenbach, 2001) are standardized t-scores. Score on the Teacher's Rating Scale of Child's Actual Behavior (TRS; Harter, 1985) are standardized. A *D* score is reported from the Implicit Association Test (IAT; Greenwald et al., 1998). * $p < .05$. ** $p < .01$.

Table 5

Correlations Between Implicit and Explicit Competence Measures

Variable	1	2	3	4	5	6	7	8	9	10
1. IAT social score	1									
2. IAT behavioral score	.22	1								
3. SPPC social score	.05	-.09	1							
4. SPPC behavioral score	-.00	-.05	.22	1						
5. TRS social score	.22	.04	.21	.14	1					
6. TRS behavioral score	.20	.02	.16	.24*	.81**	1				
7. Explicit social PIB	-.13	-.10	-.64**	-.07	-.62**	-.51**	1			
8. Explicit behavioral PIB	-.17	-.06	-.05	-.62**	-.54**	-.61**	.47**	1		
9. Implicit social PIB	.62**	.14	-.12	-.12	-.63**	-.49**	.40**	.30**	1	
10. Implicit behavioral PIB	.01	.70**	-.17	-.21	-.55**	-.70**	.29**	.40**	.45**	1

Note. All scores from the Self-Perception Profile for Children (SPPC; Harter, 1985) and Teacher's Rating Scale of Child's Actual Behavior (TRS; Harter, 1985) are standardized. The TRS score is the mean score of parent and teacher report of the child's competence. A *D* score is reported from the Implicit Association Test (IAT; Greenwald et al., 1998). * $p < .05$. ** $p < .01$.

Table 6

Differences in Scores of Competence Between Children with ADHD and TD Children

Variable	ADHD (n = 23) Mean (SD)	TD (n = 55) Mean (SD)	p
IAT social score	.18 (.47)	.32 (.45)	.22
IAT behavioral score	.33 (.49)	.31 (.41)	.85
SPPC social score	2.75 (.67)	2.88 (.77)	.48
SPPC behavioral score	3.04 (.66)	3.27 (.68)	.17
TRS social score	2.12 (.52)	3.58 (.48)	< .01
TRS behavioral score	2.20 (.67)	3.75 (.35)	< .01
Implicit social PIB	1.04 (1.00)	-0.41 (1.08)	< .01
Implicit behavioral PIB	1.32 (1.44)	-0.55 (.96)	< .01
Explicit social PIB	1.15 (1.03)	-0.43 (1.05)	< .01
Explicit behavioral PIB	0.96 (1.26)	-0.52 (.93)	< .01

Note. All scores from the Self-Perception Profile for Children (SPPC; Harter, 1985) and Teacher's Rating Scale of Child's Actual Behavior (TRS; Harter, 1985) are standardized. A *D* score is reported from the Implicit Association Test (IAT; Greenwald et al., 1998).

Table 7

Hierarchical Multiple Regression Analyses Predicting Symptoms of Psychopathology from Social Positive Illusory Bias

	Anxiety		Depression		Externalizing		CDI		MASC	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.46		.47		.72		.11		.01	
Child diagnostic status (ADHD=1; TD=0)										
Step 2	.02		.00		.00		.07		.00	
Explicit PIB		.17		.04		.03		-.31*		-.05
Step 3	.00		.01		.01		.01		.11	
Implicit PIB		.04		.12		.13		.18		.40**
Step 4	.00		.00		.00		.01		.00	
Explicit PIB x implicit PIB		-.05		-.06		.00		.09		.04
Total R^2	.48		.49		.74		.20		.13	

Note. Scores of anxious/depressed symptoms, withdrawn/depressed symptoms, and externalizing symptoms are standardized *t*-scores from the Child Behavior Checklist/6-18 (CBCL; Achenbach, 2001). Scores from the Children's Depression Inventory (CDI; Kovacs, 2003) and Multidimensional Anxiety Scale for Children-10 (MASC; March, 1997) are standardized based on age and gender norms. * $p < .05$. ** $p < .01$

Table 8

Hierarchical Multiple Regression Analyses Predicting Symptoms of Psychopathology from Behavioral Positive Illusory Bias

	Anxiety		Depression		Externalizing		CDI		MASC	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.46		.47		.72		.11		.01	
Child diagnostic status (ADHD=1; TD=0)										
Step 2	.00		.00		.00		.13		.02	
Explicit PIB		-.04		-.08		-.03		-.44**		-.17
Step 3	.00		.01		.01		.06		.03	
Implicit PIB		.01		-.09		.10		.30*		.21
Step 4	.00		.02		.02		.01		.00	
Explicit PIB x implicit PIB		-.00		-.15		.15*		-.12		.03
Total R^2	.46		.50		.75		.31		.06	

Note. Scores of anxious/depressed symptoms, withdrawn/depressed symptoms, and externalizing symptoms are standardized *t*-scores from the Child Behavior Checklist/6-18 (CBCL; Achenbach, 2001). Scores from the Children's Depression Inventory (CDI; Kovacs, 2003) and Multidimensional Anxiety Scale for Children-10 (MASC; March, 1997) are standardized based on age and gender norms. * $p < .05$. ** $p < .01$

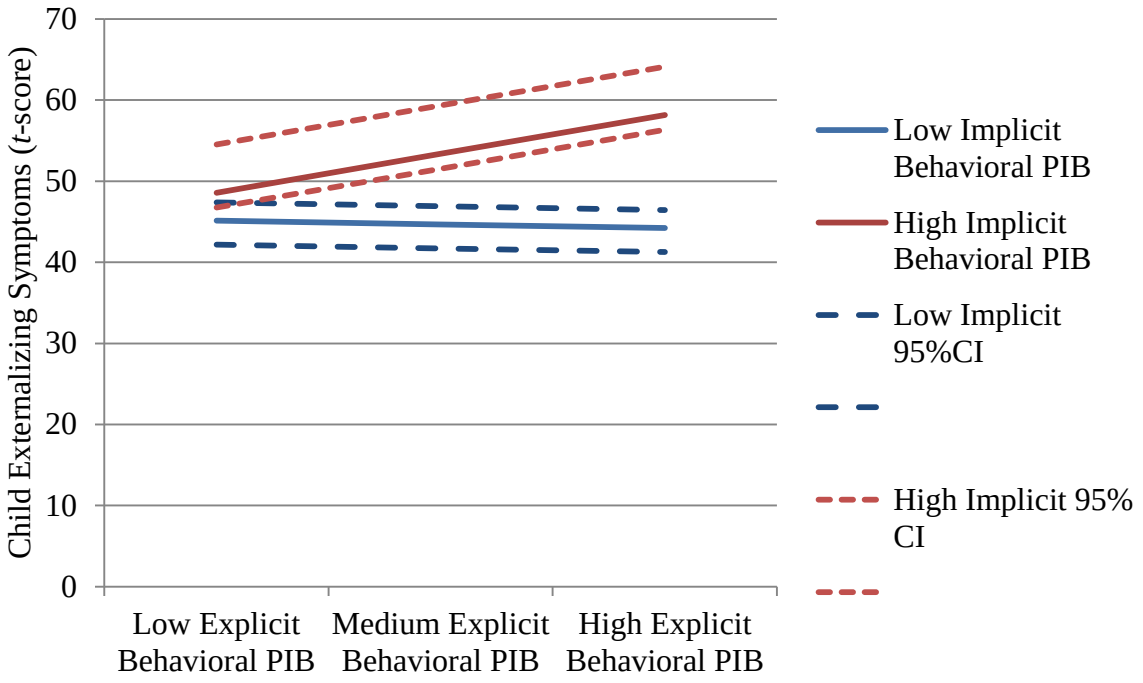

Figure 1. Relationship between explicit behavioral PIB and implicit behavioral PIB predicting adult-rated symptoms of externalizing psychopathology.

APPENDIX A

Adult and child consent/assent forms

Parent/Guardian Informed Consent Agreement

Please read this consent agreement carefully before you decide to participate in the study. Your child will also receive an assent form; please review the assent form with your child.

Purpose of the research study: The purpose of the study is to learn ways in which teacher practices affect children's social behaviors with their peers. We will be testing two treatments. Both treatments involve training teachers how to manage their classroom and to handle children's behaviors. We expect that both treatments will help improve children's social behaviors with peers, but we are interested in seeing if the treatments work in different ways or on different types of social behavior.

What your child will do in the study: Today your child will have his or her photograph taken. Then your child will be given a cognitive test that involves him or her answering questions and solving puzzles. Finally, your child will answer some questions about his or her feelings. After today's intake session, if your child fits the other requirements of the study, your child's regular classroom teacher will be asked questions about your child's behavior. Your child will also be invited to participate in the enrichment program this summer. The program will run on weekdays from 9a.m. to 3p.m. at a nearby location. Your child will be in a group with seven other children who are the same age and also the same gender as your child. The group will be lead by two teachers who will both be with the children at all times. In addition, there will be many other adult counselors around to help things go smoothly. Children will participate with their group in art, P.E., class, and other activities that are meant to be fun and that give children a chance to interact with their peers.

Throughout the summer program we will interview your child about who he or she gets along with in the peer group, and observe your child's social behaviors. We will also ask the teachers at the summer program to fill out questions about your child's behavior. Teachers at the summer program will be trained in one of the two treatments that we are studying. Both treatments are meant to help teachers handle children's behaviors better. Your child's classroom during the summer program will also be videotaped. The focus of the videotapes will be on the teachers, not on the children, because the purpose is for the researchers to see how the teachers implement the interventions.

Some of the children at the summer enrichment program will be selected because they have a history of ADHD behavior problems, and some of the children at the program will be typical children without behavior problems. Both types of children will be mixed together in the groups. The summer program will take place for four weeks. If your child has a history of ADHD behavior problems, then your child will participate in the camp for the full four weeks. If your child is a typical child without behavior problems, then your child will participate for two of the weeks (either the first two weeks or the last two weeks), and not the other two weeks. All of the activities will be the same for children with and without ADHD behavior problems, the only difference will be the amount of time the children are in the summer program.

What you will do in the study: Today you will answer questions about your child's behavior, to help us understand more about your child. You may skip any question that makes you uncomfortable and you can stop the survey at any time. During the summer program, you will be asked to have somebody bring your child to the program every day. However, you will not need to participate in the summer program yourself.

Time required: The study will require about 120 minutes of your time and your child's time today. If your child enrolls in the summer enrichment program, then your child will either participate for four weeks (if your child has a history of ADHD behavior problems), or for two weeks (if your child is a typical child without behavior problems). The summer program is held Monday through Friday from 9a.m. to 3p.m.

Risks: The main risk is a loss of confidentiality, but we will try to prevent this risk as described in the "confidentiality" section below. Another risk is that your child might not get along with the peers at the summer program. We have many adults at the program who are very well-trained in managing children's behaviors, so we hope to reduce this risk. Another risk is that you or your child may be asked questions that make you feel uncomfortable. Both you and your child have the right to not answer any questions that you don't want to answer. If your child seems uncomfortable during any interview, research staff will stop the interview.

Benefits: You will receive a brief report about your child's functioning. You may learn more about their child's behaviors and strengths and weaknesses from this report. All children will receive one of two treatments at the camp. Both treatments are behavioral and involve training the teachers how to better manage their classrooms. Both treatments are thought to improve the social behaviors of children, but we are testing whether the treatments work in different ways or on different behaviors. Therefore, your child may gain benefit from these treatments, although this may be more helpful to your family if your child has ADHD and not if your child does not have behavior problems.

Confidentiality: The information that your child gives or that you give in the study will be handled confidentially. Your information will be assigned a code number. The list connecting your child's name and/ or your name to this code will be kept in a locked file. Your child's name and/or your name will not be used in any report. The photograph that we take of your child will not have your child's name on it and will be kept in a locked file cabinet separate from the other information about your child. Data will be kept indefinitely unless you request that we destroy the data.

Voluntary participation: Your participation in the study is completely voluntary.

Right to withdraw from the study: You have the right to withdraw your child and yourself from the study at any time without penalty. Your child's picture and data will be destroyed if you decide to withdraw.

How to withdraw from the study: If you and/or your child want to withdraw from the study, tell the researcher. There is no penalty for withdrawing. You will still receive the report about

your child's functioning. If you have completed some days of the summer program, you will receive payment for the number of days that your child has attended. If you would like to withdraw after the summer program is concluded, please contact:
Amori Yee Mikami, Ph.D.
Department of Psychology, University of Virginia
102 Gilmer Hall
Charlottesville, VA 22904-4400
434-243-2327; mikami@virginia.edu

Payment: In order to thank you for completing the research measures and to assist with transportation costs, your family will receive $10 for every full day that your child attends the summer program. The assessment report and the activities and child care in the summer program will be provided at no charge to families.

If you have questions about the study, contact:
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102 Gilmer Hall
Charlottesville, VA 22904-4400
434-243-2327; mikami@virginia.edu

If you have questions about your rights in the study, contact:
Tonya R. Moon, Ph.D.,
Chair, Institutional Review Board for the Social and Behavioral Sciences
One Morton Dr Suite 500
University of Virginia, P.O. Box 800392
Charlottesville, VA 22908-0392
Telephone: (434) 924-5999
Email: irbsbshelp@virginia.edu Website: www.virginia.edu/vpr/irb

Agreement:
I agree to allow my child to participate in the research study described above.
I agree to participate in the research study described above.

Signature: _____ Date: _____
You will receive a copy of this form for your records

Classroom Teacher Informed Consent Agreement

Please read this consent agreement carefully before you decide to participate in the study.

Purpose of the research study: The purpose of the study is to learn more about children's social behaviors with their peers, and what treatments might be helpful to improve children's peer relationships. You are being contacted because a parent of a child in your class has expressed interest in having the child participate in our study. We are looking for some children who have ADHD, and for some children who do not have ADHD, so the child in your class may be part of either group.

What you will do in the study: You will complete questionnaires about the child's behavior and peer relationships now. Your information is critical to helping us understand this child's functioning in his or her regular school environment.

The child will then be participating in a day camp at the University of Virginia this summer as part of the research study. The day camp will be testing two different behavioral treatments that are thought to help children with ADHD improve their peer relationships and social skills. However, as stated above, we are recruiting both children with ADHD and children without ADHD as part of this summer camp, so that the camp better resembles a regular classroom. We ask all teachers the same questions, regardless of whether the child has ADHD or does not have ADHD.

The child's parents will receive a report that summarizes the child's functioning, which will include the summary scores from the questionnaires that you complete about the child.

Time required: The study will require about 30 minutes of your time to complete the questionnaires about the child.

Risks: There are no anticipated risks to you in this study.

Benefits: There are no direct benefits to you for participating. Our hope is that participating in the study will help the children, and will also help researchers develop better interventions for children with ADHD in the future.

Confidentiality: Information that you give in the study will be handled confidentially. Your information will be assigned a code number. The list connecting your name to this code will be kept in a locked file. Your name will not be used in any report.

Voluntary participation: Your participation in the study is completely voluntary.
Right to withdraw from the study: You have the right to withdraw from the study at any time without penalty

How to withdraw from the study: If you want to withdraw from the study, tell the researcher. There is no penalty for withdrawing. You will still receive payment for the parts of the study you have completed. If you would like to withdraw, please contact:

Amori Yee Mikami, Ph.D.
Department of Psychology, University of Virginia
102 Gilmer Hall
Charlottesville, VA 22904-4400
434-243-2327
mikami@virginia.edu

Payment: You will receive payment of $20 for completing the questionnaire packet about the child.

If you have questions about the study, contact:
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Department of Psychology, University of Virginia
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Agreement:
I agree to participate in the research study described above.

Signature: _____ Date: _____

You will receive a copy of this form for your records.

Minor Informed Assent Agreement 6-12
Please read this paper with your Mom or Dad.

We want to learn about how children act with their friends.

As part of our study, we would like to ask you to do some puzzles today, and to answer questions about your friends and your feelings. We will also take your picture today. Today you will be here for about two hours.

If you and your parents agree, then we will have you come back this summer for a children's camp. You will go to the camp during the day on Mondays through Fridays. It would be about the same amount of time as you spend in regular school. At the camp you will be in a classroom with seven other kids the same age as you. If you are a boy, all the other kids will be boys, and if you are a girl, all the other kids will be girls. You will have teachers for your classroom at the camp. You will do things like art, music, P.E., and class. The camp is meant to be fun for children and to give children a chance to play with the other kids. At camp we will also ask you some questions about who you are making friends with there. Sometimes we will take videos of your classroom at camp. We will also ask your parents, your teachers at camp, and your regular school teacher to tell us more about you.

Risks/Benefits: Being in this study will bring you no harm. We hope that you will have a good time at camp. This study may help you make friends at camp, but it also may not help you in any way. It will hopefully help us know more about how children act with their friends.

Confidentiality: Your answers to our questions and behaviors during this study will be kept private. Your name will not be used, and no one who reads about our study will know it was you. We keep things locked up so only people who work on this study see them.

You don't have to participate in this study. You can stop doing the study at any time. If you want to stop doing the study, tell me. If you choose to stop before we are finished, any answers you already gave will be destroyed. There is no penalty for stopping. If you decide that you don't want your answers in the study but you already turned them in, have your parents let us know. The name of the person your parents should tell is:

Amori Yee Mikami, Ph.D.
Department of Psychology, University of Virginia
102 Gilmer Hall
Charlottesville, VA 22904-4400
434-243-2327
mikami@virginia.edu

We will give your family a little bit of money for every day that you come to camp.
If you have questions about the study, contact:
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Department of Psychology, University of Virginia
102 Gilmer Hall

Charlottesville, VA 22904-4400
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I agree to participate in the research study described above.

Signature: _____ Date: _____
You will receive a copy of this form for your records

APPENDIX B

Self-Perception Profile for Children

What I Am Like (SPPC: 8-10 yrs old)

INSTRUCTIONS TO THE CHILD:

We have some sample sentences here and, as you can see from the top of your sheet where it says
"What I am like," we are interested in what each of you is like, what kind of a person you are like. This is a survey, *not* a test. There are no right or wrong answers. Since kids are very different from one another, each of you will be putting down something different.

First let me explain how these questions work. There is a sample question at the top, marked (a). I'll read it out loud and you follow along with me. (Examiner reads sample question.) This question talks about two kinds of kids, and we want to know which kids are most like *you*.

(1) So, what I want you to decide first is whether *you* are more like the kids on the left side who would rather play outdoors, or whether you are more like the kids on the right side who would rather watch T.V. Don't mark anything yet, but first decide which kind of kid is *most like you*, and go to that side of the sentence.

(2) Now, the *second* thing I want you to think about, now that you have decided which kind of kids are most like you, is to decide whether that is only *sort of true for you*, or *really true for you*. If it's only sort of true, then put an X in the box under sort of true; if it's really true for you, then put an X in that box, under really true.

(3) For each sentence you only check one box. Sometimes it will be on one side of the page, another time it will be on the other side of the page, but you can only check *one box* for each sentence. You *don't* check both sides, just the *one* side most like you.

(4) OK, that one was just for practice. Now we have some more sentences which I'm going to read out loud. For each one, just check one box, the one that goes with what is true for you, what you are most like.

SAMPLE SENTENCE

	Really True for Me	Sort of True for Me			Sort of True for Me	Really True for Me
(a)	☐	☐	Some kids would rather play outdoors in their spare time	**BUT**	Other kids would rather watch T.V.	☐	☐

1.	☐	☐	Some kids find it hard to make friends	**BUT**	Other kids find it's pretty easy to make friends.	☐	☐
2.	☐	☐	Some kids often do not like the way they behave	**BUT**	Other kids usually like the way they behave.	☐	☐
3.	☐	☐	Some kids have a lot of friends	**BUT**	Other kids don't have very many friends.	☐	☐
4.	☐	☐	Some kids usually do the right thing	**BUT**	Other kids often don't do the right thing.	☐	☐
5.	☐	☐	Some kids would like to have a lot more friends	**BUT**	Other kids have as many friends as they want.	☐	☐
6.	☐	☐	Some kids usually act the way they know they are supposed to	**BUT**	Other kids often don't act the way they are supposed to.	☐	☐

	Really True for Me	Sort of True for Me			Sort of True for Me	Really True for Me
7.	☐	☐	Some kids are always doing things with a lot of kids	**BUT**	Other kids usually do things by themselves.	☐	☐
8.	☐	☐	Some kids usually get in trouble because of things they do	**BUT**	Other kids usually don't do things that get them in trouble.	☐	☐
9.	☐	☐	Some kids wish that more people their age liked them	**BUT**	Other kids feel that most people their age do like them.	☐	☐
10.	☐	☐	Some kids do things they know they shouldn't do	**BUT**	Other kids hardly ever do things they know they shouldn't do.	☐	☐
11.	☐	☐	Some kids are popular with others their age	**BUT**	Other kids are not very popular.	☐	☐
12.	☐	☐	Some kids behave themselves very well	**BUT**	Other kids often find it hard to behave themselves.	☐	☐

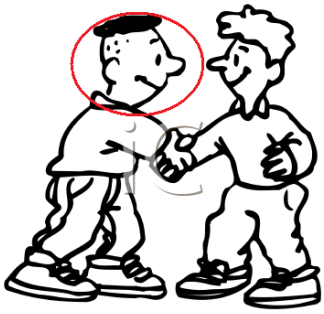
APPENDIX C

Implicit Association Test Stimuli

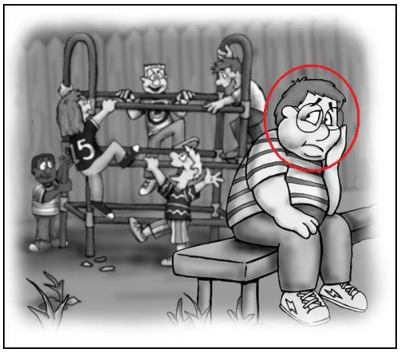
Kid

Adult

Likeable



Unpopular



Behaved

Naughty

APPENDIX D

Teacher's Rating Scale of Child's Actual Behavior

SPPC – Teacher

Child's Name:_____Class/grade/group_____Rater_____

For this child, please indicate what you feel to be his/her actual competence on each question, in your opinion. First decide what kind of child he or she is like, the one described on the left or right, and then indicate whether this is just sort of true or really true for that child. Thus, for each item, check one of the four boxes.

	Really True	Sort of True			Sort of True	Really True
1.	☐	☐	This child finds it hard to make friends.	**OR** For this child it's pretty easy.	☐	☐
2.	☐	☐	This child is usually well-behaved.	**OR** This child is often not well-behaved.	☐	☐
3.	☐	☐	This child has a lot of friends.	**OR** This child doesn't have many friends.	☐	☐
4.	☐	☐	This child usually acts appropriately.	**OR** This child would be better if s/he acted differently.	☐	☐
5.	☐	☐	This child is popular with others his/her age.	**OR** This child is not very popular.	☐	☐
6.	☐	☐	This child often gets in trouble because of things he/she does.	**OR** This child usually doesn't do things that get him/her in trouble.	☐	☐