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Changes in Self-Perceptions in Children with ADHD:
A Longitudinal Study of Depressive Symptoms and Attributional Style

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Abstract

Examined positive self-perceptions in relation to depressive symptoms and attributional style in a sample of 88 boys with Attention-Deficit/Hyperactivity Disorder (ADHD) assessed at baseline and at a two- to three-year follow-up. Change in boys' self perceptions of competency in the scholastic, social, and behavioral domains was examined as a predictor of changes in depressive symptoms and depressive attributional style. Additionally, teacher-rated perceptions of competency at baseline and follow-up were considered as unique predictors. Results indicated that across all three domains, a reduction in children's self perceptions of competency over time predicted greater depressive symptoms at follow-up, even when controlling for teacher-rated competency. Analyses also suggested that a reduction in self-perceptions in the social domain was the strongest relative predictor of later depressive symptoms and also predicted greater depressive attributional style at follow-up. In contrast, teacher-rated competency was not a significant predictor of depressive symptoms or attributional style at follow-up. Results support a protective function of positive self-perceptions in regards to depressive cognitions over a two- to three-year period for children with ADHD. However literature suggesting risks for other negative outcomes also is discussed.

Key Words: Attention-Deficit/Hyperactivity Disorder, Self-perceptions, Positive illusions, Depression, Attributional style

Changes in Self-Perceptions in Children with ADHD:

A Longitudinal Study of Depressive Symptoms and Attributional Style

Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most commonly diagnosed childhood behavioral disorders, occurring in 3% to 7% of school-aged children (American Psychiatric Association, 2000). Children with ADHD are characterized by developmentally inappropriate levels of inattention and/or hyperactivity/impulsivity. Along with these core symptoms, children with ADHD have accompanying impairment across multiple domains such as at school or home and with peers (Abikoff, Jensen, Arnold, Hoza, Hechtman, Pollack, et al., 2002; DuPaul, McGoey, Eckert & VanBrakle, 2001; Hoza et al., 2005; Pelham, Fabiano, & Massetti, 2005). For many children with ADHD, the disorder is chronic with continued impairment into adolescence and adulthood (American Psychiatric Association, 2000). Further, childhood ADHD is associated with many long-term risks including emotional difficulties (Spencer, Biederman, & Mick, 2007) and increased rates of depression (Biederman, et al., 2006; Jensen, Shervette, Xenakis, & Richters, 1993; Treuting & Hinshaw, 2001). Despite this observed increase in depression rates, very little is known about the cognitive elements that may underlie this increase.

Increasingly, researchers have noted the potential importance of self-perceived competency in children with ADHD and the relation between this cognitive element and adjustment (Hoza, Murray-Close, Arnold, Hinshaw, & MTA Cooperative Group, 2010; Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007). Given the impairment of children with ADHD across multiple domains, it may be expected that they would experience lower self-perceived

competency. However, studies examining the self-perceptions of children with and without ADHD have been mixed, with some finding lower self-perceptions among children with ADHD (Horn, Wagner, & Ialongo, 1989; Ialongo, Lopez, Horn, Pascoe, & Greenberg, 1994) and others surprisingly finding no differences, even in domains typically impaired in children with ADHD (Gresham, MacMillan, Bocian, & Ward, 2000; Hoza, Pelham, Milich, Pillow, & McBride, 1993). Conflicting findings may be the result of differences in measurement of self-perceptions and sample characteristics (Owens et al., 2007). Further, when studies have controlled for comorbid internalizing symptoms, results appear clearer and show no differences in the self-perceptions of children with and without ADHD across domains of competency (Hoza et al., 1993).

When the self-perceptions of children with and without ADHD have been compared to a criterion, such as teacher ratings or actual performance level, results have shown that children with ADHD tend to overestimate their competency relative to external indices (for a review see Owens, et al., 2007). This overestimation, also known as a *positive illusory bias*, has been demonstrated in children with ADHD across several domains of competency and with both questionnaire and laboratory tasks (Diener & Milich, 1997; Hoza, et al., 2004; Hoza, Pelham, Dobbs, Owens, & Pillow, 2002). For instance, questionnaire studies examining the discrepancy between children's self-reported competence and their parents' or teachers' rating of their competence have found that children with ADHD demonstrate greater positive bias than control children (Hoza et al., 2004; Hoza et al., 2002).

Laboratory studies examining mean differences between ADHD and control children demonstrate a similar pattern of results. For instance, in an academic "find-a-word" laboratory puzzle task, post-task self-evaluations of boys with ADHD were no different than those of

control boys, despite boys with ADHD solving fewer puzzles and being rated by objective observers as less effortful (Hoza, Pelham, Waschbusch, Kipp, & Owens, 2001). Further, in a social “get-acquainted” laboratory task, children with ADHD evaluated their social performance more positively than children without ADHD, despite being independently rated as less socially effective by independent observers blind to ADHD diagnostic status (Hoza, Waschbusch, Pelham, Molina, & Milich, 2000). Thus, to date, a large body of literature suggests that the self-evaluations of performance and competency of children with ADHD are not commensurate with their actual performance or others’ evaluations of their abilities.

Despite findings that children with ADHD tend to report self-perceptions that overestimate their competency, the implications of this bias are not well understood. Thus the present study focuses on the potential protective implications of overly positive self-perceptions for children with ADHD. Indeed, some researchers have suggested that overly positive self-perceptions may buffer children with ADHD from the effects of failure experiences and protect their self-esteem (Diener & Milich, 1997; Owens et al., 2007). A handful of findings from cross-sectional studies support this possibility. For instance, a positive bias is most apparent in children with ADHD in response to failure situations (Hoza et al., 2000) and in domains of greatest impairment (Hoza et al., 2002). Additionally, research has found that boys with ADHD show less overestimation of social abilities after receiving positive feedback about a prior social interaction (Diener & Milich, 1997).

Taken together, these results suggest that positive self-perceptions may help children with ADHD cope with failure or areas of uncertain competence. However, with one exception (Hoza, et al., 2010), the protective implications of overly positive self-perceptions have only been explored in cross-sectional studies. Thus the long-term implications of positive self-perceptions

for later adjustment in children with ADHD have not been well explored (Owens et al., 2007). Further, previous studies examining positive self-perceptions in children with ADHD often use a discrepancy score as a measure of positive bias, which is calculated by subtracting the teacher's rating of competency from the child's self-rating. Though discrepancies are useful in examining the extent of overestimation, this method does not consider the unique roles of children's and teachers' ratings of competency. Given that academic and social impairment also are predictors of depressive symptoms (Asher, Hymel, & Renshaw, 1984; McCarty, et al., 2008; Parker & Asher, 1997; Seroczynski, Cole, & Maxwell, 1997) it may be important for studies to also examine child-rated or teacher-rated perceptions of competency as unique predictors of later adjustment to ascertain the role of each. Further, no study has yet examined how changes in self-perceptions over time, across multiple domains, may relate to adjustment in children with ADHD.

One reason it is important to explore the implications of change in self-perceptions for later adjustment in children with ADHD is that a debate remains over whether overly positive self-perceptions are adaptive (Taylor & Brown, 1988) or maladaptive (Colvin & Block, 1994). Drawing from adult studies, Taylor and Brown (1988) argued that overly positive self-perceptions buffer individuals from negative feedback in failure situations and are therefore protective. From this perspective it is both normative and adaptive to have overly optimistic perceptions of the self. In contrast to this view, Colvin and Block (1994) have argued that accurate self-perceptions are necessary for mental health because they allow individuals to incorporate social feedback and to remain motivated to improve.

Given that children with ADHD generally experience a greater frequency of failure than children without ADHD, it is possible that consistently positively biased self-perceptions have

protective implications for adjustment. At the same time, the ability to accurately perceive feedback and adjust one's behavior would appear crucial for children with ADHD to improve in areas of deficit. Given these conflicting views and the fact that children with ADHD demonstrate a greater bias in self-perceptions than non-ADHD children (Hoza et al., 2004; Hoza et al., 2002), it is important to understand how self-perceptions may or may not be protective for children with ADHD.

The protective function of positively biased self-perceptions has been discussed in relation to depressive symptoms in cross sectional studies of children with ADHD (Hoza et al., 2004; Hoza et al., 2002). For instance, Hoza and colleagues (2004) found that whereas children with ADHD, compared to control children, generally overestimated their competency relative to a criterion, those with both ADHD and depressive symptoms did not. These findings suggest an inverse relation between the extent to which children demonstrate positively biased self-perceptions and levels of depressive symptoms. Further, in non-ADHD samples, perceived self-competency has been consistently inversely linked to depressive symptoms in children and adolescents (Cole, Martin, Peeke, Seroczynski, & Fier, 1999; Jacobs, Reinecke, Gollan, & Kane, 2008). These findings lend initial support to the possibility that, in regards to depression, positive self-perceptions may be protective.

Only one study to date has examined the association between positively biased self-perceptions and depressive symptoms over time in children with ADHD. Interestingly, among a sample of children with and without ADHD, although decreases in positively biased self-perceptions were associated with increases in depressive symptoms over time, positive bias was not causally predictive of changes in depressive symptoms (Hoza et al., 2010). However additional studies are needed that examine the implications of positive self-perceptions for

children with ADHD. Given concurrent findings that the positive self-perceptions of children with ADHD may be protective in regards to depressive symptoms (Hoza et al., 2004; Hoza et al., 2002), a reduction in self-perceptions of competency over time may predict observed increases in levels of depression in children with ADHD.

Given that self-perceptions represent a cognitive thinking style and are related to concurrent depression (Jacobs, et al., 2008), it is likely that self-perceptions also relate to other cognitive features typically associated with depression in children and adolescents. For instance, children and adolescents with depressive symptoms are more likely to exhibit negatively biased causal attributions and are more likely to attribute negative events to internal, stable, and global factors (i.e. a “depressogenic” attributional style; Joiner, 2000; Kaslow, Rehm, Pollack & Siegel, 1988; Spence, Sheffield, & Donovan, 2002). Further, for non-ADHD children, greater depressive symptoms also are associated with less attribution of positive events to internal, stable, and global factors (Hoza, et al., 1993).

Despite findings linking these cognitive features to depression in non-ADHD samples, little attention has been paid to the relation of self-perceptions to attributional style in children with ADHD. In ADHD samples, the majority of studies examining attributional style in children with ADHD have examined attributions for performance on laboratory tasks without examining depressive symptoms (Carlson, Pelham, Milich, & Hoza, 1993; Hoza et al., 2001; Milich, Licht, Murphy, & Pelham, 1989) or have examined attributions for positive and negative events of a hypothetical boy with ADHD (Treuting & Hinshaw, 2001). Further, to date, no study has examined the relation between self-perceptions and cognitive features of depression in children with ADHD over time, despite the fact that both are associated in predictable ways with depression.

It also may be important to identify which domains of self-perceived competency (i.e. scholastic, social, or behavioral conduct) have the strongest relation to changes in depressive symptoms and depressive attributions. Research does suggest that there are developmental changes in the importance of different domains of competency during adolescence. For instance, social acceptance and friendships become increasingly important during early and mid-adolescence (Berndt, 1996; Bukowski & Kramer, 1986; Hartup, 1992). In contrast, poor behavioral conduct may actually become increasingly valued during adolescence, given research suggesting that minor delinquent behaviors can actually confer some social benefit for adolescents (Moffitt, 1993; Parkhurst & Hopmeyer, 1998). Additionally, research has found that children demonstrate a significant decrease in their value of scholastic competence from first to twelfth grade (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002). Thus a greater awareness of lesser competency in behavioral conduct or scholastic ability may not be as upsetting to adolescents as would be an awareness of lesser social competence. Though yet to be examined empirically, this may suggest that decreases in self-perceptions in the social domain would have the strongest relation to increases in depressive symptoms and depressive cognitions.

Thus, the focus of the current study was to examine the relation between changes in self-perceptions over time and indices of depression in a sample of children with ADHD followed over a two- to three-year period. We hypothesized that a reduction in self-perceptions of competency over time would predict increases in depressive symptoms and depressogenic attributions two to three years later. Further, we hypothesized that this relation would hold even when controlling for teacher-rated competency at baseline and follow-up. We considered changes in self-perceptions in three domains of competency (scholastic, social, and behavioral conduct) and also examined the relative importance of changes in self-perceptions in each of

these domains. We expected decreases in self-perceived competency to predict greater depressive symptoms and cognitions across all three domains of competency but expected that changes in social self-perceptions would emerge as the strongest predictor.

Method

Participants

This sample was comprised of 88 boys with ADHD. Participants were drawn from a larger sample for inclusion in this study based on complete relevant measures at baseline and at two- to three-year follow-up. At baseline, subjects ($n=184$) were enrolled in an 8-week Summer Treatment Program (STP; Pelham & Hoza, 1996) or Saturday Program ($n=1$) for children with behavior problems. One hundred and twelve boys with ADHD (61% of the larger sample) were assessed again two to three years later and 88 participants had complete relevant measures at both time points. At baseline, boys were 8.0 to 12.6 years old ($M = 9.6$ years, $SD = 1.2$) and at follow-up they were 9.9 to 15.3 years old ($M = 12.0$ years, $SD = 1.2$). Socioeconomic status was assessed at baseline using the Hollingshead Four Factor Index and ranged from 16 to 66 ($M = 44.63$, $SD = 13.00$; Hollingshead, 1975). The sample was comprised of 76 boys identified as Caucasian (86.4%), 7 identified as African American (8.0%), and 5 identified as other races/ethnicities or mixed race (5.6%). Boys were enrolled in regular classrooms ($n=70$), fulltime ($n=3$) or part time ($n=11$) classrooms for children with learning disabilities, or fulltime ($n=1$) or part time ($n=2$) classrooms for socially and emotionally disturbed children. For one boy, classroom placement was not reported. At baseline, both boys and girls were recruited to participate in this study. However due to low recruitment of girls with ADHD at baseline ($n=11$), only boys were retained for follow-up. A detailed description of participant recruitment and study procedures has been previously reported by Hoza and colleagues (2002).

All participants were assessed at baseline using the standard STP assessment protocol which included the Disruptive Behavior Disorders Rating Scale completed by parents and teachers (DBD; Pelham, Gnagy, Greenslade, & Milich, 1992) and the parent DBD structured interview designed to accompany the rating scales. The DBD rating scale and structured interview provided a measure of DSM-III-R (American Psychiatric Association, 1987) symptoms of ADHD, Oppositional Defiant Disorder (ODD), and Conduct Disorder (CD). Final ADHD diagnoses were verified via case review by one or more experts in ADHD or by a doctoral-level clinician specializing in ADHD research. If there was diagnostic uncertainty, the majority of diagnosticians were required to reach a consensus before a diagnosis was assigned. Diagnoses were based on DSM-III-R criteria (American Psychiatric Association, 1987) because this was the current DSM version at the time of the first data collection (see Hoza et al., 2002). Excluded from the sample were boys with full scale IQ scores below 80 at baseline, as assessed by the Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1974) or Third Edition (WISC-III; Wechsler, 1991).

Procedures

Prior to participation, participants provided written assent and their parents provided written consent. At both time points, boys completed questionnaires individually with a research assistant; all relevant measures for this study were administered at both time points. All children who typically took stimulant medication completed rating scales while off medication. Additionally, participants' teachers completed a series of questionnaires at both time points¹. If a participant had more than one academic teacher, each teacher received rating forms. In the final analyses, the teacher who spent the most time with the participant was used; if an equal amount

of time was spent with each teacher, the teacher assigning the most severe ratings on the DBD rating scale (Pelham, et al., 1992) was used.

Measures

Self-Perception Profile for Children. The Self Perception Profile for Children (SPPC; Harter, 1985) is a 36-item child-rated questionnaire that assesses self-perceived scholastic competence, social acceptance, athletic competence, physical appearance, and behavioral conduct, as well as global self-worth. Each of the six domains is comprised of 6 items which are rated on a 1 to 4 scale, with higher scores indicating greater self-perceived competence. In the present study, only the scholastic, social, and behavioral competence subscales were used, given that these domains represent the three most common areas of impairment for children with ADHD (DuPaul, et al., 2001; Pelham, et al., 2005). According to self-concept theory, self-concept only can be assessed in a domain specific manner (Harter, 1985). Cronbach's alphas for these subscales at baseline and follow-up ranged from 0.69 to 0.85. One-year test retest reliability is not available for the SPPC. However, in our sample two- to three-year test-retest reliability ranged from .22 to .51, which is consistent with other reports of 3 year test-retest reliability of the SPPC (Granleese & Joseph, 1994).

Boys' teachers completed the teacher version of the SPPC as a measure of boys' actual competence (Harter, 1985). The teacher version of the SPPC is a 15-item measure, parallel to the child version of the SPPC, but includes 3 items per subscale rather than 6 items. The teacher SPPC assesses children in the five specific domains (scholastic competency, social competency, athletic competency, physical appearance, and behavioral conduct) but not global self-worth, since according to Harter (1985), global self-worth represents a self-judgment that cannot be evaluated by others. Cronbach's alphas for the teacher-rated scholastic, social, and behavioral

subscales used in this study ranged from 0.89 to 0.95. Two- to three-year test-retest reliability in our sample ranged from .27 to .38.

Children's Depression Inventory. The Children's Depression Inventory (CDI; Kovacs, 1992) is a 27-item self-report measure that assesses cognitive, affective, and behavioral symptoms of depression. Items present three alternative responses representing different levels, frequencies, and severities of symptoms; children are instructed to select one of the three responses based on how they have been feeling in the past two weeks. Items are scored from zero to two and can be summed to obtain both a total score, as well as individual subscale scores assessing negative mood, interpersonal problems, feelings of ineffectiveness, anhedonia, and negative self-esteem; on all subscales higher scores indicate greater depressive symptomatology. Subscales and the total score can be converted into T-scores based on gender and age norms. The CDI is a widely-used self-report measure of childhood depressive symptoms for both school and clinical samples and has adequate reliability and validity data (see Kovacs, 1992 for a review). In this study, the total depressive symptoms T-score was used; cronbach's alpha for the summed raw score was 0.88 at baseline and 0.84 at follow-up. Test-retest reliability over a two- to three-year period in the present sample was .41.

Children's Attributional Style Questionnaire/Kastan-Revised (CASQ-R; Kaslow, Rehm,, Pollack, & Siegel, 1978; Thompson, Kaslow, Bahr & Nolen-Hoeksema, 1998). The Children's Attributional Style Questionnaire is a 24-item self-report measure of children's general attributional style for positive and negative outcomes along three dimensions (stable/unstable, global/specific, and internal/external). Items describe a situation and ask the respondent to select the most likely explanation for the event from two possible attributions. For example, "you get an 'A' on a test" is presented and children must choose between a global explanation, "I am

smart” and a specific explanation, “I am good in the subject that the test was in.” Overall composite scores for negative events and for positive events were calculated by summing the number of stable, global, and internal attributions made for each type of event. Higher composite scores (i.e. more stable, global, and internal) for negative events indicate a more maladaptive/depressogenic attributional style and lower composite scores (i.e. less stable, global, and internal) for positive events indicate a more unhealthy/depressogenic attributional style. Due to low reliability of the composite score for negative events, two items assessing internal/external attributions (item 2 “Some kids that you know say that they do not like you” and item 3 “A good friend tells you that he hates you”), and one item assessing stable/unstable attributions (item 14 “A team that you are on loses a game”) were deleted. The shortened version of the negative composite subscale, comprised of 9 items, was used in all analyses because it was more reliable than subscales including all items. Cronbach’s alphas for these subscales at baseline and follow-up ranged from 0.50 to 0.60. Although the CASQ-R has been reported to have only moderate internal consistency (Joiner, 2000; Thompson et al., 1998), studies have demonstrated that the CASQ-R composite scores are related to greater depressive symptoms in children and adolescents (Jacobs, et al., 2008; Kaslow et al., 1988; Spence et al., 2002). For this reason this measure was retained despite its limitations. The CASQ-R has been found to be fairly stable over 6 months, with a test-retest reliability of 0.53 for the total score (Thompson, et. al., 1998). Two- to three-year test-retest reliability in this study was .30 for positive events and .26 for negative events.

Results

Preliminary Analyses

Preliminary analyses were conducted to appraise whether subjects with complete data at both time points ($n=88$) were comparable to those with data only at baseline ($n=96$). A series of one-way ANOVA's were conducted comparing subjects on SES, Full Scale IQ, mean parent and teacher ratings of ADHD and ODD symptom items on the DBD rating scale, baseline level of the dependent variables, and baseline child-rated self-perceived competency in the three domains. Across all analyses, there were no significant differences between boys with and without complete follow-up data. Additionally, a chi-square test was run examining differences in race composition (Caucasian versus non-Caucasian) for boys with and without complete follow-up data. Results indicated that there were significantly fewer subjects with complete follow-up data identified as non-Caucasian $\chi^2(1, N = 172) = 5.63, p > .05$. Additionally, given the age range of the sample, the correlations between age and follow-up depressive symptoms and attributional style for positive and negative events were examined and indicated that age was not significantly related to these adjustment variables at follow-up. Hence age was not included as a covariate. Subjects with missing data at baseline or follow-up were not included in analyses. Descriptive statistics and intercorrelations of adjustment variables at baseline and follow-up were examined and are presented in Table 1.

To quantify change in boys' self-perceptions of competency from baseline to follow-up, change scores were calculated by subtracting Time 1 ratings from Time 2 ratings. Separate change scores were calculated using perceptions of competency in the scholastic, social, and behavioral competency domains. Negative change scores indicated a decrease in perceptions of competency from time 1 to time 2 and positive scores indicated an increase in perceptions of competency. For all subsequent analyses, the child change scores served as predictor variables signifying change in child perceptions of competency. Descriptive statistics of boys' self-

perceptions of competence, change in self-perceptions of competence, and teacher ratings of competence in each domain are presented in Table 2.

Do Changes in Self-Perceived Competency Predict Depressive Symptoms and Attributional Style at Follow-up?

Nine longitudinal, hierarchical multiple regression analyses were conducted to examine the extent to which change in self-perceptions predicted depressive symptoms and attributional style for positive and for negative events at follow-up. To ascertain the unique effects of changes in self-perceptions, rather than other-reported competence, teachers' perceptions of boys' competency at baseline and at follow-up were included as covariates. Teacher ratings at baseline and follow-up were used as separate covariates, rather than examining a change score in teacher ratings, because different teachers rated participants at each time point. Follow-up depressive symptoms, attributional style of negative events, and attributional style of positive events served as dependent variables. Separate regression analyses were run considering changes in perceptions in each of the three domains of competency (scholastic, social, and behavioral). In each regression, at Step 1, baseline level of the dependent variable was entered. At Step 2, teacher-rated perception of competency at baseline and at follow-up was entered and at Step 3, change (Time 2 – Time 1) in child-rated self-perceptions was entered. Due to missing data the number of subjects in each analysis ranged from 85 to 88.

Results showed that across all three domains of competency, change in child-rated self-perceptions predicted depressive symptoms, above and beyond teacher-rated competency (see Table 3). The direction of the relation indicated that a reduction in self-perceived competency from baseline to follow-up predicted an increase in depressive symptoms at follow-up. In contrast, across the three domains, teacher-rated competency at baseline and at follow-up was

not a significant predictor of changes in depressive symptoms at follow-up². To examine the magnitude of the effect of changes in self-perceptions in predicting depressive symptoms, effect sizes were calculated based on Cohen's recommendations for multiple regression (Cohen, 1988). Effect sizes were medium across the scholastic (Cohen's $f^2=.18$), social (Cohen's $f^2=.14$), and behavioral conduct domains (Cohen's $f^2=.12$; Cohen, 1988).

In regards to attributional style, results indicated that change in child-rated self-perceptions in the social domain significantly predicted maladaptive attributions for negative events (see Table 4) and less healthy attributions for positive events at follow-up (see Table 5), above and beyond teacher-rated perceptions of child social competency. The direction of the relation suggested that a decrease in self-perceived social competency over time predicted depressogenic attributions for positive and negative events. In all three domains, teacher-rated perceptions of competency at baseline and follow-up were not a significant predictor of attributional style at follow-up. The effect size was medium in predicting attributions for negative events (Cohen's $f^2=.15$) and was between small and medium in predicting attributions for positive events (Cohen's $f^2=.08$; Cohen, 1988)³.

What is the Relative Importance of Changes in Self-Perceptions of Competency in Each Domain?

Given that changes in self-perceptions of competency in all three domains predicted changes in depressive symptoms, follow-up analyses were conducted to examine the relative importance of changes in the three domains of self-perceived competency. Because teacher-rated perceptions of competency did not emerge as significant predictors in the primary analyses, teacher ratings were not included in follow-up analyses. To predict depressive symptoms, baseline level of depressive symptoms was entered at Step 1 and all three change scores were

simultaneously entered at Step 2. Results indicated that when considered simultaneously, change in self-perceptions of social competency was the only significant predictor of depressive symptoms at follow-up ($\beta = -.29, t(83) = -2.97, p < .01$). In contrast, change in self-perceptions of scholastic and behavioral conduct competency were not significant predictors when considered simultaneously.

Do Boys With ADHD Demonstrate Positively Biased Self-Perceptions of Competency?

In order to ascertain if the self-perceptions of boys with ADHD in the present sample were positively biased, discrepancy scores were computed by subtracting teacher ratings of children's competence from children's self-ratings in each of the three domains. The discrepancy scores indicated the extent to which each child either overestimated or underestimated their competency relative to teacher report; scores greater than zero indicated an overestimation of competency and scores less than zero indicated an underestimation of competency.

Descriptive statistics of the calculated discrepancy scores were run to examine the extent to which boys overestimated their competency across the three domains at follow-up. Baseline results were previously published on a larger sample that included subjects without complete follow-up data and confirmed the presence of positively biased self-perceptions (Hoza et al., 2002). In the present sample, ADHD boys continued to demonstrate an overestimation of competency relative to teacher ratings at follow-up in the scholastic ($M=0.42, SD= 0.98$), social ($M=0.60, SD= 1.08$), and behavioral ($M=0.58, SD= 1.04$) domains (See Table 2). Thus consistent with previous concurrent studies, boys with ADHD in this sample tended to exhibit a positive bias across domains of competency at follow-up.

Discussion

The purpose of this study was to examine changes in self-perceptions of competency as a predictor of later adjustment in children with ADHD. Importantly, results demonstrated that a reduction in self-perceptions over time, across all domains of competency, predicted greater depressive symptoms, even when controlling for teacher-ratings of competence. A change towards more negative social self-perceptions also predicted less healthy attributional styles at follow-up. Thus these results are some of the first to find longitudinal support for the protective function of positive self-perceptions for children with ADHD, at least in regard to depressive symptoms and attributional style.

Results are consistent with cross-sectional research demonstrating that children with greater levels of depressive symptoms are less likely to demonstrate high self-perceptions of competence (Cole, et al., 1999; Hoza et al., 2004; Hoza et al., 2002). By examining changes in self-perceptions over time, this study adds to previous findings by demonstrating that, for children with ADHD, this thinking style may be protective in relation to depressive symptoms and depressogenic attributional style over a two- to three-year period. Interestingly, overall, children in this sample continued to demonstrate overly positive self-perceptions from baseline to follow-up across domains of competency. Despite this pattern, we found that a reduction in self-perceptions over time was associated with increases in depressive symptoms and unhealthy attributions. In contrast, teacher-rated competency was not a predictive of depressive symptoms or attributional style.

Interestingly, follow-up analyses suggested that when considered simultaneously, change in social self-perceptions was the only significant predictor of later depressive symptoms. This may not be surprising given that social status has been found to be a strong predictor of later adjustment in children (Cowen, Pederson, Babigian, Izzo, & Trost, 1973) and that social

competence is particularly salient to adolescents (Berndt, 1996; Bukowski & Kramer, 1986; Hartup, 1992). Thus decreases in self-perceived social competence appear to be particularly important to increases in depressive symptoms and depressive cognitions for older children and young adolescents with ADHD. This suggests that clinicians should pay close attention to changes in self-perceptions in the social domain, as this may represent a risk factor for depression.

This study extends previous research by examining the relation between self-perceptions and other cognitive features of depression (Joiner, 2000; Kaslow et al., 1988; Spence et al., 2002) that have not previously been examined over time in a sample of children with ADHD. Further, by examining changes in child self-perceptions and teacher-rated competency as unique predictors, this study found that it was change in self-perceptions that were predictive of depressive symptoms and attributional style rather than teacher-rated competency. Given that boys in this sample tended to overestimate their competency across domains and over time, results imply that those children who demonstrate a reduction in self-perceptions are at increased risk for depression. If positively biased self-perceptions are protective because this thinking style buffers children from the effects of negative feedback and failure, then it is not surprising that a reduction in self-perceived competency over time would predict an increase in depressive symptoms and depressogenic attributions.

Of course, depression is only one possible adjustment indicator, especially for children with ADHD who are at risk for the development of many types of difficulties such as school failure, poor relationships, aggression, and antisocial behavior (Spencer, et al., 2007; Thaper, van den Bree, Fowler, Langley, & Wittering, 2006). In the only other study examining positively biased self-perceptions over time, Hoza and colleagues (2010) found that although an increase in

positively biased self-perceptions over a six year span was associated with decreases in depression, it was also associated with increases in aggression. Further, cross-lag analyses suggested that positive bias was not related to later depressive symptoms but was related to later aggression. Thus positively biased self-perceptions may place children at greater risk for other forms of maladjustment such as aggression. Consequently, positively biased self-perceptions may be both protective *and* risk factors for children with ADHD. Thus, future research must examine other indicators of adjustment in relation to self-perceptions and actual competency in order to fully understand how positively biased self-perceptions relate to adjustment in children with ADHD.

In the social psychology literature there has been a debate over the potential positive and negative implications of positively biased self-perceptions. On the one hand, positive self-perceptions may be protective and buffer individuals from failure and the development of depression (Taylor & Brown, 1988). Further, some have argued that positive self-perceptions lead to greater mastery of skills in children by allowing them to persist on tasks even when they do not have the skill level (Bjorklund, 1997). On the other hand, accurate self-perceptions may be necessary for individuals to adjust their behavior, improve their performance over time, and remain motivated to change their behavior in accordance with feedback from those around them (Colvin & Block, 1994). From this view point, even if positive self-perceptions can serve some protective function in relation to depressive symptoms and negative feedback, positively biased self-perceptions may not be adaptive in the long run. This second viewpoint may be especially true for children with ADHD, who experience failure in many situations and, due to their impairment, would benefit from the ability to learn from previous mistakes. Thus, even if positive self-perceptions are protective in regards to depressive symptoms and associated

cognitive features, overly positive self-perceptions also may limit the ability of children with ADHD to learn from their mistakes and alter their future behavior.

Consequently, although some researchers have suggested that positively biased self-perceptions are associated with positive adjustment, the picture is less clear for children with ADHD. For instance, despite having positive self-perceptions, children with ADHD tend to exhibit less persistence and poorer performance in laboratory tasks than control children (Hoza et al., 2001; Hoza et al., 2000). Further, children with ADHD generally experience impairment across domains of competency (Abikoff et al., 2002; DuPaul, et al., 2001; Hoza, et al., 2005; Mrug, Hoza, & Gerdes 2001), even though they tend to demonstrate positively biased self-perceptions in these same domains. Thus, some of the apparent benefits of positive self-perceptions do not appear to apply to children with ADHD.

Unfortunately, studies have yet to examine how self-perceptions of competency relate to psychopathology over time. In regards to depression, it is possible that positively biased self-perceptions not only limit individuals' abilities to learn from mistakes, but also limit the development of effective coping skills to handle failure situations. As individuals mature, they may develop a greater awareness of their competency levels in certain domains but they may not have effective coping skills to manage disappointment when faced with failure. The combination of poor competency and fewer coping skills may therefore make these individuals more vulnerable to depression and depressive cognitions. However, research has yet to examine whether positively biased self-perceptions limit the acquisition of effective coping skills and whether this affects later depression. It will be important for future research to consider potential mechanisms that may explain how positively biased self-perceptions relate to later psychopathology.

In interpreting our findings, several caveats should be noted. First, due to difficulty recruiting an adequate sample of females at the time of data collection, the generalizability of these findings is limited to males. Second, ADHD diagnoses were based on DSM-III-R criteria (American Psychiatric Association, 1987) rather than the current DSM-IV criteria (American Psychiatric Association, 2000); therefore we can not be certain that all of our study participants classified as having a diagnosis of ADHD at baseline would meet currently accepted DSM-IV ADHD criteria. Additionally given research suggesting that ADHD subtypes may differ in levels of depressive symptoms and positive bias (Owens & Hoza, 2003; Tomb, Hoza, Gerdes, Kaiser, & Vaughn, 2009), it will be important for future work to examine whether this pattern of results holds across subtypes. Third, child reports were used both to compute change in self-perceptions as well as for assessment of depressive symptoms and attributional style, introducing the possibility of a common rater bias. Thus we cannot exclude the possibility that some of the relations between our independent and dependent variables may be due to the use of the same rater. Fourth, although teachers have the opportunity to observe children in both academic and social interactions and to compare children to their classmates, future research may want to consider other external indices of competence such as test scores or performance during laboratory tasks. Lastly, due to our smaller sample size, this study was unable to test whether self-perceptions were *causally* related to changes in depressive cognitions. Only one study has examined this possibility in children with ADHD (Hoza et al., 2010) and normative studies examining this question have found mixed results (Jacobs et al., 2008); thus it will be important for future research to examine causal relations with larger samples.

Given what is known about the relation between positively biased self-perceptions and adjustment, what clinical implications can be gleaned? Though this study suggests that

consistently positive self-perceptions are protective in relation to depressive symptoms and depressive attributional style, other studies have noted that increases in positively biased self-perceptions place children at risk for other negative outcomes such as increased aggression (Hoza et al., 2010). Therefore, results do not suggest that further increasing self-perceptions would necessarily be beneficial, especially if children with ADHD continue to have low levels of competency. Given these concerns, it may be most advantageous to increase children's competency in domains of impairment in order to bring their perceptions of competency and their actual ability into greater agreement.

Additionally, few studies have examined whether self-perceptions can be modified. Several lines of research may suggest potential ways to adjust the self-perceptions of children with ADHD. For instance, some evidence suggests that positive feedback may reduce subsequent overestimation of competency, at least in a laboratory social interaction task (Diener & Milich, 1997); however, we do not know how these changes may relate to future performance or other measures of adjustment. In addition, limited evidence suggests that there may be a link between positively biased self-perceptions and executive functioning deficits in children with ADHD (McQuade, Tomb, Hoza, Waschbusch, Hurt, & Vaughn, 2009; Owens et al., 2007); this link could suggest that improvement in executive functioning in children with ADHD may reduce positively biased self-perceptions. In addition, though cognitive therapy has shown little benefit in changing behavior in children with ADHD (Abikoff & Klein, 1992), cognitive strategies may be useful in adjusting their self-perceptions. In adult populations, researchers also have argued that improving competence may lead to increases in self-awareness (Kruger & Dunning, 1999), suggesting that interventions that improve the competencies of children with ADHD also may increase insight. However, empirical evidence is needed to examine whether each of these

approaches can modify the self-perceptions of children with ADHD. Further, it is still unclear whether it is clinically advantageous to help children with ADHD become more aware of their difficulties. Future research will be necessary in order to understand whether self-perceptions can be changed without increasing risk for depression.

In summary, results provide support for a protective function of self-perceptions in relation to depressive symptoms and attributional style for boys with ADHD over a two- to three-year period. However, findings from this study should be considered in light of other new research suggesting both positive and negative implications associated with positive self-perceptions. Although results suggest that high self-perceptions over time have positive implications for adjustment in terms of lower depressive symptoms and less depressive attributional style, it is possible that overly positive self-perceptions also may relate to other negative indicators of adjustment. These results highlight the critical need for future research to explore the relation between changes in self-perceptions over time, both with regard to external indices of competency and independently, using multiple types of adjustment indicators. Future research will need to consider the potential malleability of the self-perceptions of children with ADHD in order to more fully understand the clinical implications of these patterns of self-perceptions.

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Footnotes

¹At baseline, teachers were instructed to rate participants off medication because their ratings were used as part of a clinical diagnostic assessment. At follow-up teachers were instructed to rate participants as they normally see them, regardless of medication status. This difference in medication status for teacher ratings was not of concern for purposes of this study because global teacher ratings of domain-specific competency were the only measure of interest rather than symptom ratings, which are known to be affected by medication status.

²Hoza and colleagues (1997) have noted that the CDI contains several items that describe social, academic, and behavioral problems that are consistent with problems experienced by children with ADHD. Thus higher CDI scores may reflect greater behavioral difficulties associated with ADHD rather than symptoms of depression. To examine whether this was the case in our sample, the regression analyses using the CDI were re-analyzed with a summed CDI score that did not contain items that pertained to school, social, and behavioral difficulties (items 5, 15, 21, 22, 23, 26, and 27; Hoza et al., 1997). Across all analyses, results remained similar.

³Given that attributions for negative events and for positive events are conceptually and empirically related to one another, analyses also were run examining the relation between changes in self-perceived competence and changes in attributions for positive and negative events using General Linear Modeling. Attributions for negative events and for positive events at follow-up were included as two dependent variables. Baseline attributions for negative events and positive events were included as covariates. Separate models were run with each of the three change scores included as a predictor. Results were consistent with the primary analyses.

Parameter estimates of unstandardized regression coefficients suggested that a decrease in self-perceptions in the social domain was a significant predictor of greater depressogenic attributions for both negative events ($b = -.68$, $t(83) = -3.68$, $p < .001$) and positive events ($b = .72$, $t(83) = 2.60$, $p < .05$) at follow-up, above and beyond baseline attributions. However, changes in self-perceptions of scholastic and behavioral competence were not significant predictors.

Table 1.

Mean, Standard Deviation and Intercorrelations of Adjustment Variables at Baseline and Follow-up.

	<u>Descriptive Statistics</u>		<u>Baseline Dependent Variable</u>			<u>Follow-up Dependent Variable</u>		
	<i>M</i>	<i>SD</i>	1	2	3	1	2	3
Baseline Dependent Variables								
1. CDI	47.95	10.67	-	.64***	-.50***	.40**	.32**	-.37**
2. CASQ-R Negative	2.38	1.91		-	-.43***	.25*	.28**	-.17
3. CASQ-R Positive	7.27	2.31			-	-.23*	.13	-.31**
Follow-up Dependent Variables								
4. CDI	45.58	8.60				-	.49***	-.57***
5. CASQ-R Negative	2.02	1.60					-	-.32**
6. CASQ-R Positive	8.08	2.35						-

Note. CDI = Children's Depressive Inventory total T-score (Kovacs, 1992); CASQ-R= The Children's Attributional Style

Questionnaire, Revised; *M* = mean; *SD* = standard deviation; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Table 2.

Descriptive Statistics of Competence, Change Scores, and Discrepancy Scores in the Scholastic, Social, and Behavioral Conduct Domains.

	Scholastic Domain			Social Domain			Behavioral Conduct Domain		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range
T1 Self-Perceived Competence	2.97	0.76	1.00 - 4.00	2.84	0.787	1.17 - 4.00	2.94	0.66	1.33 - 4.00
T2 Self-Perceived Competence	3.07	0.64	1.67 - 4.00	2.95	0.70	1.00 - 4.00	2.96	0.68	1.17 - 4.00
Change in Self-Perception	0.89	0.70	-1.50 - 1.50	0.10	0.85	-1.83 - 2.33	0.18	0.84	-2.5 - 1.67
T1 Teacher-rated Competence	2.57	0.95	1.00 - 4.00	2.09	0.85	1.00 - 4.00	1.80	0.82	1.00 - 4.00
T2 Teacher-rated Competence	2.64	0.83	1.00 - 4.00	2.33	0.91	1.00 - 4.00	2.37	0.96	1.00 - 4.00
T1 Discrepancy Score	0.41	1.05	-1.83 - 2.67	0.75	1.04	-1.67 - 3.00	1.14	1.00	-1.33 - 3.00
T2 Discrepancy Score	0.42	0.98	-2.00 - 2.50	0.60	1.08	-1.83 - 3.00	0.58	1.04	-2.00 - 3.00

Note. T1 = Time 1; T2= Time 2; *M* = mean; *SD* = standard deviation; discrepancy scores were computed by subtracting teacher ratings of children's competence from children's self-ratings in each of the three domains

Table 3

Regression Analyses Predicting Follow-up Depressive Symptoms from Changes in Child Perceptions of Competency

	Scholastic Domain		Social Domain		Behavioral Conduct Domain	
	Beta	R ² Change	Beta	R ² Change	Beta	R ² Change
Step 1 Baseline CDI score	0.46***	0.16***	0.46***	0.18***	0.39***	0.16***
Step 2 Baseline Teacher Perception	-0.03	0.01	-0.11	0.05	-0.04	0.04
Follow-up Teacher Perception	0.10		-0.17		-0.14	
Step 3 Change in Child Self-Perceptions	-0.32***	0.10***	-0.39***	0.14***	-0.28**	0.08*
Total R ²		0.27***		0.34***		0.28***
Total Adjusted R ²		0.24***		0.31***		0.24***

Note. All standardized Betas are from the final step of the equation. Scholastic and Behavioral Conduct Domains n=88; Social Domain n=85; CDI = Children's Depressive Inventory Total T-score (Kovacs, 1992).

*p ≤ .05; **p ≤ .01; ***p ≤ .001

Table 4.

Regression Analyses Predicting Follow-up Attributions for Negative Events from Changes in Child Perceptions of Competency

	Scholastic Domain		Social Domain		Behavioral Conduct Domain	
	Beta	R ² Change	Beta	R ² Change	Beta	R ² Change
Step 1 Baseline CASQ-R negative event score	0.24*	0.07*	0.33**	0.08**	0.28*	0.07*
Step 2 Baseline Teacher Perception	-0.16	0.02	-0.03	0.00	-0.13	0.02
Follow-up Teacher Perception	0.01		-0.03		0.02	
Step 3 Change in Child Self-Perceptions	-0.17	0.03	-0.36***	0.13***	-0.14	0.02
Total R ²		0.11*		0.21***		0.10*
Total Adjusted R ²		0.07*		0.17***		0.06*

Note. All standardized Betas are from the final step of the equation. Scholastic and Behavioral Conduct Domains n=88; Social Domain n=85; CASQ-R= The Children's Attributional Style Questionnaire, Revised (Thompson et al., 1998).

*p ≤ .05; **p ≤ .01; ***p ≤ .001

Table 5.

Regression Analyses Predicting Follow-up Attributions for Positive Events from Changes in Child Perceptions of Competency

	Scholastic Domain		Social Domain		Behavioral Conduct Domain	
	Beta	R ² Change	Beta	R ² Change	Beta	R ² Change
Step 1 Baseline CASQ-R positive event score	0.29**	0.09**	0.34**	0.10**	0.27**	0.09**
Step 2 Baseline Teacher Perception	0.11	0.03	-0.07	0.01	0.16	0.03
Follow-up Teacher Perception	-0.20		-0.01		-0.14	
Step 3 Change in Child Self-Perceptions	0.04	0.00	0.25*	0.06*	0.03	0.00
Total R ²		0.13**		0.17**		0.12**
Total Adjusted R ²		0.08**		0.13**		0.08**

Note. All standardized Betas are from the final step of the equation. Scholastic and Behavioral Conduct Domains n=88; Social Domain n=85; CASQ-R = The Children's Attributional Style Questionnaire, Revised (Thompson et al., 1998).

*p ≤ .05; **p ≤ .01; ***p ≤ .001