2016

Positive Illusory Bias in Adolescents with ADHD: Prevalence, Stability, and Accuracy of Reporters

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Positive Illusory Bias in Adolescents with ADHD: Prevalence, Stability, and Accuracy of Reporters

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

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April, 2016

Acknowledgement

This research was funded by grant number R01 MH082865 awarded to Drs. Joshua Langberg and Steven W. Evans by the National Institute of Mental Health. I am grateful to my advisor, Dr. Joshua Langberg, for his constant encouragement, gentle guidance, and frequent reassurance throughout my thesis in particular and in my graduate career overall. His incredibly supportive mentorship style made this process enjoyable and rewarding, and I am thankful to have the opportunity to learn from his expertise. I also greatly appreciate the thoughtful feedback and assistance I received from Drs. Terri Sullivan and Kevin Sutherland, who were very helpful in allowing me to consider this project from multiple viewpoints. I would also like to acknowledge the guidance I received from Dr. Robert Perera, whose knowledge of the statistical techniques used in this thesis proved invaluable. Lastly, I am grateful to my labmates, friends, and family members – particularly my grandfather – for the ongoing support, helpful advice, and endless encouragement.

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Abstract

POSITIVE ILLUSORY BIAS IN ADOLESCENTS WITH ADHD: PREVALENCE, STABILITY, AND ACCURACY OF REPORTERS

By Elizaveta Bourchtein, B.A.

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Major Director: Joshua Langberg, Ph.D., Associate Professor, Department of Psychology

The positive illusory bias (PIB) – over-reporting levels of self-competence compared to other raters – has been demonstrated in youth with attention-deficit/hyperactivity disorder (ADHD), despite increased impairment rates. However, due to inconsistent definitions of the PIB, conflicting findings have emerged regarding prevalence of the PIB in youth with ADHD and whether parent or child report is actually "biased" and driving the PIB. Additionally, stability of the PIB across time is unknown. The present study used person-centered methodology cross-sectionally and longitudinally to evaluate the prevalence of the PIB in adolescents with ADHD. Results revealed a cross-domain global PIB group at baseline (18.4% of sample) but only a small social PIB group was present and stable across time. Parents in the PIB group were better reporters of scholastic competence relative to an objective measure than were youth. These findings suggest that the PIB may be significantly less prevalent in this population than previously thought.

Overview

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder that affects approximately 7% of school-aged children (Visser, Blumberg, Danielson, Bitsko, & Kogan, 2013) and is characterized by developmentally inappropriate levels of inattention and/or hyperactivity and impulsivity (American Psychiatric Association, 2013). Although children with ADHD typically experience clinically significant impairment across a variety of domains (Hinshaw, 2002), some exhibit inflated, positive self-perceptions of their behavior, a phenomenon referred to as a positive illusory bias (PIB). Specifically, despite experiencing repeated failures and underachievement, a subset of youth with ADHD rate themselves as significantly more competent in comparison to other raters (e.g., parents and teachers). In non-ADHD samples, the presence of a PIB may be adaptive, as it is linked to higher self-esteem (Gresham, Lane, MacMillan, Bocian, & Ward, 2000). In ADHD samples, however, a PIB may have potentially deleterious effects, including associations with poorer social skills, higher levels of aggression, and increased risky behavior in adolescence (e.g., Hoza, Murray-Close, Arnold, Hinshaw, Hechtman, & MTA Cooperative Group, 2010; Hoza et al., 2013). Given the negative outcomes associated with the PIB, intervention development has been proposed. Specifically, if youth with ADHD do not recognize their difficulties, it may be important to help them gain a more realistic appraisal of their functioning before they will be motivated to learn new skills or to change patterns of behavior (Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007). However,

it is premature to consider implications of the PIB for ADHD intervention because a number of significant definition and measurement limitations exist.

Multiple salient criticisms regarding current methods for measuring and defining the PIB have been raised. First and foremost, the categorical presence or absence of the PIB has been determined by subtracting an adult's ratings from the child's ratings and applying a cut-point of ≥ 1 to indicate the presence of a PIB. However, there is no empirical basis for this cut-point, and arbitrary cut-points may make the presence or absence of the PIB unstable over time. Further, because subtraction is used, youth who are rated as competent in a domain by a parent or teacher, cannot have a PIB (i.e., a ceiling effect). Partly due to differences in definitions of the PIB, prevalence rates are rarely reported; the only study to categorize children as being with or without the PIB found that 30% of ADHD children had a PIB (Hoza et al., 2013). Additionally, although the PIB is frequently discussed as being a global construct, it has traditionally been measured within individual domains; thus, conclusions cannot be drawn regarding the pervasiveness of the bias. Further, the developmental course of the PIB is unclear, particularly as related to the period of adolescence when self-perceptions begin to evolve and to change (Hoza et al., 2010). Prevalence and stability of the PIB construct across time have significant implications for whether resources should be devoted to addressing the PIB in ADHD interventions.

Another concern is that, to date, it has been assumed that youth with ADHD are the ones who are inaccurate in their self-perceptions, and that parents/teachers are the more accurate raters. This assertion has recently been challenged and there is some evidence that relative to objective measures, youth with ADHD may actually be more accurately representing their functioning (Swanson, Owens, & Hinshaw, 2012). This finding has not previously been

replicated but, if confirmed, would also have significant implications for PIB-related intervention (i.e., whether the target would be child or parent). The present study addressed these limitations in a large sample of young adolescents with ADHD. Specifically, we used a latent profile analysis, which does not require the use of cut-points, to determine what percent of the ADHD sample has a PIB. We also longitudinally evaluated the stability of the PIB construct over a period of 18 months using a latent transition analysis. Finally, we compared self- and parent-ratings of competence to objective measures of functioning to evaluate the relative accuracy of these perceptions.

Introduction

ADHD is characterized by clinically significant levels of inattention, hyperactivity, and/or impulsivity, which must be present in at least two settings (e.g., at home and school) by age 12 (American Psychiatric Association, 2013). The disorder can be further subdivided into three categories, which are not stable across time (Lahey, Pelham, Loney, Lee & Willcutt, 2005) and are thus labeled as "presentations" rather than "subtypes": predominantly inattentive (six or more symptoms of inattention and fewer than six symptoms of hyperactivity/impulsivity); predominantly hyperactive/impulsive (six or more symptoms of hyperactivity/impulsivity and fewer than six symptoms of inattention); or combined presentation (six or more symptoms in both domains). Whereas the combined and hyperactive/impulsive presentations are more common in younger children, the inattentive presentation is most common in adolescents and emerging adults (Lahey et al., 2005).

Impairment Across Development

Regardless of presentation, youth with ADHD experience functional impairment across a variety of domains, with the types of impairment that are most salient varying across

development. In preschoolers with ADHD, noncompliant behaviors at home and school are common and lead to problems developing peer relationships and preacademic skills (DuPaul, McGoey, Eckert, & VanBrackle, 2001). Social difficulties are also prominent in elementary school, with up to 70% of children with ADHD having no close friends by third grade (Wehmeier, Schacht, & Barkley, 2010). Additionally, elementary-school-age children with ADHD experience more familial conflict and increased difficulties with academic functioning (Johnston & Chronis-Tuscano, 2015; Scheffler et al., 2009). The transition to middle school is especially difficult for youth with ADHD, as it is characterized by increased academic responsibilities and expectations for more autonomous self-regulation of behavior (Jacobson, Williford, & Pianta, 2011; Langberg et al., 2008). Academic functioning is arguably the most pervasive and prevalent aspect of impairment during the adolescent period, with adolescents with ADHD exhibiting homework problems, low and failing grades, and poor performance on standardized tests (DuPaul & Langberg, 2015). The majority of adolescents with ADHD continue to experience clinically significant symptoms into high school (Lahey et al., 2005) and high-school-age students with ADHD are at increased risk for reckless driving, substance use, risky sexual behaviors, and school dropout (Kent et al., 2011; Kuriyan et al., 2012).

Self-Perceptions of Functioning and Impairment

Despite these well-documented impairments, some children with ADHD exhibit a PIB. Those who exhibit a PIB rate themselves as being more competent or skilled than what is reported by other raters, such as parents, teachers, or peers, or by objective measures, such as academic achievement tests (see Owens et al., 2007, for a review). This bias has been found across a variety of domains pertinent to children's functioning, including social, academic, and behavioral. It is important to note that the PIB is not unique to children with ADHD. Overall,

people tend to overestimate their performance on tasks and overrate the frequency that they display socially desirable behaviors (Gosling, John, Craik & Robins, 1998; Robins & Beer, 2001). However, youth with ADHD develop a PIB earlier than do their non-ADHD peers and tend to overestimate their competence to a *greater* extent, meaning that the difference between child and others' ratings is larger in children with ADHD than in those without. Group effect sizes comparing teacher-child discrepancy scores of children with and without ADHD are in the medium range (Cohen's *d* ranging from 0.46 to 0.63 depending on domain; Hoza et al., 2004). In youth with ADHD, the PIB appears early (e.g., by age 8 in the social and behavioral domains; Hoza et al., 2010) and then gradually decreases during high school to a level similar to non-ADHD individuals by late adolescence (e.g., age 17; Hoza et al., 2010). Conversely, elementary- and middle-school-aged children without ADHD seem to *under*rate their competence relative to teachers and parents; therefore, the PIB may be something that develops over adolescence in youth without ADHD (Evangelista, Owens, Golden, & Pelham, 2008; Swanson et al., 2012). In summary, although the presence of a PIB is normative in the general population, children and adolescents with ADHD exhibit it earlier and to a greater extent in comparison to their peers, and a PIB in ADHD appears to be associated with negative outcomes.

Outcomes Associated with a PIB in Youth with ADHD

Social functioning and aggression behaviors. The presence of a PIB in youth with ADHD is associated with poor interpersonal skills and higher rates of aggression. For instance, using a TV talk show task (participants acted as TV talk show hosts who had to get confederate children posing as guests to talk on a number of topics), Linnea, Hoza, Tomb, and Kaiser (2012) found that children with ADHD who exhibited a social PIB were rated as being less friendly, responsive, and engaged than children with ADHD without a PIB. This may be because children

with ADHD and a PIB exhibit higher levels of aggressive and oppositional behaviors. For example, using a cross-lagged path analysis, Hoza and colleagues (2010) found a reciprocal relationship between aggression and a PIB in the behavioral domain across four time points. Specifically, the presence of a PIB related to ratings of behavior predicted increases in aggression, which in turn predicted increases in the magnitude of the PIB. Positive associations between a PIB in youth with ADHD and oppositional behaviors such as defiance and noncompliance have also been demonstrated (Jia, Jiang, & Mikami, 2015). Overall, it appears that a PIB in youth with ADHD serves as a risk factor for oppositional and defiant behaviors, which may in turn lead to negative social outcomes.

Risky behaviors as an outcome of the PIB. Hoza and colleagues (2013) studied whether a PIB in different domains (scholastic, behavioral, or social) mediates the relationship between ADHD and the development of risky behaviors, specifically risky driving (e.g., driving illegally, traffic violations) and sexual behaviors (e.g., number of sexual partners, failure to use a condom). The authors concluded that a PIB in the behavioral domain partially explained the later presence of risky driving behaviors in youth with ADHD as well as the relationship between ADHD diagnostic status and number of lifetime sexual partners. Oddly, a PIB in the academic domain partially mediated the relationship between ADHD diagnosis and an earlier age of first sexual intercourse. Overall, these findings are important because they suggest that a PIB in childhood may lead to negative outcomes in late adolescence.

Poorer treatment outcomes in children with a PIB. As noted above, one reason it may be important to study the PIB in children with ADHD further is that difficulties with accurately self-rating performance might limit gains associated with intervention. To date, only one study has evaluated whether the presence of a PIB affects treatment outcomes in ADHD children.

Mikami, Calhoun, and Abikoff (2010) found that children who had inflated ratings of self-perception did not respond to a behavioral summer treatment program for ADHD as well as children who did not exhibit inflated self-ratings. The study indicated that having a high PIB in the behavioral domain (that is, thinking one is behaving better than the camp counselor rated them to be) led to increased rates of conduct problems, whereas having no PIB was associated with having more friends by the end of the program.

Theories Explaining the Presence of the PIB

Although multiple theories have been proposed to explain the presence of a PIB in children with ADHD, the theory with the most empirical support is the self-protective hypothesis. The self-protective hypothesis suggests that in light of repeated failures experienced by youth with ADHD, having a positively skewed view helps the child maintain their self-esteem and also appear more confident to others (Diener & Milich, 1997). Thus, in this theory, the PIB is viewed as a helpful coping mechanism. At least two studies have found support for this hypothesis. Both Diener and Milich (1997) and Ohan and Johnston (2002) found that children with ADHD who were given positive feedback about their performance on a task *reduced* their ratings of self-competence. These findings have been interpreted as lending credence to the self-protective hypothesis. Specifically, when children received positive feedback and felt secure that they were liked and valued, they became more comfortable making realistic self-appraisals.

Further, findings from Evangelista and colleagues (2008) that the PIB does not extend to ratings of others also makes sense in light of the self-protective hypothesis. Specifically, youth with ADHD who inflate ratings of their own competence do not inflate ratings of their peers' competence, presumably because ratings of peers are not associated with one's own self-esteem. Additionally, some studies have found that levels of the PIB and depressive symptoms are

negatively correlated, with inflated self-perceptions protecting against the development of depression (McQuade et al., 2014). This finding suggests that, consistent with the self-protective hypothesis, a PIB may indeed limit the impact of poor functioning on self-esteem.

Defining the PIB

Although there has been a significant amount of research on the PIB in youth with ADHD, this research is greatly limited by the fact that there is no consistent method for defining the presence or absence of a PIB and the methods that are used have not been fully validated. Varying definitions of the PIB may explain inconsistent findings regarding predictors and outcomes associated with the PIB (e.g., Owens & Hoza, 2003; Swanson et al., 2012). Further, the lack of a validated definition has prevented basic questions about prevalence and stability of the PIB over time from being answered. Currently, the prevalence of the PIB in ADHD is unknown, with one study reporting that it is only present in approximately 30% of children with ADHD (Linnea et al., 2012). This is noteworthy because clinically, the PIB is often discussed as ubiquitous to children with ADHD. If only a small proportion of youth with ADHD actually display the bias, this would have implications for the necessity of addressing the PIB in ADHD interventions. Further, without a consistent definition, it is impossible to tell whether the PIB is stable over time or whether, similar to ADHD "subtypes", the PIB is better considered as a "presentation" that may shift over time. In sum, it is important to come to a consensus regarding the best, most clinically-relevant way to measure the construct. To date, there have been several ways that the PIB has been calculated.

Subtracting raw scores. The Self-Perception Profile for Children (SPPC; Harter, 1985, 2012) and its counterpart, the Self-Perception Profile for Adolescents (SPPA; Harter, 1988, 2012), are the rating scales most frequently used to measure the PIB in the ADHD literature.

Using a 4-point scale, the SPPC asks a child to rate themselves using 36 items on five different domains of competence – social competence, scholastic competence, behavioral conduct, physical appearance, and athletic competence – as well as a measure of global self-worth. There are also corresponding teacher and parent versions of this scale, which are used to evaluate for the presence of a PIB. Most commonly, parent or teacher ratings of the child's competence will be subtracted from the child's self-ratings of competence within the same domain. The resulting discrepancy score is most frequently evaluated as a continuous variable, with any discrepancy that is greater than zero (i.e., child rates higher competence than do teacher or parent) considered to be "overestimation" (e.g., Hoza et al., 2013).

It is also important to be able to define the PIB categorically, to evaluate prevalence and stability over time. Specifically, it is important to evaluate what level (e.g., .5 or 1.0 or 1.5 point difference on the SPPC) of discrepancy between child and other ratings is truly meaningful. In the only study to evaluate the PIB categorically in children with ADHD, the construct was defined as anything greater than or equal to a +1 point discrepancy between child and teacher on the social domain of the SPPC (Linnea et al., 2012). The authors reasoned that this was about one standard deviation greater than the mean discrepancy score for the sample. Using the +1 point discrepancy, the authors found a 30% prevalence rate for PIB in a sample of 87 seven- to 11-year-old children with ADHD. However, the sample was small, only the social domain was evaluated, and as noted above, the +1 cut-point was largely arbitrary and needs to be validated. Additionally, given that the PIB is often thought of as an overarching construct pervasive across domains, it is necessary to evaluate its presence beyond just looking within individual domains.

Subtracting standardized scores. Others (e.g., Scholtens, Diamantopoulou, Tillman, & Rydell, 2012) have advocated for the use of standardized scores, as recommended by De Los

Reyes and Kazdin (2004). They argue that standardized difference scores, rather than raw or residual difference scores, are optimal for looking at informant discrepancies due to the fact that these scores correlate equally with both informants' ratings. Further, the use of standardized scores is necessary when children's ratings are compared to alternate measures of competence that do not use the same scale. However, there is currently no consensus on what constitutes a PIB when using standardized difference scores and using discrepancy scores may be problematic due to increased rates of measurement error. For example, Edwards (2001) asserts that discrepancy scores are less reliable than their individual counterparts, and that even when their reliability is high, other methodological issues such as increased Type I error rates are so concerning that "these problems are sufficient to proscribe the use of difference scores regardless of the reliabilities they exhibit."

One way to reduce this error would be to examine naturally-occurring patterns of responses at the participant level and to classify individuals into groups – or profiles – based on these patterns. This could be accomplished with latent profile analysis (LPA), which has not yet been used to study the PIB. Doing so would remove the discrepancy problem entirely by considering child responses separately from other ratings. This allows researchers to examine how the combination of absolute values of the different raters' measures affects the outcome variable. Using LPA would also allow for the examination of the presence of a cross-domain PIB, as it could consider multiple areas of competence simultaneously.

Additional Issues in the Measurement of PIB

Assumption of third-party raters' accuracy. One inherent assumption of the discrepancy method for calculating the PIB is that the child is not as accurate as others at reporting their functioning. This assumption is apparent in the naming of the parent and teacher

measures of the SPPC: The Parent/Teacher Rating Scale of Child's *Actual* Behavior. The implication is that self-perceptions are subject to biases, whereas outside raters can judge these constructs more objectively. Thus, any positive deviation on the child's part from what their parent or teacher reports is viewed as a "bias".

This assumption, in itself, may be a flawed and simplistic view of self-perception. First, generally speaking, parents and teachers are more likely to focus on the negative aspects of children's behavior and have their own biases when rating children (De Los Reyes & Kazdin, 2005). Further, parents of children with ADHD often have their own psychopathology, which may impact ratings. For example, Chi and Hinshaw (2002) found that depressed mothers rated their ADHD children significantly more negatively than did teachers. Parents of children with ADHD are also significantly more stressed and have more conflicts with their children compared to non-ADHD peers (Johnston & Mash, 2001). Parents who are stressed have lower agreement with teachers and adolescents when rating children's behavior (Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Therefore, the discrepancy between child and adult ratings may not be solely a function of the child's own biases, and could actually reflect inaccuracies on the part of the parent or teacher. In fact, the SPPC manual clearly states that one should not "view discrepancies necessarily reflecting distortions on the part of the child" (Harter, 1985, 2012).

In the only study to date to examine this issue, Swanson and colleagues (2012) compared SPPC ratings of girls with and without ADHD to standardized scores from six different sources: the mean of their Wechsler Individual Achievement Test scores (WIAT; Wechsler, 1992); a teacher-rated measure of academic performance; peer-reported popularity based on sociometric nominations; teacher-rated social acceptance; a maternal single-item rating of popularity; and teacher-rated behavioral conduct. The authors raised two issues with the PIB: first, the

assumption that the bias is *positive,* and second, that the bias is *illusory*. To address the "positive" assumption, the authors compared *z*-scores to find that although girls with ADHD rated themselves as more competent in comparison to the six objective indices, they were still rating themselves more negatively than the non-ADHD children were rating themselves. This indicates that children with ADHD are aware of their impairments relative to their peers and can recognize that they are less competent in these domains. For this reason, the authors suggest the phenomenon be referred to as a "discrepancy" rather than a PIB. Addressing the "illusory" assumption, the authors noted that self-ratings of scholastic and social competence from participants with ADHD were not statistically different from WIAT scores and peer ratings, respectively. Parents and teachers, on the other hand, rated participants with ADHD lower than the WIAT and peer ratings, while rating girls without ADHD *higher* than their WIAT and peer ratings. Accordingly, this study provides preliminary evidence that in some cases, youth with ADHD and a PIB may be rating themselves more accurately than their parents and teachers relative to objective measures.

Potential for a ceiling effect. Another issue to consider is the fact that ADHD children are significantly more impaired than their non-ADHD counterparts. Thus, they have considerably more room to overestimate their competence (Owens et al., 2007). Further, there is considerable heterogeneity in the impairment profiles of youth with ADHD and some children are impaired in one domain (e.g., academics) but not others (e.g., social). If a child is rated by a teacher or parent as minimally impaired in a particular domain, it is statistically impossible for them to have a PIB due to restricted range of the measure of competence (i.e., a child cannot rate +1 points higher on the SPPC). Thus, it appears PIB prevalence may vary as a function of actual

competence and as a function of the domain being measured. This has not been considered in prior PIB prevalence studies, which have chosen a single domain for defining the PIB.

Present Study and Aims

As summarized above, there are multiple measurement limitations associated with the study of the PIB in youth with ADHD. First, the PIB is typically calculated using a simple subtraction method using raw or standardized difference scores within specific domains of competence, and these estimates may not be reliable. Second, there is no established and validated cutoff score for defining the PIB, especially as a global construct, and as such, prevalence of the PIB in an ADHD sample is largely unknown, and it is unclear whether prevalence varies as a function of the domain of functioning being measured. Given that there is heterogeneity in the functioning of youth with ADHD, and that the PIB cannot be present when functioning is rated as high by the other reporter (ceiling effect), it seems likely that prevalence may vary as a function of competence within each domain. Third, because almost all PIB research has been at the group level rather than the individual level, it is unclear if the PIB is a stable construct or if the PIB may be situational or influenced by environmental factors, with children moving in and out of "having a PIB" across time. Lastly, it is unclear if the PIB in ADHD is driven by children *over*reporting their abilities or parents *under*reporting them, and there is one study suggesting that children may actually be fairly accurate relative to objective measures. The present study will address each of these limitations in order to develop a more comprehensive understanding of the PIB. Further, these questions will be evaluated in a large sample of young adolescents with ADHD followed for 18 months during middle school, a developmental period where perceptions are important and rapidly changing and when PIB may be most common (Hoza et al., 2010).

Aim 1: Using latent profile analysis to define the PIB. One approach that has not yet been used to examine the PIB and where cut-points may naturally emerge is latent profile analysis (LPA). LPA is used to determine the optimal number of groups (or profiles) of participants that the sample can be divided into based on their patterns of responses. Instead of looking at patterns at the individual item level, as is done for factor analysis, LPA takes into account the individual's entire set of responses. One strength of using LPA is that it considers all entered variables at once in order to find naturally-occurring groups of participants without an *a priori* hypothesis. Therefore, whereas previous studies have defined PIB groups based on various potentially arbitrary cut-points, the current study used LPA to examine the number and types of groups that best fit the data. Additionally, most prior work with the PIB in children with ADHD has calculated the mean discrepancy score for all children within the ADHD group. This method assumes that all children with ADHD have comparable levels of the PIB. However, there could be a smaller subgroup of children with a large PIB that drives the mean discrepancy score. Thus, it was necessary to assess whether there are naturally-occurring groups with different levels of the PIB within an ADHD sample. Further, three different domains of functioning were evaluated simultaneously using LPA (scholastic, social, and behavioral) as the presence or absence of a PIB may vary across domain. The presence or absence may vary naturally due to differing perceptions, or as a function of high competence in some domains leading to ceiling effects. Additionally, examining the domains simultaneously would allow for an overarching, global PIB construct to emerge if it was present in an ADHD population. Using LPA with multiple domains of functioning thus allowed for a more nuanced look at the presence of the PIB in youth with ADHD.

Hypothesis 1a. Given that the vast majority of prior findings support the presence of the PIB, we predicted that a profile would emerge that represents a global PIB, with adolescents rating their own performance across all three domains approximately one point higher than parents. Additionally, we predicted that there would be a high competence group, wherein both adolescents and parents endorsed high levels of competence across all domains; some members of this group may exhibit the ceiling effect, as the high parent ratings would reduce the amount of possible overestimation that the students can engage in. Lastly, we predicted that there would be a low competence group, where both parents and adolescents reported low levels of competence across all domains.

Hypothesis 1b. Although the PIB is often discussed as present in all youth with ADHD, the only previous study that used a difference of one or greater to define the PIB group found a prevalence rate of approximately 30% (Linnea et al., 2012). Though this was a sample of younger children with ADHD (*Mage* = 8.64 years), there are contradictory findings as to whether the PIB increase or decreases over adolescence in this population (Hoza, et al., 2010). Thus, we predicted that the prevalence rate of the PIB in our sample would also be around 30%.

Aim 2: Assess the stability of the PIB over time using latent transition analysis (LTA) approach. LTA was used to assess whether a PIB status would emerge when considering the stability of parent and adolescent perceptions of competence over time. Following the self-protective hypothesis, which states that the PIB is protective in children with ADHD given they experience many failures, we predicted that a stable global PIB status would emerge and continue to exist in youth with ADHD as they progressed throughout middle school, which is often a difficult period in this population.

Hypothesis 2. We predicted that a global PIB status would emerge in LTA, and that this status would be relatively stable over time. Currently, no guidelines exist to define a stable versus non-stable status as determined by LTA. Thus, we hypothesized that, similar to research with ADHD subtypes (Lahey et al., 2005), about three-quarters of the sample identified as having a PIB at baseline via LTA would remain in the PIB group at the 18-month follow-up.

Aim 3: Examine whether parent or adolescent reports are driving the PIB. We attempted to replicate Swanson et al.'s results in a mixed-gender adolescent sample (the Swanson et al. (2012) sample was all female) by comparing parent and adolescent reports of scholastic competence to more objective measure of academic performance, school grades.

Hypothesis 3. Based on the findings from Swanson and colleagues (2012), we hypothesized that parents of adolescents exhibiting a PIB would be less in line (i.e., lower correlations and larger Cohen's *d* measuring the magnitude of the difference) with an objective measure of scholastic competence (i.e., grades) than would parents whose children are not exhibiting a PIB. We also predicted that scholastic competence ratings from adolescents with and without a PIB would be equally in line with grades (i.e., similar correlations and Cohen's *d*; Cohen, 1988).

Methods

Participants

Participants include 326 middle school age students with ADHD (*Mage* = 12.26 years) who were recruited as part of a study evaluating the impact of two school-based interventions. Participants were recruited from nine urban, suburban, and rural public middle schools over three consecutive years via letters, fliers, and direct referrals by school staff.

Inclusion criteria for the study included 1) attending one of the participating schools; 2) meeting full criteria for the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; American Psychiatric Association, 1994), ADHD Combined or Inattentive subtype, assessed via the Parent Children's Interview for Psychiatric Syndromes (P-ChIPS; Weller, Weller, Fristad, Rooney, & Schecter, 2000); 3) the presence of functional impairment identified using the parent or teacher version of Impairment Rating Scale (IRS; Fabiano et al., 2006); and 4) an IQ of 80 or greater as estimated using the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV; Wechsler, 2003). The P-ChIPS (Weller et al., 2000) is a semi-structured diagnostic interview that assesses the presence of 20 disorders based on DSM-IV diagnostic criteria. The interview has demonstrated high internal consistency and test-retest reliability (Fristad, Teare, Weller, Weller, & Salmon, 1998). Additionally, it has high convergent validity with the Diagnostic Interview for Children and Adolescents—Revised–Child Version (Rooney, Fristad, Weller, & Weller, 1999). Exclusion criteria included meeting diagnostic criteria for a pervasive developmental disorder or for bipolar disorder, psychosis, or obsessive-compulsive disorder.

The resulting sample was 71% male (n = 232). 77% of the sample self-identified as Caucasian, 12% as African American, 8% as Biracial, and 2% identified with another race. 3% of the sample also identified as Hispanic. Participants' annual family income ranged from less than $10,000 to more than $225,000 ($M$ = $54,248, Mdn = $37,500). Highest level of education as reported by the participants' parents is as follows: did not earn a high school degree (5% of mothers, 10% of fathers), high school degree (33% of mothers, 44.5% of fathers), associate's degree (32% of mothers, 15% of fathers), bachelor's degree (19% of mothers, 20.5% of fathers), and advanced degree (11% of mothers, 10% of fathers). Approximately one third of the sample

(31%) had an Individualized Education Program (IEP) or a 504 Plan and 50% reported taking medication for ADHD.

Procedure

All recruitment efforts (e.g., fliers) were based upon a description of ADHD behaviors (e.g., difficulty paying attention) and students/families with and without previous diagnoses of ADHD could participate in the screening and evaluation process. Interested parents or primary caregivers contacted the research team and were administered a brief telephone screen. The screener included questions assessing the nine DSM symptoms in the ADHD inattentive domain. Adolescents who had a prior diagnosis of ADHD or whose parents endorsed four or more symptoms of inattention were eligible for the full assessment.

The full screening assessment consisted of semi-structured diagnostic interviews (P-ChIPS and ChIPS) with the primary caregiver ("parent") and adolescent separately. Parents and teachers of the adolescents also completed the Disruptive Behavior Disorder (DBD; Van Eck, Finney, & Evans, 2010) rating scale, which includes all 18 DSM-IV ADHD items, as well as rating scales assessing the adolescents' functioning and potential comorbidities. Adolescents also completed a brief assessment battery consisting of four WISC-IV subtests and seven WIAT-III subtests to evaluate reading, mathematics, and writing skills. During this initial assessment (T1), adolescents and parents also completed the Hater Rating Scales (SPPC/PRS) to evaluate perceptions of their behavior. Adolescents and parents were then reassessed 12 (T2) and 18 months (T3) later. Among other measures, both parents and adolescents completed the SPPC/PRS at each of the subsequent time points. At T2, attrition rate for the SPPC was 21.2% and for the PRS was 19.3%; at T3, attrition rates were 29.4% and 27.9% for the SPPC and PRS, respectively. School grades were also collected at each time point.

Measures of Competence

Self-Perception Profile for Children (SPPC). The SPPC (Harter, 1985, 2012) is a well-validated 36-item measure assessing children's perception of competence. The measure consists of six subscales: five subscales measuring different domains of competence (i.e., social, scholastic, athletic, physical appearance, behavioral conduct) and one subscale assessing global self-worth. Ratings are on a 4-point scale, with higher ratings representing greater levels of competence. Each item consists of two statements; youth must choose which of the two describes "what I am like" and then must indicate if that statement is "really true for me" or "sort of true for me." For instance, an item in the scholastic competence domain is, "Some kids feel that they are very good at their school work BUT Other kids worry about whether they can do the school work assigned to them." The SPPC presently does not have norms: raw scores are calculated by averaging all of the items within each domain. The subscales have demonstrated adequate internal consistency and test-retest reliability (Harter, 1985, 2012). In the current sample, the α value of the scale at baseline was 0.90. The present study includes the scholastic competence, social competence, and behavioral conduct domains.

Parent Rating Scale of Child's Actual Behavior (PRS). The PRS (Harter, 1985, 2012) is a 24-item measure adapted from the SPPC and contains the same subscales of competence, excluding physical appearance (i.e., scholastic competence, social competence, behavioral conduct; global self-worth is a measure of self-esteem and cannot be assessed by outside raters). Items are the same as on the SPPC but worded to be from the parent's rather than child's perspective. Items are also scored on a 4-point scale with greater numbers indicating greater levels of competence. An average of the items within each domain is used to calculate competence levels. The measure has good internal consistency and high test-retest reliability

(Cole, Martin, Powers, & Truglio, 1996). In the current sample, the α value of the scale at baseline was 0.86. The present study includes the scholastic competence, social competence, and behavioral conduct domains.

Grades. Grade Point Average (GPA) is a standardized numerical measure of aggregated grades from a student's courses within a given time period. GPA is on a 4-point scale, with higher numbers indicating better grades (4.0 = A, 3.0 = B, 2.0 = C, 1.0 = D). In the current study, grades from four core subjects (i.e., mathematics, English, science, and social studies) were collected and converted into the 4-point scale. The two quarters of the school year closest to T1 were averaged and used in the analyses.

Analytic Plan

Aim 1

To assess the presence of a naturally-occurring PIB group in the sample, LPA was conducted using Mplus Version 7.31 (Muthén & Muthén, 1998-2011). Variables included in the LPA were the three domains of competence (i.e., scholastic, social, behavioral) as rated by both child and parent (i.e., six variables in total). As the SPPC and PRS have the same scales, the raw average scores from each domain were entered. Given that these variables are continuous and not categorical, LPA was used rather than latent class analysis (LCA). The optimal number of profiles that fit the data was determined by comparing the fit indices of a model with *k* profiles to a model with *k*-1 profiles. Fit indices included the following: size of profiles (i.e., no profile should contain less than 5% of the total sample); the Bayesian Information Criterion (BIC); the Akaike Information Criterion (AIC); the Vuong-Lo-Mendell-Rubin test (VLMR); and the bootstrapped parametric likelihood ratio test (BLRT). Additionally, theoretical rationale was used to make a decision when fit indices did not provide enough information. A model with *k*

profiles is considered a better fit than one with *k*-1 profiles if 1) the BIC decreases; 2) the AIC decreases; and/or 3) the VLMR and/or BLRT remain significant.

Aim 2

To determine whether a PIB group emerges when change over time is taken into account, LTA was conducted over three time-points (i.e., T1, T2, T3) using MPlus Version 7.31. The term "status" is used in place of "profile" in LTA to indicate that this is a longitudinal analysis. In LTA, probabilities of transitioning to another latent status or remaining in the same status are calculated conditional on the status at baseline (Collins & Lanza, 2010). The number of statuses that describes the data most parsimoniously was determined by comparing the fit indices of a model with *k* statuses to a model with *k*-1 statuses. Theoretical rationale helped guide decisions made using the fit indices. The AIC, BIC, and size of statuses (i.e., no status should be smaller than 5% of the sample) were used as a measure of model fit (Collins & Lanza, 2010). In order to ensure that the definition of the statuses at each time-point was constant (meaning that identical sets of responses at different times would have identical probabilities of status classification regardless of time-point), item-response probabilities were constrained equal across the time-points. This allows for more direct group comparisons and helps stabilize estimation and improve identification and interpretation of statuses.

Next, transition probabilities were examined to determine stability of statuses between T1 and T2 as well as between T2 and T3. Intervention status was included as a covariate in the LTA to control for any potential treatment effects.

Aim 3

In order to evaluate whether parents of adolescents with a PIB may be driving the difference in competence ratings, a test of the difference between two correlations was first used

(Fisher, 1921). Online software from Soper (2015) was used. This test calculates whether two correlation coefficients are significantly different from one another. The test was used to calculate the difference between the PIB group and non-PIB groups on the correlation between grades and the scholastic competence domain on the SPPC/PRS. The PIB and non-PIB groups were defined using the LPA from Aim 1. As more than one non-PIB profile emerged in the LPA, we used the non-PIB profile whose GPA was most comparable to that of the PIB profile. Given our hypothesis that parent report may be driving the PIB, we predicted that the PRS in the High Competence group was significantly more correlated with grades than was the PRS in the PIB group. Based on findings from Swanson et al. (2012), we also predicted that the SPPC from adolescents with and without the PIB would be equally correlated with grades.

Additionally, we calculated effect sizes using Cohen's *d* to determine the magnitude of the difference between parent ratings and GPA and adolescent ratings and GPA. First, the Scholastic subscales of the SPPC and PRS as well as the GPA were converted into *z*-scores. Second, the standardized GPA variables were subtracted from the standardized SPPC and PRS variables separately and divided by the pooled *SD* to obtain a Cohen's *d*. Cohen's *d* was calculated in this manner for parents and adolescents within each profile that emerged in the LPA. We predicted that effect sizes for the non-PIB profiles would be small and would not differ between parents and adolescents, indicating that parents and adolescents are equally discrepant with GPA in these groups. We also predicted that the magnitude of the difference would be moderate in the PIB profile and that the direction of the effect size would indicate that parents are more discrepant from GPA than are adolescents.

Results

Missing Data

To assess whether data were missing completely at random (MCAR), Little's test (Little, 1988) was used. The test indicated that the data were MCAR ($\chi^2 = 333.781$; df = 319; $p = 0.273$). As a result, the missing data were accounted for by using maximum likelihood estimation for Aims 1 and 2. For Aim 3, listwise deletion was used for missing data to help ensure that the samples being compared were the same. Given that baseline data were used, missing data were minimal ($n = 5$ for SPPC and PRS; $n = 39$ for baseline GPA). Participants with missing GPA data were compared to those with complete data using independent-sample *t*-tests; there were no significant differences between the groups on gender, grade in school, race, ethnicity, IQ, or amount of ADHD symptoms (all *p*s > 0.05).

Aim 1

Optimal number of profiles. LPA models with two through five profiles were tested; the four-profile model was determined to be the most parsimonious and optimal solution using indices of fit. Six indicators were included in the analyses: the scholastic, social, and behavioral subscales from both the PRS and the SPPC. The fit indices for two- through five-class solutions are included in Table 1.

Table 1

Indices of Fit for Two- to Five-Profile Solutions at Baseline using LPA

Number of Profiles	AIC	BIC	VLMR	BLRT
Two	4262.27	4334.221	0.0007	0.0000
Three	4212.009	4310.468	0.0837	0.0000
Four	**4152.382**	**4277.349**	**0.2155**	**0.0000**
Five	4133.176	4284.652	0.1189	0.0000

Note. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; VLMR = Vuong-Lo-Mendell-Rubin Likelihood Ratio Test; BLRT = Parametric Bootstrapped Likelihood Ratio Test

Theoretical conceptualization of profiles. Closer examination of the individual profiles (Figure 1) revealed the presence of one global PIB profile (Profile 4), wherein the difference in estimated means between child and parent report on the scholastic, social, and behavioral subscales was 0.597, 0.902, and 0.634, respectively.

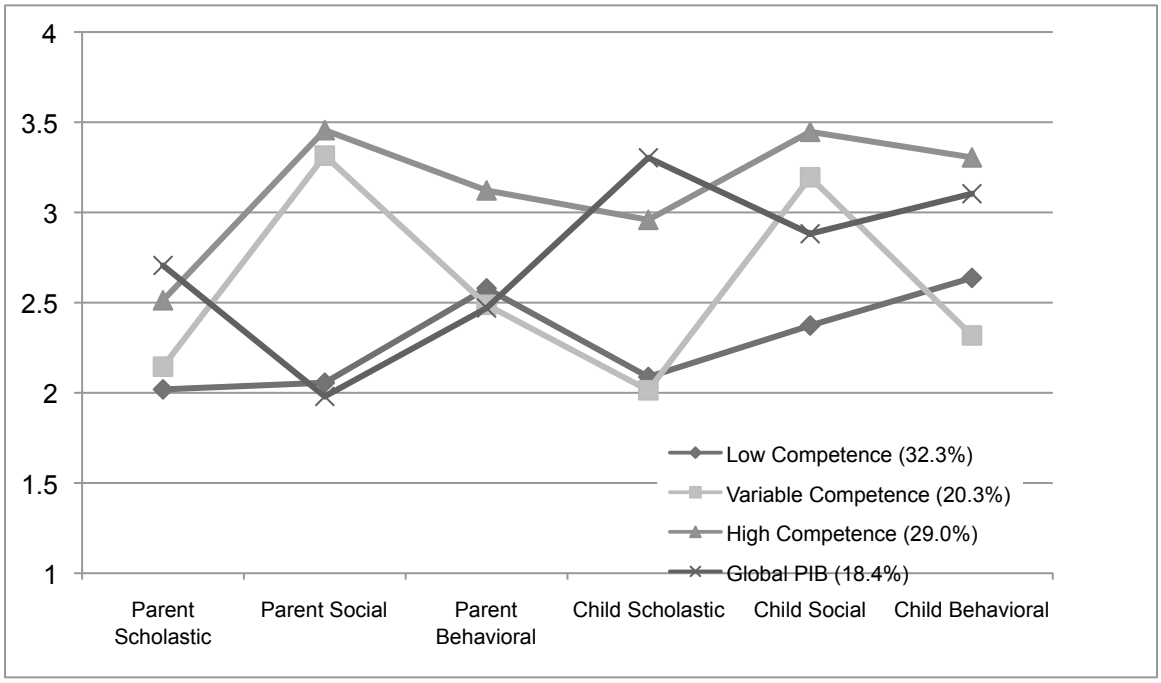

Figure 1. Optimal Profile Solution at Baseline Using LPA.

Estimated means for each profile are included in Table 2. In addition to the PIB profile, three other profiles emerged: low (Profile 1), variable (Profile 2), and high (Profile 3) competence. Discrepancies between parent and child ratings in these three profiles were all of lower magnitude than the discrepancies in the PIB profile. However, the discrepancy in the scholastic competence domain of the high competence profile (0.446) suggests that this profile exhibits a smaller PIB in this domain. The variable competence profile includes youth and parents whose ratings were in line with each other and who endorsed relatively high social competence compared to the ratings of scholastic and behavioral competence.

Table 2

Means and Discrepancies of Each Domain of the SPPC/PRS Within Profiles Defined using LPA at Baseline.

Profile	Child Scholastic	Parent Scholastic	Scholastic Discrepancy	Child Social	Parent Social	Social Discrepancy	Child Behavioral	Parent Behavioral	Behavioral Discrepancy
Low Competence	2.09	2.02	0.07	2.37	2.06	0.31	2.64	2.58	0.06
Variable Competence	2.01	2.15	-0.14	3.20	3.32	-0.12	2.32	2.49	-0.17
High Competence	2.96	2.51	0.45	3.45	3.46	-0.01	3.31	3.12	0.19
Global PIB	3.39	2.71	0.59	2.88	1.98	0.90	3.10	2.47	0.63

Note. Discrepancies were calculated by subtracting mean parent score from mean adolescent score within each domain on the SPPC/PRS. Positive discrepancies indicate youth overestimation, whereas negative discrepancies indicate youth underestimation relative to parents.

Proportion of sample in each profile. The low competence profile included the largest proportion of the sample, $n = 105$ (32.3%). 29% of the sample ($n = 95$) was in the high competence profile, whereas 20.3% of the sample ($n = 66$) belonged to the variable competence profile. The PIB profile contained 18.4% of the sample ($n = 60$).

Aim 2

Optimal number of statuses. An LTA was conducted to assess for the presence of a PIB group when data across all three timepoints were considered. Intervention status was included as a covariate to control for treatment effects over time. Given that the LTA takes into account all time points entered, the statuses that emerged in the LTA differed at baseline from the profiles described in Aim 1. As in the LPA, six variables (i.e., parent and adolescent report of scholastic, social, and behavioral competence) were entered simultaneously at three time points (i.e., Time 1-3). Based on the indices of fit, a 4-status solution was deemed to best represent the data. The fit indices for two- through five-class solutions are included in Table 3.

Table 3

Indices of Fit for Two- to Five-Profile Solutions using LTA

Number of Statuses	AIC	BIC
Two	10552.365	10715.202
Three	10236.154	10501.237
Four	**10023.734**	**10421.359**
Five	9890.661	10451.122

Note. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria

Theoretical conceptualization of statuses. The four statuses that emerged were comparable to those in the LPA, with one notable exception: the lack of a clear PIB status across the three domains (see Figure 2).

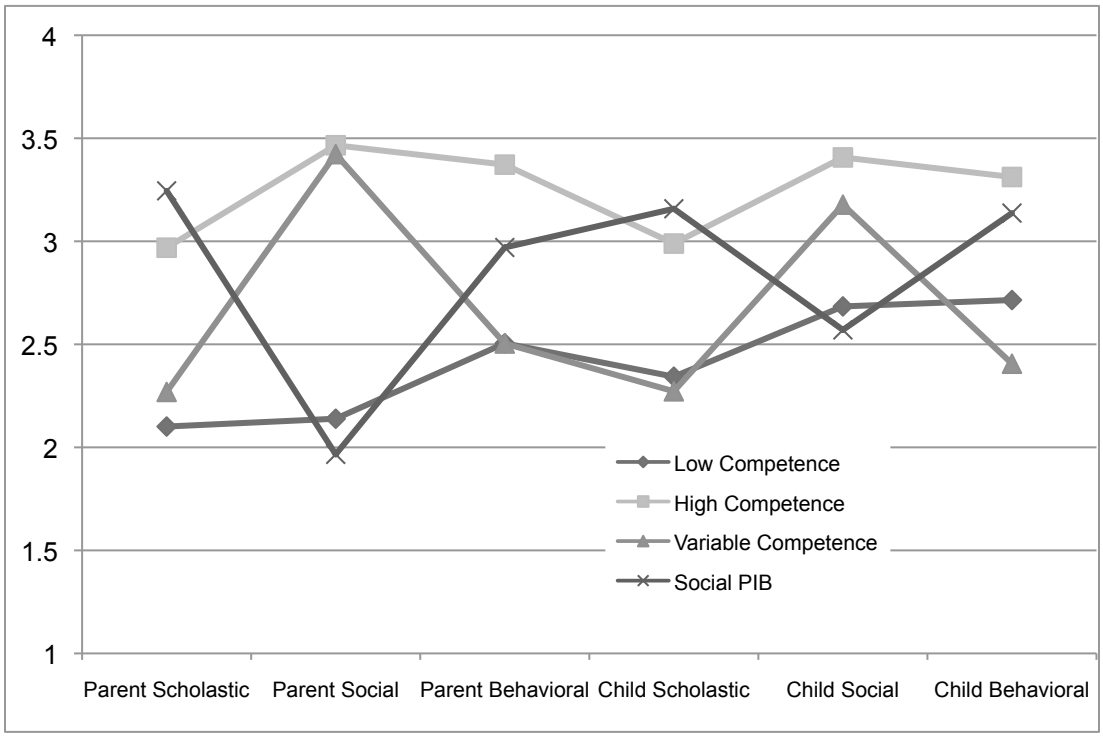

Figure 2. Optimal Status Solution at Baseline Using LTA
Note. Figure incorporates data from times 1-3.

The statuses appeared to represent a low competence (status 1), high competence (status 2), variable competence (status 3), and social PIB (status 4) group. Statuses 1-3 consisted of ratings from parents and adolescents that were in line with each other across all three domains,

with the variable competence status including adolescents who were rated higher on social competence relative to the behavioral and scholastic domains. The social PIB status contained participants who had comparable and relatively high parent and adolescent ratings in the scholastic and behavioral domains, but whose adolescent ratings of social competence were 0.6 points higher than those of their parents.

Proportion of sample in each status. The low competence status contained the largest proportion of the sample at each time point (40.4%, 33.4%, 31.3%, respectively). The second-largest status at time 1 was the variable competence group (32.3%); its prevalence diminished over time, with 26.5% of the sample falling into the status at time 2 and 25.7% at time 3. The high competence status increased in size over time, with 14.4%, 22.3%, and 25.4% of the sample belonging to the status at time 1-3, respectively. Lastly, the social PIB status contained 12.9% of the sample at baseline, and 17.7% and 17.6% at time 2 and 3.

Stability of statuses over time. The statuses were all fairly stable between time 1 and time 2 and highly stable between time 2 and 3. The proportion of participants who remained in their status between times 1 and 2 for statuses 1-4 was 80.7%, 96.1%, 78%, and 97.7%, respectively, indicating that the high competence and social PIB statuses were the most stable, while the low competence and variable competence statuses were relatively less stable. Changes to the social PIB status at time 2 included the addition of 11.3% of the low competence status, and the loss of 2.3% of the social PIB status to the high competence status. Between time 2 and time 3, 91.3%, 100%, 96.8%, and 99.4% of statuses 1-4, respectively, remained in their status.

Aim 3

Two tests of the differences between two correlations were conducted. Participants in the PIB profile that emerged from the LPA conducted in Aim 1 were compared to participants from

the high competence profile; this profile was chosen because the mean GPA of this group (2.59) at baseline most closely matched the mean GPA of the PIB group at baseline (2.34; see Table 4). Results indicated that the adolescents in the PIB profile and adolescents in the high competence profile were not significantly differently correlated with their respective GPA (*z*-score: 0.94, *p* = *ns*). Parents' ratings of adolescent scholastic competence in the PIB and high competence profiles also did not differ significantly in their correlation with their children's GPA (*z*-score = 0.54, *p* = *ns*).

Table 4

Scholastic Indicators and Comparison with GPA Across LPA-Defined Profiles at Baseline.

	Parent Scholastic (PRS)		Child Scholastic (SPPC)		GPA		Cohen's *d*	
Profile	*M (SD)*	*Z*-score	*M (SD)*	*Z*-score	*M (SD)*	*Z*-score	Parent/GPA	Child/GPA
Low Competence	2.00 (0.60)	-0.42	2.07 (0.46)	-0.53	1.90 (0.89)	-0.17	-0.27	-0.45
Variable Competence	2.14 (0.57)	-0.22	1.98 (0.52)	-0.64	1.75 (0.84)	-0.34	0.14	-0.38
High Competence	2.74 (0.70)	0.67	3.38 (0.40)	1.21	2.59 (0.84)	0.57	0.10	0.86
Global PIB	2.53 (0.68)	0.35	2.99 (0.57)	0.69	2.34 (0.91)	0.30	0.05	0.44

Note. Cohen's *d* calculated by comparing *z*-scores of parent ratings to GPA and adolescent ratings to GPA within each profile. Cohen's *d* guidelines suggest the following for measures of effect size: 0.20 = small effect; 0.50 = medium effect; 0.80 = large effect (Cohen, 1988).

Cohen's *d* was calculated using standardized variables to determine the magnitude of the difference between the parent scholastic competence and GPA and adolescent scholastic competence and GPA within each of the four profiles described in Aim 1. In all profiles, parents were more in line with adolescents' GPA than were the adolescents (see Table 4). Additionally, the effect sizes of the differences between parent ratings and GPA were in the small range (i.e., 0.05 to -0.27). Conversely, differences between adolescent reports and their GPA were in the

small to moderate range in the low competence, variable competence and global PIB groups (-0.45, -0.38, and 0.44, respectively), whereas the difference was in the large range in the high competence (i.e., scholastic PIB) profile (0.86). Additionally, adolescents in the low and variable competence group underestimated their competence relative to their GPA, as indicated by the negative direction of the Cohen's *d* within those profiles. Parents in the low competence group also underestimated their offspring's scholastic competence relative to GPA, but to a lesser extent than did the adolescents.

Discussion

The present study built upon prior work by evaluating naturally-occurring patterns of responses from adolescents and their parents cross-sectionally and longitudinally in order to determine whether a PIB group would emerge. When evaluated cross-sectionally, a global PIB group did emerge, comprising 18.4% of the sample. Additionally, a second, domain-specific PIB group was identified (29% of the sample). This group exhibited high competence in the social and behavioral domains according to parent- and self-report and a small PIB in the scholastic domain. However, when evaluated over an 18-month period, only a domain-specific social PIB group emerged, including 12.9% of the sample at baseline and 17.7% and 17.6% of the sample 12 and 18 months later, respectively. In terms of accuracy of self- and parent-report as related to an objective measure, in all groups, parents were more in line with GPA than were the adolescents. Additionally, adolescents who displayed a domain-specific or global PIB were overestimating their competence relative to GPA, whereas the other two groups were *under*estimating their academic abilities. These findings are discussed in more detail below along with implications for future research.

Prevalence of PIB

The PIB is often cited in research with youth with ADHD as a rationale for why parent-report is emphasized over self-report, especially as related to measuring treatment outcome (e.g., Barkley, Fischer, Smallish, & Fletcher, 2002; Klassen, Miller, & Fine, 2006). However, the results of the present study indicate that the PIB as defined globally and without the use of arbitrary cut-points actually pertains to only a small subset of young adolescents with ADHD (18%). The majority of the sample was in line with their parents across the majority of the domains of competence. Prior research focusing on the prevalence of the PIB used a cut-point of 1 and was a social domain-specific evaluation (Linnea et al., 2012). Nevertheless, this study also reported a fairly low prevalence rate of a social PIB in children with ADHD (30%). In the present study, youth in profile 3 (i.e., the high competence profile) could be conceptualized as having a domain-specific PIB in the area of scholastic competence. However, the mean difference score between parent and adolescent ratings in this domain was only 0.446. As this scholastic PIB group was also rated to be highly competent in the other domains of functioning (i.e., social, behavioral) by parents, this group may in fact be exhibiting a ceiling effect, wherein the adolescents are not able to over-report their competence due to a limited range on the SPPC. Overall, given the relatively low prevalence of participants with a naturally-occurring global PIB, the field should consider more consistently incorporating youth self-report in evaluations of functioning in this population.

Associations with More Objective Indicators

Overall, the hypothesis, based on the Swanson et al. (2012) conclusions, that parent ratings may be driving the PIB (i.e., may be less accurate than those of adolescents) is not supported by the results of the present study. Across all groups (i.e., PIB and non PIB), parent

ratings of scholastic competence were more in line with GPA than were adolescents' ratings. However, consistent with the findings noted earlier that the PIB is not an ADHD group-wide trait, two of the groups, though more discrepant than parents, were actually underestimating their performance relative to GPA. Specifically, whereas youth in the high competence (i.e., scholastic competence PIB) and the global PIB groups overestimated their abilities relative to GPA, youth in the low and variable competence groups *under*estimated their performance (Cohen's d = -0.45, -0.38, respectively).

Measurement of PIB

As discussed earlier, there is significant variability in how the PIB has traditionally been defined, including some prior research defining the PIB as *any* difference between adolescents and other raters greater than zero. This resulted in some studies finding relatively small mean differences between reporters that were still labeled as a PIB (e.g., 0.28 and 0.41 in Emeh & Mikami, 2014; 0.08 – 0.29 in Evangelista et al., 2008). These studies evaluated overall mean differences between raters in ADHD samples and led to conclusions that as a group, children with ADHD have a positive bias in ratings of their behavior. However, results from the present study suggest that this may not be accurate, and that overall group mean differences are likely driven by a small subset of youth with ADHD who markedly overestimate their own performance. An important direction for future research is to determine at what level of discrepancy, if any, mean differences between reporters are clinically important. Using naturally occurring groups, the present study found that mean difference scores in the PIB groups ranged from .4 to .9. This is below the 1 point cutoff used in prior work and well above what has been reported in ADHD samples as a whole (e.g., Evangelista et al., 2008). However, we did not evaluate the external validity of these discrepancies. It may be that certain thresholds (e.g., .5 and

greater) predict the occurrence of negative outcomes. Regardless, research to find a meaningful cut-point may not be relevant if the presence of a PIB is not stable or consistent over time.

Stability Across Time

Few studies have longitudinally evaluated the stability of the PIB over time, despite the fact that it is often perceived to be a stable trait. Findings from Hoza and colleagues (2010) suggest that the magnitude of the bias changes differentially over the course of adolescence based on domain of competence. However, Hoza et al. (2010) and other studies (e.g., Mikami et al., 2010) examining the PIB longitudinally grouped all youth with ADHD together and looked at changes in the PIB at the group, rather than the individual, level. Results of the present study using a person-centered approach across time revealed that adolescent and parent ratings were largely consistent. Specifically, the global PIB profile was no longer present and only one group with a domain-specific (i.e., social) PIB emerged. Further, this social PIB status only accounted for 12-17% of the sample at any given time (compared to 30% of the sample in Linnea and colleagues' (2012) examination of the social PIB), indicating that the vast majority of adolescents with ADHD in this sample did not display a stable and consistent PIB relative to their parents over time. It appears that assessing the PIB cross-sectionally may lead to erroneous identification of youth who appear to be misjudging their competence; these differences may be best viewed as temporary fluctuations, perhaps influenced by the present context (e.g., grades received in school in the past week). It does appear that there is a small subset of adolescents with ADHD who are consistently biased in their perception of their social abilities. This group's social competence was rated to be the lowest among the four statuses by *both* parents and adolescents. Thus, these findings appear consistent with the assertions from Swanson et al. (2012) that, despite the presence of a social PIB, these adolescents are recognizing that their

social functioning is poor relative to their peers. However, without comparison to more objective indicators of social functioning (e.g., peer sociometrics) it is really not possible to say whether it is the parent or the adolescent who is biased.

Limitations

One of the main limitations of this study is that the external validity of the profiles that emerged through LPA and LTA was not evaluated. Accordingly, we cannot make statements about whether adolescents in the identified PIB groups exhibit better or poorer outcomes than their peers. A second limitation is that a non-ADHD control sample was not available. As such, we are unable to determine if the groups that emerged are unique to youth with ADHD, or if similar profiles would emerge in the general population. As noted in the introduction, the PIB is not a phenomenon unique to ADHD and it may be that the prevalence rates identified in the present study are similar to what exists in the general population. In addition, it is important to note that this is a young adolescent sample. The PIB may be present at higher rates in younger children, whom developmentally, we would expect to less frequently reflect upon their own behavior as related to others. As such, the findings from the present study may not generalize to younger or older children with ADHD. Lastly, the vast majority of studies, including the present one, have used the SPPC as a measure of self-reported competence. However, the items on the SPPC have a limited range; thus, youth who are being rated as being highly competent have less of an opportunity to overestimate their abilities. Future studies should consider using a measure with a greater range in order to reduce the possibility of a ceiling effect.

Future Directions

The present study provides an important foundation to further the study of the PIB in youth with ADHD. Given that a subset of youth was found to have a global PIB at baseline,

future research should evaluate whether these youth have differential outcomes over time, particularly in relation to the domain-specific PIB group. This would help determine whether defining the PIB through LPA leads to clinically meaningful groupings. It would also shed light on whether having a global PIB is more detrimental than having a PIB in one specific domain. Predictors of PIB status should also be examined, as past literature has shown inconsistent findings regarding predictors, such as gender and ADHD presentation status (Owens et al., 2007). Given that a clear global PIB group was present at one point in time, but did not exist longitudinally, it is particularly important to consider what contextual variables are associated with the appearance of a PIB. For instance, elevated levels of depressive symptoms have been linked to more realistic self-appraisals in adult populations (Lewinsohn, Mischel, Chaplin, & Barton, 1980). Given that youth with ADHD are at an increased risk for the development of depression (Angold, Costello, Erkanli, 1999), changes in levels of internalizing symptoms over development may contribute to the lack of a stable global PIB construct. The accuracy of youth and parent report as compared to objective measures should also continue to be evaluated. Previous research with the PIB (e.g., Diener & Milich, 1997) compared predictions of performance to actual performance on a laboratory task; future studies could follow this methodology and include parent or teacher predictions as well in order to ascertain whether youth or adults are better at predicting actual performance.

Conclusions

In conclusion, future research should not assume that all, or even a majority of youth with ADHD, exhibit a positive bias in their ratings. In treatment outcome studies, rather than dismissing self-report, one option would be to remove the participants who are positively biased and therefore have no room for improvement according to self-report (ceiling effect) or to

evaluate outcomes for these youth separately. That said, the present practice of emphasizing parent ratings in ADHD treatment outcome research appears to be appropriate, at least for the scholastic domain, as parents were consistently more closely aligned with the objective indicator. Perhaps the most important implication from this study is that the PIB may not be a stable construct across time. Only a PIB in the social domain was stable across the 18-month study period and only for a small subset of youth. This suggests that intervention targeting a PIB broadly in youth with ADHD is probably not necessary, at least in young adolescent populations, as their self-perceptions are likely to change naturally.

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Vita

Elizaveta Bourchtein was born on August 13th, 1988, in Moscow, Russia, and became a US citizen in 2014. She received her Bachelor's degree is Psychology from Wesleyan University in May, 2010, where she was a member of Psi Chi, the International Honor Society in Psychology. Upon graduation, she volunteered in Dr. Joel Kleinman's laboratory investigating the molecular biology of schizophrenia at the National Institutes of Health in Bethesda, Maryland, and then worked as a research assistant and intervention coach under Dr. Naomi Steiner at Tufts Medical Center in Boston, Massachusetts. Consequently, Elizaveta was a research coordinator and project manager at Queens College, in Queens, New York, where she worked with Dr. Jeffrey Halperin on several clinical research studies involving children and adolescents with Attention-Deficit/Hyperactivity Disorder (ADHD). She began working towards her doctoral degree in Clinical Psychology, child/adolescent track, at Virginia Commonwealth University in August, 2014, where she is mentored by Dr. Joshua Langberg. Elizaveta's research interests lie broadly in clinical and school-based interventions for youth and emerging adults with ADHD; additionally, she is interested in the influence of parent variables, such as stress and psychopathology, on children's functioning and outcomes.