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Is the Positive Illusory Bias Common in Young Adolescents with ADHD? A Fresh Look at Prevalence and Stability Using Latent Profile and Transition Analyses

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Abstract

The goal of this study was to use novel approaches that do not require the use of arbitrary cut-points (i.e., latent profile/transition analysis) to evaluate the prevalence and stability of the positive illusory bias (PIB) in young adolescents with attention-deficit/hyperactivity disorder (ADHD). Participants were 326 middle-school students diagnosed with ADHD (*M*age = 12.26 years, 71% male, 77% Caucasian). The Self-Perception Profile for Children (SPPC) was completed by participants and their parents at baseline and again 12 and 18 months later. Cross-sectional results revealed four subgroups based on SPPC responses. Only a small subset (18.4%) of youth with ADHD exhibited a global PIB, across the behavioral, scholastic, and social domains, with an additional 29% displaying a PIB in the scholastic domain only. Additionally, average parent/adolescent-rated competence within each subgroup was in line with an objective measure of scholastic competence (i.e., grades). When examined longitudinally, only a PIB in the social domain was stable across the 18-month study period and only for half of the sample. These findings suggest that the PIB is not ubiquitous in youth with ADHD, with many young adolescents rating themselves accurately relative to their parents and their grades. Further, when stability across time is considered, the PIB may be specific to social functioning, as opposed to a global, cross-domain phenomenon. Implications for the future measurement of the PIB are discussed.

Keywords

ADHD; positive illusory bias; adolescents; latent profile analysis

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Attention-deficit/hyperactivity disorder (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). Youth with ADHD experience functional impairment across a variety of domains: academically, they earn lower grades and have higher drop-out rates; socially, they have fewer friends and poorer social skills; with parents, they are more likely to experience familial conflict (Johnston & Chronis-Tuscano, 2015; Scheffler et al., 2009; Wehmeier, Schacht, & Barkley, 2010). 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).

Despite these well-documented impairments, some children with ADHD exhibit a positive illusory bias (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, Goldfine, Evangelista, Hoza, & Kaiser, 2007, for a review). This bias has been found across a variety of domains pertinent to children's functioning, including social, academic, and behavioral. Although the PIB is not unique to those with ADHD, youth with ADHD tend to overestimate their competence to a greater extent than youth without ADHD. For example, Evangelista, Owens, Golden, and Pelham (2008) in a sample of children in grades 3 through 5 found that youth with ADHD overestimated their competence relative to teacher report (on average by 0.08 to 0.50 points on a 3-point scale), whereas non-ADHD youth *under*estimated their competence relative to teacher report (on average by 0.31 to 0.62 points). Additionally, the presence of a PIB in youth with ADHD is associated with negative outcomes, including poor interpersonal skills in middle to late childhood, higher rates of aggression throughout late childhood and adolescence, risky behaviors (i.e., reckless driving and risky sexual behavior) in late adolescence and young adulthood, and poorer treatment outcomes in elementary-school students (Hoza et al., 2010; Hoza et al., 2013; Linnea, Hoza, Tomb, & Kaiser, 2012; Mikami, Calhoun, & Abikoff, 2010).

Although there have been many studies examining the PIB in youth with ADHD, this research is greatly limited by the fact that there is no consistent method for categorically defining the presence or absence of a PIB and the methods that have been 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, Owens, & Hinshaw, 2012). Further, the lack of a clear definition has prevented basic questions about prevalence and stability of the PIB over time from being answered. Most commonly, in order to calculate the PIB, parent or teacher ratings of the child's competence are subtracted from the child's self-ratings of competence within the same area of functioning. The resulting discrepancy score (raw or standardized) is 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). However, this has led to relatively small discrepancies between external raters and youth (e.g., 0.08 – 0.50 in Evangelista et al., 2008) being labeled as a PIB without validation that such small differences are clinically relevant. Thus, a consensus on what threshold

constitutes a PIB has not yet been reached. Several studies (i.e., Linnea et al., 2012; McQuade, Tomb, Hoza, Waschbusch, Hurt, & Vaughn, 2011) have used a cut-point of ≥ 1 to indicate the presence of a PIB. In both of these studies, the authors first calculated a discrepancy by subtracting teacher scores from child scores within the same domain on the Self-Perception Profile for Children (SPPC; Harter, 1985, 2012), one of the most commonly used measures of competence; subsequently, they classified participants as having a PIB within each domain if the discrepancy was greater than or equal to 1. However, there is no empirical basis for this cut-point and thus the legitimacy of this cut-point remains unclear.

Using discrepancy scores to define PIB may also create measurement problems (e.g., Edwards, 2001; Laird & Weems, 2011). Discrepancy scores may be biased by correlating more highly with one informant's responses than the other's. Additionally, children with ADHD are significantly more impaired than their non-ADHD counterparts. Thus, they have considerably more room to overestimate their competence (Owens et al., 2007). Conversely, if a child is rated by a teacher or parent as minimally impaired in a particular domain, it is statistically impossible using current methods for them to have a PIB due to restricted range of the measures of competence (i.e., ceiling effect). 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). Thus, historically, researchers have focused on individual domains when evaluating the PIB rather than assessing whether the PIB exists as a global construct present across multiple domains. Whereas prevailing theory suggests that self-concept varies across domains (Harter, 2012), it is less clear whether the tendency to inflate one's self-perception of competence occurs within a single or across multiple domains. Given that a global PIB may have a different etiology and clinical implications than a PIB confined to one domain only, it is important to evaluate whether there is a subset of youth with ADHD who exhibit a PIB across multiple areas of competence.

One way to address these measurement limitations would be to examine patterns of responses at the participant level across multiple domains of functioning and to classify individuals into groups – or profiles – based on these patterns. This could be accomplished with a latent profile analysis (LPA), which has not yet been used to study the PIB. Doing so would allow for an evaluation of PIB prevalence and stability across time by considering parent and child responses without needing to calculate a discrepancy score. Currently, the prevalence of the PIB in ADHD is unknown; this is noteworthy because clinically, the PIB is often discussed as ubiquitous to children with ADHD (e.g., Hoza et al., 2004). If only a small proportion of youth with ADHD actually displays the bias, this would have implications for the necessity of addressing the PIB in ADHD interventions. Additionally, LPA allows for the examination of profiles without the need for an *a priori* hypothesis; this allows for the emergence of both global and domain-specific PIB groups, if present in the sample, without arbitrarily making assumptions regarding the prevalence of these possible groups.

In terms of stability across time, the PIB has not been evaluated longitudinally *within* participants due to the previously-mentioned measurement issues. Although previous studies (e.g., Hoza et al., 2010) have looked at the trajectory of the PIB within various domains of

functioning over time, they did this at a group, rather than individual level. Additionally, they examined the bias longitudinally within specific domains only. Determining whether the PIB is a stable and global construct within individuals with ADHD has important clinical implications – if the PIB is not stable over time, it likely represents natural fluctuations in perceptions of one's own competence, and intervention may not be warranted. Conversely, if the PIB is stable over time, this would indicate that youth with ADHD consistently overestimate their competence and may suggest the need for intervention for the subset of the population for whom it is impairing. Latent transition analysis (LTA) may be useful in addressing these issues as it evaluates the stability of groups of participants across time.

Lastly, the PIB is most frequently examined in an elementary-school age group; older populations, such as middle school students, are less frequently assessed. The magnitude, prevalence, and stability of the PIB may vary as a result of age. For instance, Mikami and colleagues (2010) found that the PIB in the social and behavioral domains was stable over a period of approximately two months in six- through 11-year-old ADHD youth. Conversely, longitudinal findings from Hoza and colleagues (2010) suggest whereas the PIB in the behavioral domain decreases dramatically between age 8 and 17 years and is no longer existent by age 17 in youth with ADHD, the PIB in the social domain plateaus and decreases only slightly over that same timeframe (the scholastic domain was not evaluated in either study). Young adolescence is a unique period of transition as children enter middle school and begin puberty. During this time, self-concept may change, as youth become more invested in comparing themselves to their peers and in peer evaluations of their competence (Harter, 2012). Whereas the PIB in young children may stem from the fact that they are not developmentally able to distinguish their ideal self from their true competence, the overestimation of competence in young adolescence may stem both from downward social comparison and from the development of the self-serving bias, wherein success is attributed to internal traits and failure to external circumstances (Harter, 2012). Thus, a moderate PIB in early adolescence appears to serve a protective function in the general population. Given that middle school is an especially difficult period of transition for youth with ADHD (Langberg et al., 2008), and the fact that the PIB is associated with negative outcomes in youth with ADHD, longitudinally examining the PIB in this age group is necessary to obtain a more comprehensive developmental understanding of the phenomenon.

Accordingly, the present study evaluates the prevalence and stability of the PIB in young adolescents across time as defined both within a single domain, and as a global construct across multiple domains, using latent profile and latent transition analyses. These analyses were conducted in a large sample of young adolescents (ages 10 to 14 years) with ADHD followed for 18 months during middle school, a developmental period where self-perceptions are increasingly important (Hoza et al., 2010). Based upon the only prior research to have used cut-points (i.e., Linnea et al., 2012, McQuade et al., 2011), we predicted that using an LPA to define subgroups within an ADHD-only population would yield a PIB profile that would have an approximately one-point discrepancy between parent- and adolescent-report across three domains of competence (i.e., scholastic, social, behavioral). Additionally, we predicted that this PIB profile would contain approximately 30% of the sample, in line with previous findings using the cut-point approach (Linnea et al., 2012). Lastly, given that previous longitudinal work on the PIB has found mixed results on

its stability (i.e., Hoza et al., 2010; Mikami et al., 2010), we did not make directional hypotheses regarding the stability of the PIB.

Methods

Participants

Participants were 326 middle-school-age adolescents with ADHD (*Mage* = 12.26 years, *SD* = 0.92, range = 10.47 – 14.40) who were recruited as part of a parent study evaluating the impact of two school-based interventions that included interventions for improving academic and behavioral functioning as compared to a community care (i.e., control) condition (see Evans et al., 2016, for details). Participants were recruited from nine public middle schools (situated in a mix of urban, suburban, and rural communities) over 3 consecutive years via letters, fliers, and direct referrals by school staff.

Inclusion criteria for the parent 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). The P-ChIPS 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.

Seventy-one percent of the resulting sample was 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 was as follows: did not earn a high school degree (7.4% of parents), high school degree (38.2%), associate's degree (24.6%), bachelor's degree (19.5%), and advanced degree (10.3%). Forty-eight percent of participants met criteria for ADHD-Combined Type and 52% met criteria for ADHD-Inattentive Type; no participants were ruled out for meeting ADHD-Hyperactive/Impulsive Type. Approximately one third of the sample (31%) had a formalized school-based treatment and/or support plan and 50% reported taking medication for ADHD at baseline. Based on DSM-IV criteria, 55% of the sample met criteria for oppositional defiant disorder or conduct disorder, 27% met criteria for an anxiety disorder, and 13% met criteria for a depressive disorder at baseline. Participants' baseline level of overall functional impairment was in the moderately impaired range (*M* = 3.16, *SD* = 1.15) based on the item

average of the parent version of the IRS (scores ≤ 3 demonstrate impairment; Fabiano et al., 2006).

Procedure

The study was approved by the Institutional Review Boards (IRB) at the universities and participating schools. Interested parents contacted the research team listed on the recruitment fliers and completed a brief telephone screen that included questions assessing the nine DSM symptoms in the ADHD inattentive domain. Young 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 young adolescents also completed the Disruptive Behavior Disorder Rating Scale (DBD; Van Eck, Finney, & Evans, 2010), which includes all 18 DSM-IV ADHD items, as well as rating scales assessing the adolescents' functioning and potential comorbidities. Diagnoses were determined using the "or" rule (symptoms were considered present if endorsed by either parent or teacher) and via consensus by two licensed psychologists. Young adolescents also completed a brief assessment battery consisting of four subtests from the Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV; Wechsler, 2003) and seven subtests from the Wechsler Individual Achievement Test, Third Edition (WIAT-III; Wechsler, 2009) to evaluate reading, mathematics, and writing skills. During this initial assessment (T1), young adolescents and parents also completed the Self-Perception Profile for Children (SPPC; Harter, 1985, 2012) and Parent Rating Scale of Child's Actual Behavior (PRS; Harter, 1985, 2012), respectively to evaluate perceptions of their behavior. Young adolescents and parents were then reassessed 12 (T2, *M*age = 13.25, *SD* = 0.92) and 18 months (T3, *M*age = 13.74, *SD* = 0.92) later. Among other measures, both parents and young adolescents completed the PRS and SPPC, respectively, at each of the subsequent time points. Participants and their parents were asked to rate current behavior according to measure instructions; as a result, some adolescents were rated on medication whereas others were rated off medication, depending on current use. Grades were also collected from schools at each time point.

Measures of Competence

Self-Perception Profile for Children (SPPC)—The SPPC (Harter, 1985, 2012) is a 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 .90. The present study includes the scholastic competence, social competence, and behavioral conduct domains (baseline α for each domain = .82, .77, .78, respectively).

Parent Rating Scale of Child's Actual Behavior (PRS)—The PRS (Harter, 1985, 2012) is a 24-item measure adapted from the SPPC that assesses parental perceptions of their child's scholastic competence, social competence, behavioral conduct, and athletic competence. 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 calculated as a measure of 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 .86. The present study includes the scholastic competence, social competence, and behavioral conduct domains (baseline α = .82, .92, .92, respectively).

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

To assess the presence of aPIB subgroup in the sample at baseline, LPA was conducted using Mplus Version 7.31 (Muthén & Muthén, 1998–2011). Variables included in the LPA were indices of the three domains of competence (i.e., scholastic, social, behavioral) as rated by both young adolescent (via the SPPC) and parent (via the PRS). Thus, in total, six variables were included simultaneously. As the SPPC and PRS have the same scales, the raw average scores from each domain were entered. 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). Theoretical rationale and parsimony were used to make a decision when fit indices did not provide enough information, in line with existing recommendations (Collins & Lanza, 2010). 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.

To determine whether a PIB subgroup 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, in line with recommendations from Collins and Lanza for determining relative model fit for LTA (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 across the time points to be equal to T1. This allows for more direct group comparisons and helps stabilize estimation and improve identification and interpretation of statuses (Collins & Lanza, 2010). 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.

Results

Missing Data

At baseline, missing data were minimal ($n = 5$ for SPPC and PRS). Missing data at T2 was 21.17% and 19.33% on the SPPC and PRS, respectively. Data were missing at T3 for 29.45% and 27.91% of participants on the SPPC and PRS, respectively. 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 ($\chi^2 = 333.78$; df = 319; $p = .27$). As a result, the missing data were accounted for by using full information maximum likelihood (FIML) estimation.

Proportion of Sample Displaying PIB Using Traditional Cut-Point Approach

To allow comparisons between this sample and previous studies, in Table 1 we provide descriptive data for the PRS, the SPPC and PRS-SPPC discrepancy scores for scholastic, social, and behavioral domains. Results indicated a consistent discrepancy of approximately 0.2 within each domain of functioning at baseline at the overall sample group level (see Table 1).

Using the discrepancies calculated within each domain of functioning, participants were split into PIB and non-PIB groups as defined by the traditional cut-point approaches used in previous studies. Participants with a discrepancy of at least +1 were classified as having a PIB within each of the three domains. This method classified 14.1%, 16.9%, and 14.7% of the sample as having a PIB in the scholastic, social, and behavioral domains, respectively, at baseline.

Groups Identified Using the Latent Profile Analysis at Baseline

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 (i.e., three out of four indicators suggested better fit than the other three models; AIC decreased by

59.62, BIC decreased by 33.12, and BLRT $p < 0.001$). 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 2. Estimated means for each profile are included in Table 3. We interpreted the profiles based on competence (i.e., parent report) and self-perception (i.e., youth report).

Examination of the individual profiles (Figure 1) revealed the presence of one global PIB profile with variable levels of competence across domains (Variable Competence/Global PIB, Profile 4), wherein the difference in estimated means between young adolescent and parent report on the scholastic, social, and behavioral subscales was 0.60, 0.90, and 0.63, respectively. The Variable Competence/Global PIB profile contained 18.4% of the sample ($n = 60$). The other three profiles can be characterized as Low Competence/Low PIB (Profile 1) which included 105 youth (32.3%). Variable Competence/Low PIB (Profile 2) which included 66 youth (20.2%), and High Competence/Scholastic PIB (Profile 3) which included 95 youth (29%).

Discrepancies between parent and youth ratings in these three profiles were all of lower magnitude than the discrepancies in the Variable Competence/Global PIB profile. However, the discrepancy in the High Competence/Scholastic PIB profile (0.45) suggests that this profile exhibits a smaller PIB in this domain. The Variable Competence/Low PIB 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.

Given that findings from past literature on the effects of gender, race, ethnicity, SES, and ADHD subtype on the PIB have been either mixed or nonexistent (Owens et al., 2007), no covariates were included in the LPA. One-way ANOVAs and chi-square tests were used to examine profile differences on these variables. Results indicates no significant profile differences on gender, χ^2 (3, $N = 326$) = 5.12, $p = .16$, ethnicity, χ^2 (9, $N = 326$) = 8.69, $p = .47$, race, χ^2 (18, $N = 326$) = 18.18, $p = .40$, or SES, $F(3, 320) = 2.63$, $p = .05$. There were significant profile differences on ADHD subtype, χ^2 (3, $N = 326 = 11.19$, $p = .01$). Standardized residuals (residual = −2.0) indicated that there were significantly fewer participants with ADHD-Combined subtype in the Variable Competence/Global PIB group ($n = 22$) than expected ($n = 33.5$).

In the parent study for this sample, medication use was tracked at all time-points and was not associated with any of the assessment measures (see Evans et al., 2016). Nevertheless, a series of one-way ANOVAs were conducted to compare participants who were medicated with those who were not at baseline across each domain on the PRS and SPPC. Results indicated that parents rated youth who were taking ADHD medication as displaying significantly greater scholastic competence ($M = 2.39$, $SD = 0.72$) compared to youth who were not medicated ($M = 2.21$, $SD = 0.65$), $t(319) = -2.42$, $p = .02$, Cohen's $d = 0.26$ (small effect size). There were no significant differences on any other PRS or SPPC domain between youth who were and were not medicated (ps ranged from .06 to .83).

Validation of Profiles Using Objective Measure of Competence

In order to validate the profiles that emerged in the LPA with an objective, non-rating metric, participants were grouped by profile for which they had the highest conditional probability. The average probability of belonging to the profile that each participant was assigned to was .86, .81, .86, and .83, for profiles 1–4, respectively. Average GPA was calculated within each profile (see Table 3). Profiles 1 and 2 (i.e., Low Competence/Low PIB and Variable Competence/Low PIB) had the lowest GPA, in the D range, whereas profiles 3 and 4 (i.e., High Competence/Scholastic PIB and Variable Competence/Global PIB) had GPAs in the C range. A one-way analysis of variance (ANOVA) indicated that the four profiles differed significantly from each other on GPA, $F(3,283) = 12.65$, $p < .001$. Hochberg's GF2 tests were conducted on all possible pairwise contrasts. The following pairs of groups were found to be significantly different ($p < .05$): Low Competence/Low PIB ($M = 1.90$, $SD = 0.89$) vs. High Competence/Scholastic PIB ($M = 2.59$, $SD = 0.84$), Cohen's $d = 0.80$ (large effect size); Low Competence/Low PIB vs. Variable Competence/Global PIB ($M = 2.34$, $SD = 0.91$), Cohen's $d = 0.49$ (medium effect size); Variable Competence/Low PIB ($M = 1.75$, $SD = 0.84$) vs. High Competence/Scholastic PIB, Cohen's $d = 1.00$ (large effect size); and Variable Competence/Low PIB vs. Variable Competence/Global PIB, Cohen's $d = 0.67$ (medium/large effect size).

Optimal Number of Statuses

An LTA was conducted to assess for the presence of a PIB group when data across all three time points were considered. A series of repeated measures ANOVAs revealed no significant effects of treatment condition (from the parent sample) over time on any of the SPPC and PRS subscales (p-values ranged from .13 to .91). Nevertheless, intervention status was included as a covariate. 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. Consistent with 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. This decision was based on the fact that the BIC, a more conservative fit index, was lowest in the 4-status solution, and is in line with the determination of optimal fit in aim 1. The fit indices for two- through five-class solutions are included in Table 4.

Theoretical Conceptualization of Statuses over Time

The four statuses that emerged were comparable to those in the LPA, with one notable exception: the lack of a clear global PIB status across the three domains (see Figure 2). The statuses appeared to represent a Low Competence/Social PIB (Status 1), Variable Competence/Low PIB (Status 2), High Competence/Low PIB (Status 3), and Variable Competence/Social PIB (Status 4) group. Statuses 2 and 3 consisted of ratings from parents and young adolescents that were in line with each other across all three domains, with the Variable Competence/Low PIB status including youth who were rated higher on social competence relative to the behavioral and scholastic domains. The Social PIB statuses (Status 1 and 4) contained participants who had comparable and relatively low and high parent and young adolescent ratings, respectively, in the scholastic and behavioral domains,

but whose young adolescent ratings of social competence were 0.55 and 0.60 points higher, respectively, than those of their parents (see Table 5).

The Low Competence/Social PIB 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/Low PIB 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/Low PIB 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 Variable Competence/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%, 78%, 96.1%, and 97.7%, respectively, indicating that the High Competence/Low PIB and the Variable Competence/Social PIB statuses were the most stable, while the Low Competence/Social PIB and Variable Competence/Low PIB statuses were relatively less stable. The majority of participants (58.5%) who did not remain in status 1 (i.e., Low Competence/Social PIB) at time 2 transitioned to the other social PIB status (status 4). Between time 2 and time 3, 91.3%, 100%, 96.8%, and 99.4% of statuses 1–4, respectively, remained in their status.

Discussion

The present study builds upon prior work by evaluating patterns of responses from adolescents and their parents cross-sectionally and longitudinally in order to evaluate the prevalence and stability of PIB. When evaluated cross-sectionally, a global PIB group (i.e., across the scholastic, social, and behavioral domains, with more modest discrepancies in the scholastic and behavioral domains) 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 domain-specific social PIB groups emerged, including 53.4% of the sample at baseline and 51.1% and 48.9% of the sample 12 and 18 months later, respectively. These findings are discussed in more detail below along with implications for future research.

Prevalence of the PIB in Young Adolescents

Research with youth with ADHD often cites the PIB as a rationale for why parent-report is emphasized over self-report (e.g., Barkley, Fischer, Smallish, & Fletcher, 2002; Klassen, Miller, & Fine, 2006). However, for several reasons, this conclusion should be reconsidered with young adolescent samples. First, the results of the present study indicate that slightly less than half of young adolescents (47%) with ADHD exhibit a PIB in any domain (i.e., the global and domain-specific PIB groups). Second, only a small subset of youth with ADHD

(18%) exhibited a global PIB, wherein the youth consistently overestimated their competence across all assessed domains. Thus, slightly more than half of the sample was in line with their parents across multiple domains of competence. Prior research focusing on the prevalence of the PIB used a cut-point of 1 (e.g., Linnea et al., 2012). Nevertheless, that study also reported a fairly low prevalence rate of a social PIB in children with ADHD (30%); when defining the PIB using this cut-point approach in the present sample, even fewer (14.1% to 16.9%) participants were identified as displaying the bias within each of the domains. Given that the present study's sample is slightly older than that of Linnea and colleagues' (2012) sample (10–14 years in the present study compared to 7 to 11 years in Linnea et al.), this difference may be due to developmental changes in the accuracy of youth self-perceptions over time. Additionally, in the present study, youth in profile 3 (i.e., the High Competence/Scholastic PIB profile) could be conceptualized as having a domain-specific PIB in the area of scholastic competence. However, the mean difference score between parent and young adolescent ratings in this domain was only 0.45. As this High Competence/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 young 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 representinga global PIB subgroup, researchers should continue to explore the constructs for which young adolescent self-report may be meaningful.

Measurement of the 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 youth 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., 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. Similarly, when discrepancies were examined at the group level at baseline in the present study, a small sample-wide PIB of approximately 0.2 was found across domains of functioning (see Table 1); even smaller discrepancies were noted at follow-up time points. However, when response patterns within subgroups are examined, it appears 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 statistically-identified subgroups, the present study found that mean difference scores in the PIB groups ranged from 0.4 to 0.9. This is well above what has been reported in ADHD samples as a whole (e.g., Evangelista et al., 2008), yet still below a cut-point of 1. However, we did not evaluate the external validity of these discrepancies. It may be that certain thresholds (e.g., 0.5 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 global (or scholastic or behavioral) PIB is not stable or consistent over time.

Comparison to Objective Measure of Competence

In this study, we explored the validity of the PIB profiles by comparing the average GPAs of young adolescents in each of the profiles. As shown in Table 3, GPAs largely aligned with each profile as expected given the ratings of scholastic competence. The PIB has been considered a maladaptive trait in this population, given that youth with ADHD have lower levels of competence compared to non-ADHD peers. In the present study, however, youth with significantly poorer scholastic functioning as measured by GPA (Low Competence/Low PIB and Variable Competence/Low PIB groups; see Figure 1), did not exhibit a PIB. Conversely, those with significantly higher grades (High Competence and Variable Competence; see Figure 1) exhibited a PIB globally or in the scholastic domain. This suggests that youth who are performing the poorest academically (i.e., GPA in the D range) may be recognizing and accurately reflecting their difficulties in their ratings, whereas those with relatively higher grades (i.e., in the mid-2.0 range) have more positive perceptions. Overall, it appears that the profiles that emerged in this study were in line with objective measures of academic competence.

Stability Across Time

Few studies have longitudinally evaluated the stability of the PIB over time. 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 level rather than the individual level. Results of the present study using a person-centered approach across time revealed that young adolescent and parent ratings were largely consistent. Specifically, the Variable Competence/Global PIB profile was no longer present and two groups with a domain-specific (i.e., social) PIB emerged. Further, these social PIB statuses accounted for 49% to 53% of the sample at any given time, indicating that approximately half of young adolescents with ADHD in this sample do not display a stable and consistent PIB relative to their parents over time.

Overall, it appears that assessing the PIB cross-sectionally may lead to erroneous identification of youth who appear to be misjudging their competence, especially in non-social domains; 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 large subset of young adolescents with ADHD who are consistently biased in their perception of their social abilities, which is in line with findings from Hoza and colleagues (2010) that the social PIB appears to plateau and only decrease slightly in youth with ADHD over late childhood and into adolescence.

Interestingly, the social competence of social PIB groups that emerged in the current study (i.e., Variable Competence/Social PIB and Low Competence/Social PIB) was rated to be the lowest among the four statuses by *both* parents and young adolescents. This suggests that, despite their social PIB, these young adolescents are recognizing that their social functioning is poor, which falls in line with findings from Swanson and colleagues (2012) that girls with ADHD assess their competence accurately relative to objective measures of functioning,

such as peer sociometrics. 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 young adolescent who is “biased”.

Limitations

We must first acknowledge that our use of the term “positive illusory bias” to describe the overestimation phenomenon, although in line with previous research, may be controversial. Specifically, while the young adolescents in our sample did overestimate their competence relative to parents, this does not necessarily mean that they are overestimating their abilities relative to their true abilities or that they are overestimating to a greater degree than are non-ADHD youth (e.g., Swanson et al., 2012).

One of the main limitations of this study is that the external validity of the profiles that emerged through LPA and LTA was evaluated relative to GPA only. Accordingly, we cannot make statements about whether young adolescents in the identified PIB groups exhibit better or poorer outcomes than their peers in social and behavioral domains. However, using GPA as an objective measure of scholastic competence, we found that the groups that emerged at baseline via the LPA appear to be valid indicators of academic functioning; profiles which had the highest parent and youth ratings of scholastic competence were also those that had highest GPA (see Table 3). 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. Another limitation is the use of subtraction to determine child-parent differences in perceptions across groups that emerged in the LPA and LTA. Although we used mixture modeling to explore naturally-occurring groups based on participant-level response patterns, we nevertheless created discrepancy scores based on the results of the LPA/LTA. As mentioned previously, the discrepancy method has been previously criticized for the possibility being more correlated with one informant than the other (e.g., Laird & Weems, 2011). In particular, this limitation may most affect our validation of the profiles using GPA; thus, interpretation of our findings that participants displaying a PIB had higher GPA levels should be interpreted more cautiously. 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. Additionally, the SPPC and PRS do not specify a time range within which competence should be rated. Given that youth with ADHD are more likely to respond to immediate rather than delayed rewards (Tripp & Alsop, 2001), they also may be more likely to consider more recent events when rating their competence, whereas their parents may be rating more stable and general levels of competence. Future studies should consider using a measure with a greater range in order

to reduce the possibility of a ceiling effect. Additionally, a clear time frame should be specified in order to ensure that all raters are considering the same point in time.

Future Directions

The present study provides an important foundation to further the study of the PIB in youth, specifically young adolescents, with ADHD. Given that a subset of youth was found to have a global PIB at baseline, future research should evaluate whether this pattern has consistency and whether these youth have differential outcomes over time, particularly in relation to the domain-specific PIB group. Similarly, the LPA method should be compared to the traditional cut-point approach of +1 on outcomes. This would help determine whether defining the PIB through LPA leads to clinically meaningful groupings, and whether the LPA is superior to the traditional PIB cut-point method at identifying at-risk individuals. It would also shed light on whether having a global PIB is more detrimental than having a PIB in one specific domain. It is important to note, however, that there is currently ample literature on the drawbacks of using raw discrepancy scores (e.g., De Los Reyes & Kazdin, 2004; Edwards, 2001). 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 in early adolescence. In line with this notion, Hoza et al. (2010) found that the presence of depressive symptoms led to later reductions of the PIB in youth with ADHD. The accuracy of youth and parent report as compared to objective measures should also be evaluated. Swanson and colleagues (2012) found that girls with ADHD were more in line with objective measures of functioning than were their parents and teachers. If replicated in a mixed-gender sample, these findings would have dramatic implications for the assumption that youth are overreporting their competence, and would instead indicate that parents are underreporting their children's abilities. Additionally, if future research confirms that self-ratings from youth with ADHD are more in line with objective measures of competence and thus are not inaccurate, the term "positive bias," rather than "positive illusory bias," may be a more appropriate name for this phenomenon.

In conclusion, future research should not assume that all, or even a majority of young adolescents with ADHD, exhibit a positive bias in their ratings. Further, it is important to recognize that even when the PIB is present, particularly in the scholastic and behavioral domains, it may be temporary, and not stable across time. Only a PIB in the social domain was stable across the 18-month study period and only for half of the sample. This suggests that intervention targeting inaccurate perceptions of competence broadly in youth with ADHD is probably not necessary, at least in young adolescent populations, as their self-perceptions are likely to change naturally. Instead, efforts may be focused on the social domain, where half of young adolescents with ADHD display a stable PIB.

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References

American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-IV. 4. Washington, DC: American Psychiatric Association; 1994.

American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5. Washington, DC: Author; 2013.

Angold A, Costello EJ, Erkanli A. Comorbidity. Journal of Child Psychology and Psychiatry. 1999; 40:57–87. [PubMed: 10102726]

Barkley RA, Fischer M, Smallish L, Fletcher K. The persistence of attention-deficit/hyperactivity disorder into young adulthood as a function of reporting source and definition of disorder. Journal of Abnormal Psychology. 2002; 111:279–289. [PubMed: 12003449]

Cole DA, Martin JM, Powers B, Truglio R. Modeling causal relations between academic and social competence and depression: A multitrait-multimethod longitudinal study of children. Journal of Abnormal Psychology. 1996; 105:258–270. DOI: 10.1037/0021-843X.105.2.258 [PubMed: 8723007]

Collins, LM., Lanza, ST. Latent class and latent transition analysis: With applications in the social, behavioral, and health sciences. Hoboken, NJ: Wiley; 2010.

De Los Reyes A, Kazdin AE. Measuring informant discrepancies in clinical child research. Psychological Assessment. 2004; 16:330–334. DOI: 10.1037/1040-3590.16.3.330 [PubMed: 15456389]

Edwards JR. Ten difference score myths. Organizational Research Methods. 2001; 4:265–287.

Evangelista NM, Owens JS, Golden CM, Pelham WE. The positive illusory bias: Do inflated self-perceptions in children with ADHD generalize to perceptions of others? Journal of Abnormal Child Psychology. 2008; 36:779–791. DOI: 10.1007/s10802-007-9210-8 [PubMed: 18188536]

Evans SW, Langberg JM, Schultz BK, Vaughn A, Altaye M, Marshall SA, Zoromski AK. Evaluation of a school-based treatment program for young adolescents with ADHD. Journal of Consulting and Clinical Psychology. 2016; 84:15–30. [PubMed: 26501496]

Fabiano GA, Pelham WE, Waschbusch DA, Gnagy EM, Lahey BB, Chronis AM, … Burrows-MacLean L. A practical measure of impairment: Psychometric properties of the Impairment Rating Scale in samples of children with attention deficit hyperactivity disorder and two school-based samples. Journal of Clinical Child & Adolescent Psychology. 2006; 35:369–385. DOI: 10.1207/s15374424jccp3503 [PubMed: 16836475]

Fristad MA, Teare M, Weller EB, Weller RA, Salmon P. Study III: Development and concurrent validity of the Children's Interview for Psychiatric Syndromes—parent version (P-ChIPS). Journal of Child and Adolescent Psychopharmacology. 1998; 8:221–226. [PubMed: 10214926]

Harter S. Self-perception profile for children: Manual and questionnaires. 1985, 2012 Unpublished manuscript.

Harter, S. The construction of the self: A developmental perspective. 2. New York: Guilford; 2012.

Hoza B, Gerdes AC, Hinshaw SP, Arnold LE, Pelham WE Jr, Molina BS, … Odbert C. Self-perceptions of competence in children with ADHD and comparison children. Journal of Consulting and Clinical Psychology. 2004; 72:382–391. [PubMed: 15279522]

Hoza B, McQuade JD, Murray-Close D, Shoulberg E, Molina BSG, Arnold LE, … Hechtman L. Does childhood positive self-perceptual bias mediate adolescent risky behavior in youth from the MTA study? Journal of Consulting and Clinical Psychology. 2013; 81:846–58. DOI: 10.1037/a0033536 [PubMed: 23834228]

Hoza B, Murray-Close D, Arnold LE, Hinshaw SP, Hechtman L. The MTA Cooperative Group. Time-dependent changes in positively biased self-perceptions of children with ADHD: A developmental psychopathology. Development and Psychopathology. 2010; 22:375–390. DOI: 10.1017/S095457941000012X [PubMed: 20423548]

Jacobson LA, Williford AP, Pianta RC. The role of executive function in children's competent adjustment to middle school. Child Neuropsychology. 2011; 17:255–280. DOI: 10.1080/09297049.2010.535654 [PubMed: 21246422]

Johnston, C., Chronis-Tuscano, A. Families and ADHD. In: Barkley, RA., editor. Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment. 4. New York: Guilford; 2015. p. 191-209.

Klassen AF, Miller A, Fine S. Agreement between parent and child report of quality of life in children with attention-deficit/hyperactivity disorder. Child: Care, Health and Development. 2006; 32:397–406.

Laird RD, Weems CF. The equivalence of regression models using difference scores and models using separate scores for each informant: Implications for the study of informant discrepancies. Psychological Assessment. 2011; 23:388–397. DOI: 10.1037/a0021926 [PubMed: 21319905]

Langberg JM, Epstein JN, Altaye M, Molina BSG, Arnold LE, Vitiello B. The transition to middle school is associated with changes in the developmental trajectory of ADHD symptomatology in young adolescents with ADHD. Journal of Clinical Child & Adolescent Psychology. 2008; 37:651–663. DOI: 10.1080/15374410802148095 [PubMed: 18645755]

Lewinsohn PM, Mischel W, Chaplin W, Barton R. Social competence and depression: The role of illusory self-perceptions. Journal of Abnormal Psychology. 1980; 89:203–212. [PubMed: 7365132]

Linnea K, Hoza B, Tomb M, Kaiser N. Does a positive bias relate to social behavior in children with ADHD? Behavior Therapy. 2012; 43:862–875. DOI: 10.1016/j.beth.2012.05.004 [PubMed: 23046787]

Little RJ. A test of missing completely at random for multivariate data with missing values. Journal of the American Statistical Association. 1988; 83:1198–1202.

McQuade JD, Tomb M, Hoza B, Waschbusch DA, Hurt EA, Vaughn AJ. Cognitive deficits and positively biased self-perceptions in children with ADHD. Journal of Abnormal Child Psychology. 2011; 39:307–319. [PubMed: 20820902]

Mikami AY, Calhoun CD, Abikoff HB. Positive illusory bias and response to behavioral treatment among children with attention-deficit/hyperactivity disorder. Journal of Clinical Child and Adolescent Psychology. 2010; 39:373–385. DOI: 10.1080/15374411003691735 [PubMed: 20419578]

Muthén, LK., Muthén, BO. Mplus User's Guide. 6. Los Angeles, CA: Muthén & Muthén; 1998–2011.

Owens JS, Goldfine ME, Evangelista NM, Hoza B, Kaiser NM. A critical review of self-perceptions and the positive illusory bias in children with ADHD. Clinical Child and Family Psychology Review. 2007; 10:335–351. DOI: 10.1007/s10567-007-0027-3 [PubMed: 17902055]

Owens JS, Hoza B. The role of inattention and hyperactivity/impulsivity in the positive illusory bias. Journal of Consulting and Clinical Psychology. 2003; 71:680–691. DOI: 10.1037/0022-006X.71.4.680 [PubMed: 12924673]

Rooney, MT., Fristad, MA., Weller, EB., Weller, RA. Administration manual for the ChIPS. Arlington: American Psychiatric Association; 1999.

Scheffler RM, Brown TT, Fulton BD, Hinshaw SP, Levine P, Stone S. Positive association between attention-deficit/hyperactivity disorder medication use and academic achievement during elementary school. Pediatrics. 2009; 123:1273–1279. DOI: 10.1542/peds.2008-1597 [PubMed: 19403491]

Swanson EN, Owens EB, Hinshaw SP. Is the positive illusory bias illusory? Examining discrepant self-perceptions of competence in girls with ADHD. Journal of Abnormal Child Psychology. 2012; 40:987–998. DOI: 10.1007/s10802-012-9615-x [PubMed: 22391774]

Tripp G, Alsop B. Sensitivity to reward delay in children with attention deficit hyperactivity disorder (ADHD). Journal of Child Psychology and Psychiatry. 2001; 42:691–698. [PubMed: 11464973]

Van Eck K, Finney SJ, Evans SW. Parent report of ADHD symptoms of early adolescents: A confirmatory factor analysis of the Disruptive Behavior Disorders Scale. Educational and Psychological Measurement. 2010; 70:1042–1059.

Wechsler, D. Wechsler Intelligence Scale for Children. 4. San Antonio, TX: Psychological Corporation; 2003.

Wechsler, D. Wechsler Individual Achievement Test. 3. San Antonio, TX: Pearson; 2009.

Wehmeier PM, Schacht A, Barkley RA. Social and emotional impairment in children and adolescents with ADHD and the impact on quality of life. Journal of Adolescent Health. 2010; 46:209–217. DOI: 10.1016/j.jadohealth.2009.09.009 [PubMed: 20159496]

Weller EB, Weller RA, Fristad MA, Rooney MT, Schecter J. Children's interview for psychiatric syndromes (ChIPS). Journal of the American Academy of Child & Adolescent Psychiatry. 2000; 39:76–84. [PubMed: 10638070]

Youngstrom E, Loeber R, Stouthamer-Loeber M. Patterns and correlates of agreement between parent, teacher, and male adolescent ratings of externalizing and internalizing problems. Journal of Consulting and Clinical Psychology. 2000; 68:1038–1050. [PubMed: 11142538]

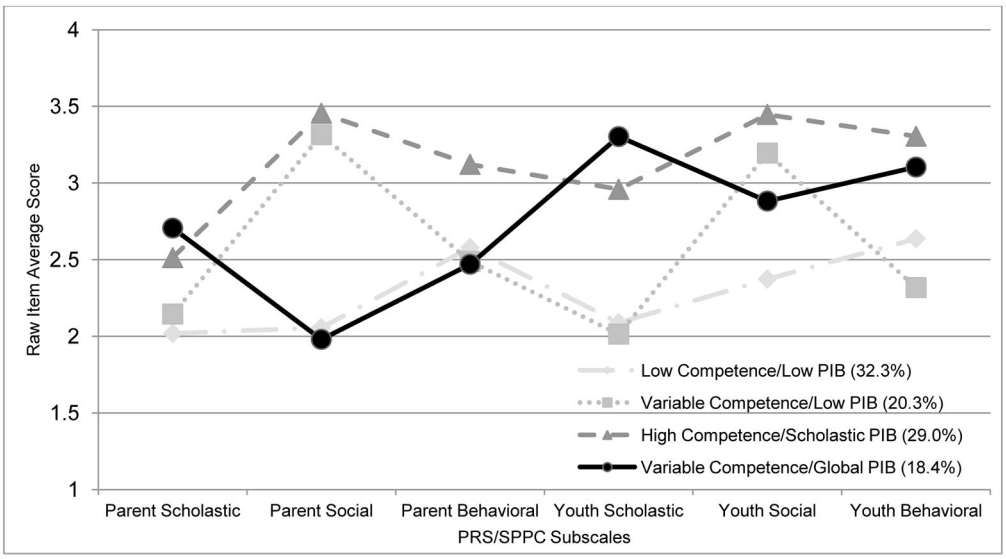

Figure 1.

Optimal Profile Solution at Baseline Using LPA.

Note. LPA = latent profile analysis; PIB = positive illusory bias; PRS = Parent Rating Scale; SPPC = Self-Perception Profile for Children.

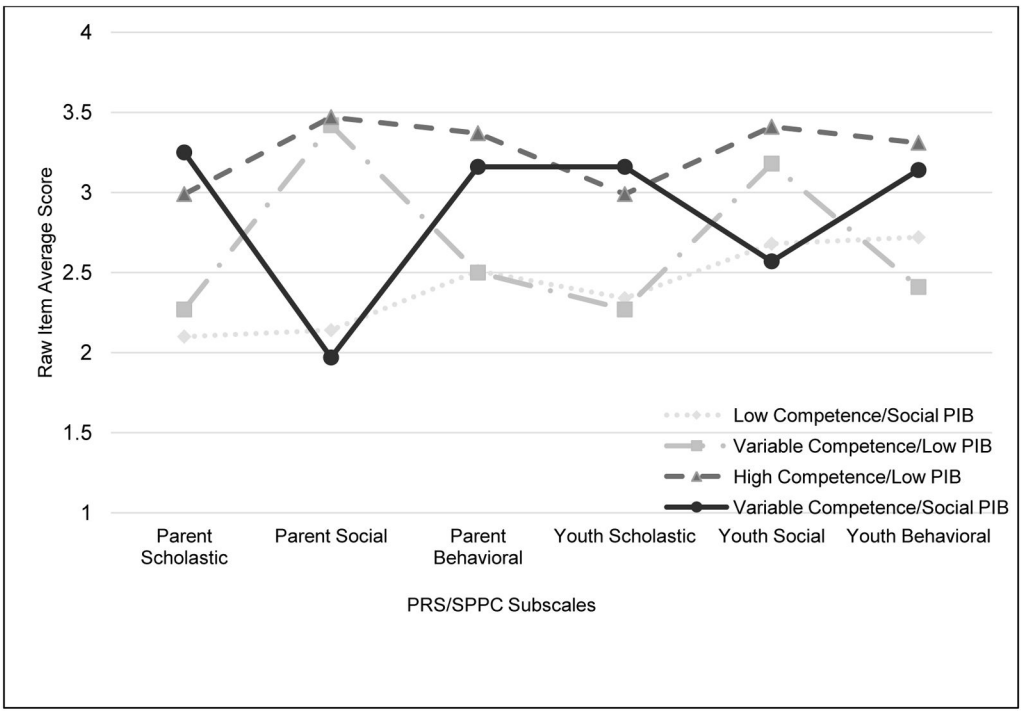

Figure 2.

Optimal Status Solution at all Time Points Using LTA

Note. LTA = latent transition analysis; PIB = positive illusory bias. Figure incorporates data from times 1–3. Statuses are identical across all three time points as item-response probabilities were constrained to be equal in the LTA

Table 1

Means and Discrepancies of Each Domain of the SPPC/PRS Over Time

	Mean (SD)		
	Time 1	**Time 2**	**Time 3**
SPPC Subscales			
Scholastic	2.47 (0.75)	2.69 (0.71)	2.65 (0.75)
Social	2.92 (0.73)	2.95 (0.71)	2.98 (0.69)
Behavioral	2.77 (0.66)	2.83 (0.64)	2.89 (0.65)
PRS Subscales			
Scholastic	2.29 (0.69)	2.66 (0.70)	2.67 (0.70)
Social	2.69 (0.85)	2.71 (0.84)	2.82 (0.81)
Behavioral	2.64 (0.84)	2.77 (0.86)	2.93 (0.88)
Discrepancy (SPPC – PRS)			
Scholastic	0.18	0.03	−0.02
Social	0.23	0.24	0.16
Behavioral	0.13	0.06	−0.04

Note. PRS = Parent Rating Scale; SPPC = Self-Perception Profile for Children. Scores on PRS and SPPC range from 1–4, with higher scores indicating greater levels of competence.

Table 2

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

Table 3

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

	Low Competence/Low PIB Profile	Variable Competence /Low PIB Profile	High Competence / Scholastic PIB Profile	Variable Competence / Global PIB Profile
SPPC Subscales				
Scholastic	2.09	2.01	2.96	3.39
Social	2.37	3.2	3.45	2.88
Behavioral	2.64	2.32	3.31	3.1
PRS Subscales				
Scholastic	2.02	2.15	2.51	2.71
Social	2.06	3.32	3.46	1.98
Behavioral	2.58	2.49	3.12	2.47
Discrepancy (SPPC – PRS)				
Scholastic	0.07	−0.14	0.45	0.59
Social	0.31	−0.12	−0.01	0.9
Behavioral	0.06	−0.17	0.19	0.63
GPA	1.9	1.75	2.59	2.34

Note. LPA = latent profile analysis; PIB = positive illusory bias; PRS = Parent Rating Scale; SPPC = Self-Perception Profile for Children; GPA = Grade Point Average. 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.

Table 4

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. LTA = latent transition analysis; AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria

Table 5

Means and Discrepancies of Each Domain of the SPPC/PRS Within Statuses Defined using LTA across Three Time Points

Status	Low Competence/ Social PIB	Variable Competence/Low PIB	High Competence/Low PIB	Variable Competence/Social PIB
SPPC Subscales				
Scholastic	2.34	2.27	2.99	3.16
Social	2.28	3.18	3.41	2.57
Behavioral	2.72	2.41	3.31	3.14
PRS Subscales				
Scholastic	2.10	2.27	2.99	3.25
Social	2.14	3.42	3.47	1.97
Behavioral	2.51	2.50	3.37	3.16
Discrepancy (SPPC – PRS)				
Scholastic	0.24	0	0	−0.09
Social	0.54	−0.24	−0.06	0.6
Behavioral	0.21	−0.09	−0.06	−0.02

Note. LTA = latent transition analysis; PIB = positive illusory bias; PRS = Parent Rating Scale; SPPC = Self-Perception Profile for Children. 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. Means and discrepancies are identical across all three time points as item-response probabilities were constrained to be equal in the LTA.