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Perceptions of Academic Performance:

Positive Illusions in Adolescents with and without Learning Disabilities

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Abstract

Children with academic and behavioral difficulties have been found to report overly positive self-perceptions of performance in their areas of specific deficit. Researchers typically investigate self-perceptions in reference to both actual performance and ratings by teachers, peers, and parents. However, few studies have investigated whether or not adolescents with difficulty report overly positive self-perceptions. The present study sought to investigate self-perceptions of performance in the domains of spelling and math among a sample of adolescents with and without learning disabilities (LD). 58 adolescents with and without LD participated. Adolescents with LD significantly overestimated their performance in math relative to their actual performance, but not in spelling, reflecting the predominant difficulty of the sample in the area of math rather than spelling. Additionally, the magnitude of the gap between math predictions and actual performance was significantly greater for the group with LD than the group without LD. Findings support the existence of positive illusions in specific areas of deficit.

Key words: positive illusions; self-perceptions; learning disabilities; adolescents; mathematics; spelling

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Our understanding of self-perceptions and the role they play in mental health has evolved gradually over the past 20 years. Early information-processing models and personality theories depicted individuals as "naïve scientists" in search of truth, gathering and organizing data from the environment in a systematic and accurate fashion (see Jahoda, 1958 for a review). In contrast, Taylor and Brown (1988, 1994) found that adults consistently reported above average self-evaluations when comparing themselves to others in the general population. On the basis that not all individuals can be above average, Taylor and Brown suggested that these perceptions were overly positive and illusory in nature, referring to them henceforth as *positive illusions*. The relationship between adults' overly positive self-perceptions and mental health and well-being has been extensively researched (Asendorpf & Ostendorf, 1998; Colvin, Block, & Funder, 1995; Coyne & Gotlieb, 1983; Robins & Beer, 2001; Taylor, Lerner, Sherman, Sage, & McDowell, 2003). Moreover, positive illusions are not consistently found across multiple domains but rather, are most notable in areas of deficiency (e.g., Asendorpf & Ostendorpf, 1998). Taken together, research in this area supports the existence of positive illusions, particularly in areas of difficulty, among typical, mentally healthy adults.

Emanating from this literature, an inquiry into the self-perceptions of children and adolescents from both typical and atypical populations began. Researchers have investigated the self-perceptions of children with diverse areas of deficiency, including learning disabilities (LD), attention deficit hyperactivity disorder (ADHD), and emotional/behavioral disorders (EBD). Despite the need for uniform definitions and research methodologies across populations and studies (Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007), researchers have consistently

found that children with difficulties report positive illusions in specific areas of academic and behavioral deficiency.

Self-Perceptions of Children with Behavioral Difficulties

A first line of evidence that children over-estimate their skills in a specific area of deficiency comes from an investigation of the social skill perceptions of children with high levels of aggression. Hughes, Cavell, and Grossman (1997) were among the first to show that children who were highly aggressive overestimate their social performance and relationship quality in social situations when compared with the ratings of parents, teachers, and peers. This finding has since been replicated by other researchers (Brendgen, Vitaro, Turgeon, Poulin, & Wanner, 2004; David & Kistner, 2000; Hymel, Bowker, & Woody, 1993). In these studies, self-perceptions are typically determined by subjective ratings of children who are directly involved in the experimental task or who participate in peer nomination techniques. This technique does not clarify whether children with aggressive behaviors rate their social performance as better than their actual performance, or whether the child with aggressive tendencies influences peers to provide excessively negative ratings, which constitutes a limitation in these findings. Regardless, this evidence suggests a significant difference between the ratings of children with behavioral difficulties and other informants regarding social performance.

Self-Perceptions of Children with ADHD

In addition to children with behavioral difficulties over-estimating social performance, children with ADHD have been found to over-estimate their performance in various areas of deficiency, including academic, social, and behavioral skills. By comparing the self-evaluations of boys with and without ADHD, two groups of researchers found no difference between ratings of academic skill and problem solving ability, despite the fact that boys with ADHD had more

difficulty in these domains (Hoza, Pelham, Milich, Pillow, & McBride, 1993; Hoza, Waschbusch, Owens, Pelham, & Kipp 2001). Diener and Milich (1997) found that following an unstructured cooperative task, boys with ADHD thought their partners enjoyed working with them *more* than did controls without ADHD. Therefore, in the domains of social performance and behavioral conduct, boys with ADHD provided above average performance evaluations.

When comparing the performance of boys with ADHD to the ratings of independent observers, parents, or teachers, Hoza, Pelham, Dobbs, Owens, and Pillow (2002) found that boys with ADHD overestimated their scholastic competence, social acceptance, and behavioral conduct. Notably, boys who had higher levels of aggression and lower levels of academic achievement, as rated by their teacher, overestimated the most in these domains. Hoza, Waschbusch, Pelham, Molina, and Milich (2000) found that boys with ADHD thought they would be equally effective as boys without ADHD at getting an unfamiliar peer to like them. This was despite observer ratings that their performance was less effective than peers without ADHD. Similarly, Evangelista, Owens, Golden, and Pelham (2008) found that boys with ADHD overestimated their performance in all domains of Harter's Self-Perception Profile for Children (1985) relative to teacher ratings, which includes the domains of scholastic competence, social acceptance, athletic competence, physical appearance, and behavioral conduct. Taken together, there is consistent support for the existence of a discord between self-perceptions of boys with ADHD and the adults with whom they interact.

Finally, researchers have investigated the congruence between self-perceptions of boys with ADHD and their actual performance in different domains by using standardized achievement tests. Owens and Hoza (2003) found that boys with ADHD overestimated their performance on a standardized achievement task, as well as relative to a teacher-rated criterion.

In addition, they found that self-perceptions differed by ADHD subtype. When asked to predict their performance on reading and math tasks, only the predominantly hyperactive/impulsive group endorsed significant overestimations of their abilities relative to their actual performance and teacher ratings. In contrast, predominantly inattentive boys and boys without ADHD did not. Owens and Hoza concluded that positive illusions were more strongly associated with hyperactivity and impulsivity than with inattention. This has important implications for research on individuals with LD, as it suggests that patterns of self-perceptions could differ when symptoms of hyperactivity are present.

Soles and Heath (2009) expanded upon this literature with their study that queried self-perceptions of attention ability among boys with and without ADHD. To assess attention, the authors used a series of Find-a-Word puzzles, as well as a computerized vigilance task (Conners' Continuous Performance Test-II; Conners, 2000). Despite performing lower than their peers, boys with ADHD predicted they would perform as well as their peers, reflecting positive illusions of their ability. However, a comparison of individual prediction to actual performance indicated that both groups underestimated their abilities on both tasks. The authors point out that both the Find-a-Word puzzles and computerized vigilance task may have been novel and unfamiliar to the participants, making it more difficult for them to predict their performance. As a result, participants may have responded differently than they would if asked to self-evaluate performance on a task with which they have repeated experience, such as spelling or math (e.g., Heath & Glen, 2005). This study underscores the importance of examining both group differences in self-perceptions and individual differences between predicted and actual performance. In this case, the results differ and both perspectives provide insight into the self-perceptions of each group.

Self-Perceptions of Children with Learning Disabilities

Children with learning disabilities (LD) have also been found to report inflated self-perceptions of their academic abilities. Heath (1995) found that, relative to their actual performance on a standardized achievement measure, children with LD in grades five and eight reported unrealistically positive self-perceptions of academic ability. In a later study by Heath and Glen (2005), children with and without LD were asked to predict their performance on standardized math and spelling tasks when given an average range of performance according to grade equivalent norms. Again, children with LD indicated significant overestimations of their actual performance. The authors also found a main effect of gender, with all boys with and without LD overestimating their performance more than girls. However, the authors did not control for the severity of difficulties between the boys and girls. It is possible that boys had more severe difficulties, which could have explained the gender effect.

To summarize, the literature reviewed here provides support for the existence of positive illusions of performance in diverse groups of children with different areas of difficulty. As reviewed by Owens and colleagues (2007), it is currently unclear whether these self-perceptions play an adaptive or maladaptive role for children and adolescents. Further, there is a previously established link between *accurate* or *realistic* self-perceptions and depression in both children and adults (e.g., Brendgen et al., 2004; Heath, 1995; McGrath & Repetti, 2002; Rudolph & Clark, 2001). For example, Heath (1995) found that depressed children with LD were more accurate in their self-evaluations of academic performance than nondepressed children with LD, who remained overly positive in their self-evaluations. The results were interpreted as consistent with depressive realism and affect regulation theories of depression. Researchers have since suggested that positive illusions can buffer depressive symptoms and disappear when external

praise is provided, suggesting a self-protective function of positive illusions (Diener & Milich, 1997; Heath & Glen, 2005; Ohan & Johnston, 2002; Soles & Heath, 2009). Given this nascent understanding of how children's self-perceptions interact with affective well-being, it is important to continue expanding our understanding of the existence of positive illusions into adolescence.

Developmental Trends in Self-Perceptions: Positive Illusions in Adolescents and Adults

Although the majority of the literature investigating the nature of self-perceptions has been completed with samples of young children, some researchers have examined the existence of positive illusions in adolescence and early adulthood. Golden, Owens, Evangelista, and Micheli (2006) completed a study investigating self-perceptions of academic competence in a sample of college students diagnosed with ADHD, with subclinical levels of ADHD, and a group without clinical or subclinical levels of ADHD symptoms. Participants rated their academic achievement and overall intellectual ability. Rather than overestimate their performance, the group with clinical and subclinical levels of ADHD rated their overall intellectual ability as being lower than their actual results on a standardized measure of intelligence, whereas the group without symptoms of ADHD did not. In addition, there was no significant difference between ratings of academic ability and performance on a standardized achievement measure for the group diagnosed with ADHD. These results are in contrast to the literature examining self-perceptions of academic ability and problem-solving ability in children with ADHD (e.g., Hoza et al., 2002; Hoza et al., 2001; Owens & Hoza, 2003), and indicate an important gap in the present literature. It is unclear what happens between childhood, which is typically marked by a positive illusory bias of academic ability, and adulthood, wherein no positive illusions of academic achievement were endorsed in a college sample. The authors hypothesize that as

children with ADHD grow up they receive ongoing explicit feedback about their difficulties, making it increasingly difficult to maintain overly positive self-perceptions. An alternative explanation is that accurate self-evaluations are associated with increased internalizing symptoms in the sample, or the atypical nature of the university sample of students with ADHD. However, these hypotheses have yet to be tested.

The possibility that self-perceptions of performance change with age has not been examined among individuals with LD. At this time, only one study of self-perceptions of adolescents with LD has been published. Stone and May (2002) found that a sample of adolescents with LD indicated a lower academic self-concept and lower performance on specific academic skills than their peers without LD. General ratings of self-worth for both groups were not significantly different. When asked to predict their performance on a vocabulary and math task, adolescents both with and without LD overestimated their abilities relative to their actual performance. Notably, the discrepancy between prediction and performance was significantly larger for participants with LD on the math task, but not the vocabulary task. Both groups significantly overestimated their performance to some extent, and participants with LD had a larger discrepancy between prediction and actual performance for the math task. Stone and May (2002) provided an important beginning point for researchers to understand the self-perceptions of adolescents with LD, and set the stage for understanding if and how self-perceptions might change throughout development.

Summary

The research findings reviewed here provide some support for the existence of positive illusions in children with behavioral difficulties, ADHD, and LD. The emerging literature on self-perceptions throughout adolescence and early adulthood in specific areas of difficulty leaves

many questions unanswered. Stone and May (2002) began to explore the self-perceptions of adolescents with LD, although their sample did not exclude participants with comorbid ADHD, which may have affected the self-perceptions of the LD group (Owens & Hoza, 2003).

Further, the majority of the research completed to date with children and adolescents has been with male samples. The relationship between self-perceptions and gender is only beginning to be understood, and some studies have examined gender effects with small samples of females (Evangelista et al., 2008; Heath & Glen, 2005; Hoza et al., 2004; Owens & Hoza, 2003). In their review, Owens, Goldfine, Evangelista, Hoza, and Kaiser (2007) note that in regards to children with ADHD, the limited available data seems to support no gender differences between the self-perceptions of boys and girls with ADHD. Heath and Glen (2005) found that boys with and without LD were more likely to overestimate than girls from both groups. Among samples of typical children, there is evidence to suggest that gender differences exist in areas of academic self-concept, notably in math (rated more favorably by males) and reading (rated more favorably by females; e.g., Eccles, Wigfield, Harold, & Blumenfeld, 1993; Herbert & Stipek, 2005). In their review, Fraine, Damme, and Onghena (2007) conclude that as children proceed through puberty, their self-perceptions about their academic skills become increasingly negative, and in particular, females' self-perceptions drop faster than males. Given this pre-existing literature on gender differences in academic self-perceptions, it is reasonable to assume that children with academic difficulties could show a pattern of gender differences in their self-perceptions and therefore, the impact of gender on reported self-perceptions must be explored.

In addition to these specific gaps, the positive illusions literature is replete with challenges. Owens, Goldfine, Evangelista, Hoza, and Kaiser (2007) review these methodological challenges and provide insight into how to address these difficulties, which presently include

different definitions of positive illusions, as well as differing methods, analyses, and samples. The present study seeks to build upon the existing literature by investigating the self-perceptions of academic ability among male and female adolescents with and without LD on a standardized measure of achievement. Participants are provided with a range of performance based on grade norms for average performance with which to make their self-evaluations, so they are able to rank themselves as below average, average, or above average. Finally, participants with comorbid ADHD symptoms will be excluded to ensure that the results reflect the self-perceptions of adolescents with academic difficulties in the absence of confounding inattention or hyperactivity.

Research Objectives

The purpose of this study was to investigate self-perceptions of performance in an adolescent sample comprised of males and females with and without LD. The first objective of the study was to determine whether or not adolescents with LD differed in their initial predictions of performance from adolescents without LD. It was hypothesized that there would be no differences between the participants with and without LD on their initial predictions. The second objective was to investigate whether or not a positive illusory bias is present among a sample of male and female adolescents with LD in two familiar academic domains (i.e., spelling and math), as well as determine potential gender effects. It was hypothesized that adolescents with LD would over-estimate their performance in both math and spelling. No hypothesis was put forth for the effect of gender in either objective due to a lack of relevant comparison literature looking at self-perceptions of adolescents. The final objective of the study was to explore differences between groups in terms of the magnitude of the gap between perceptions and actual performance, also investigating potential gender effects. It was hypothesized that the

magnitude of the gap between prediction and performance would be significantly larger for the LD group on both tasks.

Method

Participants

The sample was comprised of high school students, including 29 participants with LD (17 males, 12 females) and 29 participants without LD (10 males, 19 females). The participants were in grades 8 through 11, between 13.33 and 17.50 years of age (M = 15.31 years, SD = 12.31 months). Participants with LD were matched to participants without LD within 18 months of age and 12 IQ points based on the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) Full Scale Intelligence Quotient (FSIQ). A total of 112 participants without LD completed the study, and the 29 that most closely matched the students with LD formed the comparison group. As a result, there were no significant differences between age or IQ scores for the groups with and without LD. For demographic information on all participants, please see Table 1.

The sample for this project was drawn from five high schools in the greater Montreal region. Four were inclusive community schools, and one was a specialized school designated for students with LD. At these five schools, all students in grades 8 through 11 received a consent form for participation in the project. A total of 155 students participated in the project. Of these participants, 41 met the criteria for LD (35.97%). A total of 12 participants with LD were further excluded on the basis of the criteria described below. Given that one of our participating schools was a specialized school for students with LD, the prevalence of LD in our sample is not representative of the general population. A total of 10 participants with LD attended this specialized school, and the remaining 19 attended community schools.

It is important to note that, with the exception of the specialized school for students with LD, the participating schools typically do not identify students with LD as the school board has a nonidentification approach. Therefore all participants, including those attending the specialized school for students with LD, were screened for LD using the following criteria: (a) one or more standard scores below 85, corresponding to the 14th percentile rank or lower, on the Wide Range Achievement Test – Third Edition (WRAT-3; Wilkinson, 1993) indicating considerable difficulties in one or more achievement area (i.e., reading, spelling, or math); and (b) an FSIQ score of at least average (i.e., 85 or higher) on the WASI. Participants without LD were identified as having: (a) all achievement scores on the WRAT-3 above 85 and (b) an FSIQ score on the WASI of at least average (i.e., 85 or higher). The inclusion of a measure of IQ for this study is not because it is decisive to the classification of LD. Rather, in line with the intra-individual approach for identifying participants with LD (e.g., Fletcher, Denton, & Francis, 2005; Kavale & Forness, 2000), the inclusion of an abbreviated measure of IQ provides information about core processing abilities that could underlie achievement difficulties. All participants' profiles reflected the intra-individual variability characteristic of students with LD, in that they had variable profiles of cognitive processing skills and academic skills, with specific strengths and difficulties in at least one area of academic achievement (see Table 2). This variability was defined as having at least one achievement area below the average range. Although the focus was on intraindividual variability, the difference between IQ and achievement area was verified and noted to be at least four points. See Table 3 for a breakdown of the identified areas of difficulty for the group with LD according to the WRAT-3.

In addition to the LD criteria, certain exclusionary criteria were also applied. Participants with other primary disabilities, as reported by parents, were excluded (e.g., Autism Spectrum

Disorder, hearing/visual impairment). Parents also completed the Conners' Parent Rating Scales-Revised: Long Form (CPRS – R:L; Conners, 2001). To avoid confounds with ADHD, participants who scored in the clinical range on any of the following three subscales were excluded: Cognitive Problems/Inattention, Hyperactivity, and Oppositional Behaviors. Of the original 41 participants who met the LD criteria, 11 were excluded on this basis: four exceeded the clinical cut-off on the CPRS subscales, and seven were excluded because of missing CPRS data despite numerous attempts by the researcher to contact the parents by telephone. Finally, one participant's responses were extreme and were, therefore, excluded as a statistical outlier. This left a final sample of 29 participants with LD, who were then matched as closely as possible in age and IQ to a group of participants without LD.

Measures

Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). The WASI is a brief, individually administered test of cognitive function for children and adults between the ages of 6 and 89 years of age. It is an abbreviated measure comprised of four subtests (i.e., vocabulary, similarities, block design, matrix reasoning), which yields a Full Scale IQ score. The four subtests of the WASI demonstrate high correlations with other measures of intelligence. In a sample of 176 children between the ages of 6 and 16, the four-subtest WASI combination yielded a correlation of .87 with the WISC-III Full Scale IQ (Sattler & Hoge, 2002). Due to its excellent psychometric properties, the WASI is commonly used as a screening test in obtaining estimates of intelligence for children and adults.

Wide Range Achievement Test – Third Edition (WRAT-3; Wilkinson, 1993). The WRAT-3 is a standardized achievement test that assesses achievement in spelling, computational arithmetic and word reading between the ages of 5 and 74. For the spelling subtest, the research

assistant dictates 40 words that the participant writes down. The participant is stopped after 10 consecutive spelling errors. For the arithmetic subtest, the participant is given 15 minutes to complete as many math problems as possible. This is a timed subtest, so the participant has the option to stop before 15 minutes has elapsed, if not, the administrator stops them after 15 minutes. Finally, for the reading subtest, the participant is asked to read a list of words increasing in difficulty. The participant is stopped after 10 consecutive errors in pronunciation. The WRAT-3 subtest test-retest coefficients range from .91 to .98 and correlations with other achievement tests range from .60 to .80 (Sattler & Hoge, 2002).

Conners' Parent Rating Scales – Revised: Long Form (CPRS – R:L, Conners, 2001). The CPRS-R:L is an 80-item inventory designed to assess the presence and severity of ADHD symptoms and related problem behaviors in children and adolescents between the ages of 3 and 17. The CPRS-R:L comprises the following scales: Oppositional Behaviors, Cognitive Problems/Inattention, Hyperactivity, Anxious-Shy, Perfectionism, Social Problems, Psychosomatic, and Global ADHD Index. The psychometric properties for the CPRS-R:L are strong. Internal reliability estimates range from .86 to .93. Test-retest reliability coefficients were calculated over a 6 to 8 week period and ranged from .62 to .85.

Procedure

The researcher met all potential participants in their classroom to briefly summarize the purpose of the research and procedures involved, as well as to distribute parent consent forms. Once parental consent was obtained, participants were seen individually in the session room located within the school and participants gave assent at that time. Participants completed two sessions. During the first session participants were administered the WASI. The second session was completed with two research assistants. The first research assistant (RA1) asked the

participant to predict their performance on two tests based on grade equivalent norms. For the spelling and math subtests (WRAT-3 Spelling and Arithmetic), RA1 informed the participant what range of correct responses, out of a total of 40, an average student in their grade would be able to answer correctly. The range of possible correct responses presented to the participant corresponded to standard scores on the WRAT-3 ranging from 85 to 115, representing performance in the average range. For example, on the spelling subtest, a participant in the ninth grade would be told that "there are 40 words in all and most kids in your grade spell about 24 to 29 words correctly." This range differed by grade level according to the WRAT-3 norms. The research assistant then asked the participant to predict how many questions out of a total of 40 they expected to complete correctly, and noted the answer. RA1 then left the room and a second research assistant (RA2) without knowledge of the participant's predictions entered and administered the WRAT-3.

In this design, spelling and math were chosen for several reasons. First, they are both familiar classroom tasks. Soles and Heath (2009) demonstrated that boys with and without ADHD underestimated their performance on an unfamiliar attention task. They concluded that in unfamiliar situations, boys with ADHD may have difficulty estimating their performance. By adolescence, students with and without LD have had repeated experience with spelling tests, controlling for this methodological limitation. Although they may be less familiar with the type of math test presented in the WRAT-3 due to an emphasis on word problems in the curriculum, the participants would have encountered these types of computational arithmetic problems at some point in their schooling. Second, the two tasks were chosen because they are common areas of difficulty for adolescents with LD (e.g., Lerner & Johns, 2008). Third, both tasks allow for exact numerical predictions of the number of words the participants with and without LD expect

to spell correctly and the number of computational problems they expect to solve correctly. The numeric estimations can then be directly compared to actual performance to determine the accuracy of their self-evaluations of performance in these two areas.

Parents were contacted by phone after all sessions were completed. They completed a background information questionnaire and were read aloud the CPRS – R:L (Conners, 2001).

Results

Predictions of Participants with and without LD

For the first objective, to investigate group differences in initial predictions, two between-subjects Analysis of Variance (ANOVA) were completed to determine if the groups with and without LD differed on their predictions of how they would perform in spelling or math. For each ANOVA, the prediction score was entered as the dependent variable, with group (with and without LD) and gender as the between-subjects variables.

For spelling, there were no main effects found for group, $F(1, 58) = 2.24$, $p = .14$, $\eta^2 = .20$, or gender, $F(1, 58) = 0.12$, $p = .91$, $\eta^2 = .00$. Further, no group by gender interaction was observed, $F(1, 58) = 0.90$, $p = .91$, $\eta^2 = .04$. Hence, spelling predictions did not differ significantly by group or gender. However, for math predictions, a significant main effect was found for group, $F(1, 58) = 5.30$, $p = .03$, $\eta^2 = .30$, with the LD group ($M = 22.41$, $SD = 4.82$) predicting significantly lower than the NLD group ($M = 25.14$, $SD = 5.01$). There was no main effect of gender on math predictions, $F(1, 58) = 1.39$, $p = .24$, $\eta^2 = .16$, nor was there a group by gender interaction, $F(1, 58) = 0.04$, $p = .85$, $\eta^2 = .03$.

Existence of Positive Illusions

The second objective sought to determine whether there is a positive illusory bias in self-perceptions of spelling or math ability among adolescents with or without LD, as measured by a

significant difference between prediction and actual performance. To test whether or not participants significantly over-estimated their performance in spelling or math, two within-subjects repeated measures ANOVAs were completed for each task (spelling and math). For each analysis, the prediction and performance scores (total out of 40) were entered as within-subjects variables; gender and group (with and without LD) were entered as between-subjects variables. This methodology allowed for an investigation of group differences that is consistent with previous methodologies (e.g., Diener & Milich, 1997; Heath & Glen, 2005; Soles & Heath, 2009) and has been argued to be the most conceptually valid approach (Owens et al., 2007). Kazdin and De Los Reyes (2004) argued that difference scores should be calculated and standardized due to possible differences in the variance of responses provided by different groups of informants, such as teacher predictions being compared to student predictions. To be conservative, the current analyses were re-run using standardized differences scores, even though predictions are repeated measures from the same informant group (students). These findings yielded the same estimates of group differences, indicating that the variance on prediction and performance ratings from the same informant group is equal. Tables 4 and 5 present the mean prediction and performance scores of each group in spelling and math, respectively.

Math. The repeated-measures analysis yielded a significant main effect of group, $F(1, 57) = 11.15$, $p < .002$, $\eta^2 = .17$. The LD group had a significantly larger difference between prediction and performance ($M = 5.13$, $SD = 3.80$) than the group without LD ($M = 0.24$, $SD = 5.92$). There was no significant effect of gender, $F(1, 57) = 0.75$, $p = .39$, $\eta^2 = .01$ or group by gender interaction $F(1, 57) = .10$, $p = .75$, $\eta^2 = .00$.

Spelling. The repeated-measures analysis did not yield a significant main effect of group, $F(1, 57) = 3.60$, $p = .67$, $\eta^2 = .06$. The LD group did not differ significantly in terms of the size of the difference between prediction and performance ($M = 1.79$, $SD = 5.77$) than the group without LD ($M = 1.10$, $SD = 4.58$). There was no significant effect of gender, $F(1, 57) = 0.39$, $p = .53$, $\eta^2 = .00$ or group by gender interaction $F(1, 57) = .10$, $p = .75$, $\eta^2 = .00$.

Discussion

This study is the first to provide evidence that adolescents with LD, who do not have comorbid symptoms of inattention or hyperactivity, exhibit overly positive self-perceptions in math, an identified area of deficit. Adolescents with LD significantly overestimated their abilities in math when compared to their actual performance, despite the fact that their initial predictions were significantly lower than their peers without LD, whereas adolescents without LD did not. In addition to this finding, the magnitude of the gap between participants' math predictions and performance was significantly larger for adolescents with LD than those without LD. In contrast to our hypotheses, adolescents with LD did not over-estimate their abilities in spelling, though a trend in this direction was noted. Similarly, there were no significant differences between the size of the discrepancy between spelling prediction and performance for the two groups, though the result was approaching significance and should be interpreted with caution. There were no gender differences in self-perceptions among this adolescent sample.

Consistent with the review by Owens et al. (2007), these findings highlight a critical methodological issue for research investigating self-perceptions. If self-evaluations are measured relative to peer self-evaluations only, than individuals with LD or other disabilities may have lower self-evaluations than their peers. However, these self-evaluations may still be positively distorted relative to their actual performance. Therefore, it is necessary to investigate how

adolescents with academic difficulties, such as those that can be associated with having an LD, perceive their performance in comparison to others and relative to their actual performance as these may reveal two different results.

The different self-perceptions found among the group with LD for the spelling and math tasks are noteworthy. These findings may be the result of the characteristics of the sample. Specifically, the sample was composed primarily of adolescents with low achievement scores in math. While 96.55% of the participants with LD had a standard score of less than 85 on the math subtest of the WRAT-3, only 34.48% of the sample had a standard score of less than 85 on the spelling portion of the WRAT-3. The discrepancy in these findings between tasks is consistent with the fact that the majority of the sample had math as a specific area of deficit, but not spelling. It could be that the disproportional number of participants with math difficulties allowed for a much more powerful test of the hypotheses in the domain of math as compared to spelling, and as such, may explain why the findings differed between tasks. Further, this study provides important information about the specificity of positive illusions in adolescence, and supports the notion that inflated self-perceptions may be limited to specific areas of deficit. However, it is important to note that the difference between spelling prediction and performance was approaching significance. Therefore, the argument that inflated self-perceptions may be limited to specific areas of deficit and not other academic areas, cannot fully be supported at this time. Further research with students with LD that have diverse areas of difficulty is needed to explore this conclusion. Given the varying profiles of proficiencies and deficiencies among students generally categorized as having an LD, providing evidence that participants with LD have deficits in the areas being investigated is critical to the interpretation of studies

investigating their self-perceptions. It is a limitation of this study that areas of deficit were based on only one measurement (WRAT-3).

Examining the means of both predictions and actual performance on each task provides useful information to the interpretation of our results. In the area of spelling, the participants were asked to predict their performance based on grade norms. The grade norms provided for the present sample was a range of possible scores that represented the average range of students in that grade level. Most students in the age range of the sample successfully complete between 24-30 items out of 40 correctly. With this in mind, it is noteworthy that participants with LD predicted they would perform close to the average range in spelling ($M = 23.17$), while participants without LD predicted they would perform within the average range ($M = 25.28$). In terms of performance, participants with LD performed below the average range ($M = 21.38$), albeit slightly lower than they had predicted, and participants without LD performed within the average range ($M = 26.38$). There were no significant differences between prediction and performance in either case. The fact that participants with LD did not significantly overestimate their spelling ability may reflect the fact that for the majority of the sample, spelling ability was not significantly deficient or below average.

With regards to math, the picture is quite different. As with spelling, grade norms given for the age group of the present sample were that most students successfully complete between 25-31 items out of 40 correctly. Given these norms, participants with LD predicted they would perform significantly below the average range ($M = 22.41$) on the math task. Participants without LD predicted they would perform very close to the average range ($M = 25.14$) on the math task. Participants with LD performed below the average range and significantly below their predictions ($M = 17.31$, indicating an overestimation of ability relative to actual performance),

while participants without LD, consistent with their predictions, performed close to the average range (M = 24.90). Therefore, although participants with LD, most of whom were identified as having math difficulties, were *overestimating* their math ability relative to their own performance, they were predicting that they would perform *below* what they understood to be the average range of performance.

This last finding, that adolescents with LD overestimate their math ability relative to their actual performance but below the average of their peers, suggests interesting directions for future research. Researchers investigating self-perceptions among children with LD in specific areas of deficit have found children with LD tend to predict performance on par with their peers without disabilities (e.g., Heath & Glen, 2005). Therefore, children predict they will perform at the average level, despite performing at the below average level. In contrast, the results found in the present study indicate that adolescents with LD predict they will perform *below* the identified average in their specific area of difficulty but continue to overestimate relative to their actual performance.

There are a few possible interpretations of these results. First, it is possible that these results indicate a gradual change of self-perceptions. For example, Golden et al. (2006) hypothesized that young adults with ADHD provided more accurate self-perceptions of performance in domains of difficulty because they had experienced years of negative feedback about their performance. Adolescents with LD may begin to incorporate more realistic self-perceptions about their specific area of difficulty, in this case math, as a result of years of negative feedback about their performance. An alternative explanation originally put forth by Stone and May (2002), is that adolescents increasing meta-cognitive awareness of their abilities is responsible for their lower initial predictions. Although adolescents with LD in our sample

acknowledge their below average performance, they still continue to significantly overestimate their ability in math. This may indicate that they are beginning to understand their difficulties, but have not yet fully done so, due to limited but emerging meta-cognitive skills (Stone & May, 2002). In fact, Stone and May's finding that adolescents had lower self-reported academic self-concept and rated their performance on specific academic skills as lower than peers without LD is consistent with this possibility and the present results. An extension of this explanation is the possibility that self-evaluations are affected by the increasingly large gap between ability and performance experienced by adolescents with LD in high school as compared with children in elementary school. Perhaps individuals with LD, much like adults studied by Taylor and Brown (1988, 1994) will always overestimate in specific areas of deficit to some extent, and the findings that children with disabilities estimated their performance to be average is a result of the fact that children's difficulties are not yet as far behind their peers without disabilities. By adolescence, it is possible that youth with disabilities performance has lagged so substantially behind their peers that even with the typical positive illusory bias their predictions remain below their peers without disabilities.

Future research is essential to further explore the developmental pattern of the positive illusory bias through the life span. The results of the present study provide some preliminary suggestions about the nature of positive illusions in adolescence, however further research is needed to clarify the purpose of these illusions in adolescence and the relationship of positive illusions to emotional well-being.

Limitations

In interpreting the results of the present study certain limitations must be acknowledged. First, there were differences in the origin of the sample, with some participants being drawn from

a specialized school for adolescents with LD. Students from both inclusive community schools and those in a segregated school for adolescents with LD may differ in certain ways, as in the former case they were likely unidentified and in a regular school setting, while in the latter they were in an identified setting where all peers had some type of similar academic difficulty. School differences may also have affected the nature of the difficulties in the present sample and/or their awareness of these difficulties. A larger sample size would also have allowed for a more robust investigation of the analyses and stronger effect sizes.

Second, the fact that participants with LD overwhelmingly had low achievement in math, as opposed to reading and spelling, is surprising. It was our experience that adolescents with reading disabilities were more likely to decline participation as they wished to avoid possible reading tasks or academic testing.

Conclusion

The present study provides an important contribution to the literature by investigating the existence of positive illusions among adolescents with LD. This is the first study to provide evidence of a positive illusory bias in a specific area of deficit among adolescent males and females with LD, who do not have any symptoms of ADHD. Results underscore the need to continue investigating the nature of self-perceptions in children and adolescents with disabilities, always with consideration for the important methodological issues relevant to this literature (e.g., Owens et al., 2007). The developing literature investigating self-perceptions among youth with disabilities has important implications for both practitioners and researchers alike.

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Table 1

Demographic Information of Participants (n = 58)

Group with LD		Group without LD	
Variable	Frequency	Variable	Frequency
Male	17	Male	10
Female	12	Female	19
Language spoken at home		Language spoken at home	
English	23	English	24
French	1	French	3
English/French	2	English/French	0
Other	3	Other	2
Mother country of birth		Mother country of birth	
Canada	25	Canada	23
Other	4	Other	6
Father country of birth		Father country of birth	
Canada	23	Canada	19
Other	6	Other	10
Participant country of birth		Participant country of birth	
Canada	28	Canada	26
Other	1	Other	3
Mother highest education		Mother highest education	
High school or less	10	High school or less	4
College	5	College	9
Undergraduate university	10	Undergraduate university	14
Graduate university	4	Graduate university	2
Father highest education		Father highest education	
High school or less	5	High school or less	2
College	8	College	11
Undergraduate university	12	Undergraduate university	13
Graduate university	4	Graduate university	3
Household income		Household income	
No response	5	No response	2
Less than 20,000	0	Less than 20,000	1
20,000-50,000	3	20,000-50,000	1
50,000-80,000	8	50,000-80,000	11
More than 80,000	13	More than 80,000	14

Table 2

IQ and Achievement Standard Scores for Participants with and without LD

	WASI IQ		WRAT-3 Spelling		WRAT-3 Math		WRAT-3 Reading	
Group	*M*	SD	*M*	SD	*M*	SD	*M*	SD
With LD	98.93	8.94	93.57	14.82	81.16	7.67	98.93	14.06
Without LD	102.38	6.12	108.93	9.29	98.75	9.05	110.93	8.16

Note: Means and standard deviations are presented for each scale. WASI and WRAT scores are standard scores. LD = Learning disability. WASI = Wechsler Abbreviated Scale of Intelligence. IQ = Intelligence Quotient. WRAT-3 = Wide Range Achievement Test, Third Edition.

Table 3

Breakdown of Identified Areas of Difficulty for the group with LD

Area(s) of difficulty	Total Number of Participants (%)
Reading, Spelling, and Math	6 (20.69)
Spelling and Math	4 (13.79)
Reading only	1 (3.45)
Spelling only	0 (0.00)
Math only	18 (62.07)
Total – Math	28 (96.55)
Total – Spelling	10 (34.48)
Total – Reading	7 (24.14)

Note. Number of participants out of a total of 29 and percentage of all participants with LD (in parentheses) are presented. Areas of difficulty were identified by the following criteria: A standard score on the respective Wide Range Achievement Test - Third edition subtest (i.e., reading, spelling, math) lower than 85. LD = Learning disability.

Table 4

Predictions and Performance on the Spelling Task for the Groups with and without LD

Group	Prediction	Performance	F Score
With LD (*n*=29)	23.17 (5.20)	21.38 (6.03)	2.29
Without LD (*n*=29)	25.28 (5.01)	26.38 (4.30)	1.34

Note. Means and standard deviations (in parentheses) are presented for prediction and performance on the spelling task out of 40. LD = Learning disability.

Table 5

Predictions and Performance on the Math Task for the Groups with and without LD

Group	Prediction	Performance	F Score
With LD (*n*=29)	22.41 (4.82)	17.31 (2.71)**	49.18
Without LD (*n*=29)	25.14 (5.01)	24.90 (3.48)	0.18

Note. Means and standard deviations (in parentheses) are presented for prediction and performance on the math task out of 40. ** $p < .00$