SELF-PERCEPTIONS OF ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER FOR THEIR PROBLEM BEHAVIORS

by

Angela Varma

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Department of Applied Psychology and Human Development
Ontario Institute for Studies in Education of the University of Toronto

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OISE/University of Toronto

Abstract

The overarching goal of this dissertation was to examine the self-perceptions of adolescents with ADHD with regard to their core ADHD symptoms and associated problem behaviors. Self-perceptions were examined in relation to awareness of problem behaviors (i.e., presence of a “positive illusory bias” or PIB), attributions, and stigma.

Study 1 examined the PIB in relation to the ignorance of incompetence hypothesis in 74 13-to-18 year old adolescents [40 ADHD; 34 Typically-Developing Comparison (TD)]. Compared to TD adolescents, adolescents with ADHD underestimated their ADHD symptoms and associated oppositional, academic, and social problems relative to parent raters, indicating that they have a PIB. Nevertheless, they were cognizant of their patterns of academic achievement and social problems. The only area in which adolescents with ADHD demonstrated limited awareness of their difficulties was for oppositional behaviors. Within the ADHD sample, adolescents with external locus of causality attributions had a higher PIB for oppositional behaviors than adolescents with ADHD with internal locus of causality attributions.

Using a cross-sectional design, Study 2 examined the PIB, attributions, and stigma perceptions in 66 14-to-18 year old adolescents (31 ADHD, 35 TD) and 107 9-to-12 year old children (65 ADHD, 42 TD); cognitive immaturity as a mechanism for the PIB and developmental differences in attribution patterns and stigmatization were the focus. Although both children and adolescents with ADHD demonstrated a PIB for their ADHD symptoms, the
magnitude of the PIB was reduced in adolescence (particularly for hyperactivity-impulsivity). Both adolescents with and without ADHD showed a reduction in the PIB for inattentive symptoms relative to children. Participants with ADHD viewed their problem behaviors as more pervasive, uncontrollable, and stigmatizing than participants without ADHD, and adolescents viewed their behaviors as more pervasive, uncontrollable, and stigmatizing than children.

The findings offered theoretical support to the cognitive immaturity mechanism for the PIB and to Harter’s (2012) model of normative development of self-representations. Associations were found between the PIB and attributions. Minimal support was obtained for the ignorance of incompetence hypothesis in most domains. Future research directions and clinical implications are discussed.
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Attention-deficit/hyperactivity disorder (ADHD) is one of the most commonly diagnosed disorders of childhood. Although prevalence estimates vary, between 2.2 to 8.9% of individuals worldwide are diagnosed with ADHD (Skounti, Philalithis, & Galanakis, 2007), and 2 to 17% of school-aged pupils are reported to have the disorder (Scahill & Schwab-Stone, 2000). Boys are 3 times more likely than girls to be diagnosed with ADHD (Biederman et al., 2002). The disorder is believed to have a neurobiological basis (Castellanos & Proal, 2012; Cortese, 2012; Cortese et al., 2012; Faraone & Biederman, 1998), and is characterized by a persistent and pervasive pattern of inattentive, hyperactivity, and impulsivity behaviors, with some symptoms typically being present before the age of 7 as outlined in the *Diagnostic and Statistical manual of Mental Disorders, 4th ed.*, text revision (*DSM-IV-TR*; American Psychiatric Association, 2000). In order to be diagnosed with this disorder, the behaviors must be more frequent and severe compared to others of similar developmental level, and must be present in at least two settings (American Psychiatric Association, 2000). Three subtypes of ADHD have been identified in the *DSM-IV-TR*; those who present with predominantly inattentive symptoms, those with predominantly hyperactive-impulsive symptoms, and those with the combined type (APA, 2000). In addition to the core features, individuals experience associated impairments in the academic, social (e.g., peer rejection), and emotional domains (e.g., anxiety, dysphoria), along with aggressive behaviors (e.g., temper outbursts; APA, 2000). As ADHD was initially believed to be a disorder of childhood, much of the research on this disorder has focused on children with
ADHD in relation to their self-perceptions of their difficulties. Currently, it is recognized that ADHD persists into adolescence and adulthood, with 50 to 80% of children continuing to meet diagnostic criteria for the disorder in adolescence (Barkley, 2004; Claude & Firestone, 1995).

The overarching goal of this dissertation was to make a unique contribution to knowledge about the self-perceptions of adolescents with ADHD regarding their core ADHD symptoms and associated problem behaviors. According to researchers that investigate ADHD (Barkley, 2004), there is diagnostic continuity in the disorder; nevertheless quantitative declines occur in symptom severity for hyperactive behaviors in adolescence (e.g., Biederman, Mick, & Faraone, 2000; Hart, Lahey, Loeber, Applegate, & Frick, 1995). Thus, adolescents with ADHD may not exhibit hyperactivity to the same degree as children do (e.g., climbing on chairs); rather, they may experience hyperactivity as subjective feelings of restlessness (APA, 2000). In adolescence, inattention symptoms and problems with inhibition continue to be present, with problems such as poor organization, planning, time management, and persistence of effort, becoming more prominent (Barkley, 2004; Langberg, Dvorsky, & Evans, 2013). There is also an increased incidence of certain co-morbidities (e.g., conduct disorder, substance use disorders) and presence of risk-taking behaviors (driving, dating, and sexual risks; Barkley, 2004; Barkley, Fischer, Edelbrock, & Smallish, 1990). Furthermore, adolescents with ADHD continue to experience impairment in the academic, social, and emotional domains (Barkley, 2004; Biederman et al., 1996; Kent et al., 2011), which are confirmed by parents and teachers of adolescents, and to a lesser extent, adolescents themselves (Barkley, Anastopoulos, Guevremont, & Fletcher, 1991; Dumas, 1998; Wilson & Marcotte, 1996). Given the numerous difficulties faced by adolescents with ADHD, along with the developmental tasks imposed during this time (i.e., increased
autonomy, formation of new relationships, identity formation), it is important to understand their self-perceptions of their core ADHD symptoms and associated problem behaviors.

This dissertation was written in manuscript format. Chapter 2 (Study 1) examines adolescents’ awareness of their ADHD symptoms and associated problem behaviors in comparison to external raters of their behaviors in order to ascertain whether they underestimate their symptoms and behaviors (known as a “positive illusory bias”), and mechanisms responsible for their underestimation. Chapter 3 (Study 2) is a cross-sectional developmental study that compares the self-perceptions of children and adolescents with ADHD in terms of the positive illusory bias for their ADHD symptoms, the attributions they ascribe to their problem behaviors, and stigmatization experienced in relation to their behaviors. Chapter 4 discusses general conclusions and implications by integrating the results of the two studies, with a focus on clinical implications for assessment and therapeutic intervention with adolescents with ADHD. Of note, as a result of the overlap of topics in the chapters, some redundancy may be evident in the topics discussed.

The present chapter provides a brief overview of the key constructs that are studied in this dissertation including relevant definitions and background literature. The areas reviewed include theoretical frameworks for normative development of self-perceptions in children and adolescents, constructs of awareness, attributions, and stigmatization. Research on both children and adolescents with ADHD will be reviewed in order to provide a developmental context for self-perceptions. Taken together, this review of the literature will highlight the unique challenges experienced by adolescents with ADHD and areas requiring further investigation. This chapter concludes with a rationale for the present research and the primary objectives of this dissertation.
Harter’s (1999; 2012) Theory of Normative Development of Self-Perceptions in Children and Adolescents

Prior to examining the empirical literature on the self-perceptions of children and adolescents with ADHD, Harter’s model of the self (1999, 2012), which considers the normative development of self-representations, is discussed. This model provides a framework for the development of self-perceptions in the general population. In her model, Harter uses the overarching term “self-representations” to refer to self-perceptions. Harter (2012) defined self-representations as “attributes or characteristics of the self that are consciously acknowledged by the individual through language” (p. 19). According to Harter, self-representations vary by developmental level and age and are influenced by both cognitive and social factors. The normative-developmental patterns of self-representations from very early childhood to late adolescence are described below.

Very Early Childhood (Ages 2 to 4)

In very early childhood, children construct concrete self-representations that pertain to observable features and behaviors, typically involving skill descriptions (Fischer, 1980—e.g., “I am strong”). In this developmental stage, children’s self-representations tend to be disjointed, isolated, highly compartmentalized (Fischer, 1980), and unrealistically positive (i.e., children over-state their abilities and over-predict their performance; e.g., Schneider, 1998). Due to a number of cognitive limitations, including difficulty separating actual from desired performance, limited ability to engage in social comparison (Ruble & Frey, 1991), limited perspective-taking ability (i.e., incorporation of others’ opinions into self-evaluations; Harter 2006), difficulty

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1 The examples used in this section were obtained from Harter’s (2012) Construction of the self: Developmental and sociocultural foundations (2nd ed.). New York: NY, Guilford Press.
recognizing that one can simultaneously possess both positive and negative attributes (Fischer & Bidell, 2006), and reliance on temporal comparisons (e.g., “I can run faster now than when I was 3”), it is normative for self-representations to be overly positive and to be characterized by all-or-none thinking.

**Early to Middle Childhood (Ages 5 to 7)**

In the next developmental stage, children’s self-representations continue to be overly positive and continue to involve all-or-none thinking, as a number of the previously described cognitive limitations (e.g., limited perspective-taking ability, use of temporal comparisons) are still present (Frey & Ruble, 1990). Nevertheless, there is more continuity in children’s self-representations, and they demonstrate simple ability to coordinate or relate self-representations (i.e., form sets that combine several of their abilities; Case, 1985; Fischer, 1980 – e.g., “I’m good at running, throwing”). There is some recognition of opposites (Fischer, 1980 – e.g., “bad versus good”). Children are also more aware that others are evaluating them and begin to engage in limited forms of social comparison (Ruble & Frey, 1991; e.g., they compare themselves with peers to determine if they are treated fairly and to learn tasks).

**Middle to Late Childhood (Ages 8 to 10)**

The major advancement of this developmental stage is that children realize that self-attributes can be both positive and negative, allowing for greater integration, continuity, and accuracy in self-representations. In addition, children are now able to integrate specific features (e.g., “good at math, language”) to form self-attributes that represent traits (Fischer, 1980; Siegler, 1991 – e.g., “I’m smart”). Greater linguistic capabilities, memory capacity, and sense of self-efficacy contribute to these more coherent self-representations. Cognitive advances, including the ability to use social comparison information for evaluative purposes (Ruble &
Frey, 1991), ability to discern real from ideal self-perceptions (Glick & Zigler, 1985), and increases in perspective-taking skills (i.e., incorporation of others’ views and standards into self-evaluations; Harter, 2012, p. 64), reduce the overly positive and inaccurate self-representations of the previous developmental stages and result in greater acknowledgement of both strengths and weaknesses.

**Early Adolescence (Ages 11 to 13)**

The key developmental task of early adolescence is the “construction of multiple selves that vary across roles and relationships” (Harter, 2012, p. 76; e.g., an adolescent perceives him/herself as an “extrovert” with friends and as an “introvert” with strangers). Socialization pressures to develop autonomy from parents (Hill & Holmbeck, 1986; White, Speisman, & Costos, 1983) and greater awareness of differing opinions that others hold towards them contribute to adolescents’ construction of multiple selves (Harter, 1990; 2006). At the cognitive level, adolescents develop the ability to integrate traits into complex, higher-order abstractions (Fischer, 1980; Harter, 1983 – e.g., combining “curious” and “smart” to form “intelligent”). Despite this cognitive advance, abstractions are compartmentalized and isolated from one another (Case, 1985; Fischer, 1980), resulting in fluctuations, contradictions, and overgeneralizations (i.e., an adolescent perceives positive attributes at one time and negative attributes at another). As adolescents do not yet possess the ability to compare their abstractions, inaccuracies and contradictions are not detected (Fischer, 1980).

**Middle Adolescence (Ages 14 to 16)**

The major developmental advance in this stage is adolescents’ ability to make comparisons between their single abstractions, particularly across roles (Harter, 2012, p. 97). This leads to recognition of both positive and negative abstractions and detection of
contradictions/opposites in self-representations (Harter, Bresnick, Bouchey, & Whitesell, 1997; Harter & Monsour, 1992). At the same time, awareness of contradictions, combined with an increased capacity for introspection, causes significant confusion and inner conflict (Fischer et al., 1984; Harter & Monsour, 1992), as adolescents struggle to determine which characteristics represent their “true” self (e.g., “am I an introvert or extrovert?”). Additionally, adolescents rely on significant others in their environment for opinions regarding which attributes to internalize; however, due to the presence of multiple selves across roles eliciting contradictory opinions, they experience further confusion regarding which characteristics to internalize. Thus, shifting and unstable self-representations are developmentally normative during this period. Negative self-perceptions may even ensue.

**Late Adolescence (Ages 17 to 19)**

In this developmental stage, a significant cognitive advance is the ability to form higher-order abstractions involving coordination of single abstractions and the ability to resolve contradictions (Case, 1985; Fischer, 1980 – e.g., a person who is extroverted with friends and introverted with strangers forms the higher-order abstraction that they are “adaptive”). During this period, adolescents realize that inconsistencies in different contexts are normative (Harter & Monsour, 1992 – e.g., “its normal be able to be different with different people”), thus reducing their inner conflict. Advances in perspective-taking also occur, as adolescents are able to appreciate various viewpoints and compare their perspectives with individuals they share close relationships with (Selman, 2003). Therefore, self-representations that emerge in this period reflect a more integrated, balanced, stable, and cohesive self; adolescents’ appraisals of both positive and negative attributes are more realistic. Furthermore, self-representations represent personal beliefs and values that have become internalized (Ryan & Deci, 2009).
In summary, based on Harter’s (1999, 2012) model, it is evident that self-representations normatively undergo a significant number of changes from toddlerhood through late adolescence. Young children hold unrealistic, overly positive self-representations that become more balanced and accurate in late childhood, followed by the development of isolated abstract self-representations in early adolescence, which become meaningfully integrated in late adolescence. In comparison to the normative population, the review that follows will demonstrate that the self-perceptions of individuals with ADHD notably differ from typically-developing children and adolescents. The following sections will review self-perceptions in children and adolescents with ADHD with regard to awareness of problems, attribution patterns, and stigmatization self-perceptions.

**Awareness of Competencies and Problem Behaviors of Children and Adolescents with ADHD**

**Evidence for a Positive Illusory Bias (PIB)**

In this study, awareness is defined as an individual’s knowledge that they have a symptom or some form of impairment. There is an abundance of literature showing that children with ADHD, 7 to 12 years of age, show limited awareness of their inadequate competencies in a number of domains relative to external raters, with children with ADHD overestimating their competence; this has been termed the “positive illusory bias” (PIB). The PIB is operationally defined as the disparity between self-reported competence and actual competence, such that self-reported competence is substantially higher (Hoza, Pelham, Dobbs, Owens, & Pillow, 2002). The PIB in children with ADHD has been demonstrated in two types of studies: those which use pre- and post-task performance predictions and those which employ discrepancy analysis (comparing child ratings to a criterion rater).
In the first type of study, children with ADHD are asked to engage in a given task (i.e., social or academic) and predict how well they performed pre- or post-task. These studies have shown that children with ADHD give optimistic predictions relative to children without ADHD, despite performing similarly or worse than their peers (e.g., Hoza, Waschbusch, Pelham, Molina, & Milich, 2000; Hoza Waschbusch, Owens, Pelham, & Kipp, 2001; Milich & Okazaki, 1991). For example, in a study by Milich and Okazaki (1991), boys with ADHD gave better pre-task performance predictions than Comparison boys when required to solve a set of “find-a-word” puzzles, despite solving fewer puzzles, giving up more frequently, and experiencing greater frustration. Hoza et al. (2001) found a similar pattern: the post-task performance predictions of boys with ADHD did not differ from boys without ADHD in the academic domain. In a study by Hoza et al. (2000), examining predictions in the social domain, boys with and without ADHD were required to get an unfamiliar child confederate to “like them” in a “get-acquainted” task. Despite objective indices (i.e., lower ratings of social effectiveness by blind coders) showing relatively poorer performance, boys with ADHD gave better post-task evaluations than boys without ADHD. These studies (primarily involving boys) collectively suggest that the self-evaluations of children with ADHD are not consistent with their actual performance – providing support for inadequate awareness of their deficits (i.e., a PIB).

In the second type of study, authors have employed discrepancy analysis, in which child self-ratings are compared with those of a criterion rater (e.g., parent) in order to obtain an external assessment of the child’s actual competence. In discrepancy analysis studies, children typically complete the Self-Perception Profile for Children (SPPC, 1985) and their parents and/or teachers complete the parallel form. A difference/discrepancy score is then computed by subtracting the parent score from the child score (child – parent/teacher). Discrepancy scores are
then compared between ADHD and Comparison samples. Using this approach, several studies have demonstrated that children with ADHD hold a PIB (i.e., overestimate their self-perceptions of competence/have higher discrepancy means) relative to children without ADHD in terms of social acceptance, behavioral conduct, and scholastic competence when parents (mothers, fathers) and teachers are used as criterion raters (Hoza et al., 2002; 2004; Owens & Hoza, 2003). Additionally, some of these studies have compared children’s ratings to scores on achievement tests (i.e., Owens & Hoza, 2003) and laboratory tasks (Ohan & Johnston, 2011) by standardizing each score (computation of a Z score) and then computing difference scores, providing further support for children’s positive illusory self-perceptions in the scholastic/academic and social domains. Some of these studies have considered girls with ADHD (i.e., Hoza et al., 2004; Ohan & Johnston, 2011; Owens & Hoza, 2003), showing that both boys and girls with ADHD demonstrate a PIB, with no significant gender differences between boys and girls with ADHD. Owens and Hoza (2003) also considered subtypes, showing that children with predominantly hyperactive-impulsive symptoms or the combined type overestimated their scholastic competence more than children with primarily inattentive symptoms (who did not differ from Comparison children), suggesting that the PIB may primarily occur in children with hyperactive-impulsive symptoms. However, an all-girl study by Swanson, Owens, and Hinshaw (2012) indicated that children with ADHD with the combined subtype did not have a larger PIB than girls with ADHD with the predominantly inattentive subtype. Although further clarification regarding the role of subtypes is needed, discrepancy studies provide support for the PIB in 7-to-12 year old children with ADHD, suggesting that they show limited awareness of their deficits in comparison to same-aged, typically-developing children.
Relative to children with ADHD, fewer studies have examined the PIB in adolescents with ADHD. Two published studies (Hoza et al., 2010; McQuade, Hoza, Waschbusch, Murray-Close, & Owens, 2011) considered the presence of positively biased self-perceptions in adolescents with ADHD longitudinally. In the first study, Hoza and colleagues (2010), using the discrepancy method, assessed the PIB in 8 to 13 year old children with and without ADHD (boys and girls). They were followed over a 6 year period (14 to 19 years of age at time of study completion), and their PIB was assessed at various time points. Children’s ratings on the SPPC (and the Self-Perception Profile for Adolescents; SPPA, Harter, 1988) were compared to teacher ratings. Although the PIB changed at various time points (discussed below), children with ADHD overall exhibited a larger positive bias over the 6-year period than children without ADHD with regard to self-perceived competence for social acceptance and behavioral conduct.

In the second study, McQuade, Hoza, and colleagues (2011) assessed the PIB in boys with and without ADHD, at ages 8 to 12, over a 2 to 3 year period relative to teacher criterion raters (discrepancy method). In childhood, boys with ADHD demonstrated a PIB for their self-perceptions of scholastic, behavioral, and social competence relative to boys without ADHD. Two to three years later, they continued to have a PIB in these domains (at ages 9 to 15).

**Mechanisms for the PIB**

Four main hypotheses have been proposed for the presence of the PIB by Owens, Goldfine, Evangelista, Hoza, and Kaiser (2007). These include ignorance of incompetence, self-protection, cognitive immaturity, and neuropsychological deficits. These hypotheses, which are not mutually exclusive, are reviewed below.

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2 Since the publication of the Hoza et al. (2010) study, the PIB is referred to as “positively biased self-perceptions.” In the current dissertation, the original term “PIB” will be used in order to maintain consistency.
**Ignorance of incompetence.** This hypothesis suggests that individuals who have poorly developed skills in a given domain are unable to recognize their incompetence in that domain, and therefore overestimate their performance (Kruger & Dunning, 1999). This phenomenon has been demonstrated in college students and adults (Ehrlinger, Johnson, Banner, Dunning, & Kruger, 2008). There is some support for this hypothesis in children with ADHD, as studies show that the PIB is most evident in children’s area of greatest deficit (Hoza et al., 2002; 2004). Specifically, these studies indicate that children with ADHD with co-occurring conduct problems tend to exhibit the greatest PIB in the behavioral and social domains compared to children with ADHD without conduct problems. As well, children with ADHD and co-occurring academic difficulties exhibit a larger PIB in the scholastic domain compared to children with ADHD without academic difficulties.

There is also some evidence that counters the ignorance of incompetence hypothesis. For example, Evangelista, Owens, Golden, and Pelham (2008) conducted a study in which children with ADHD, demonstrating a PIB for their scholastic and social competence (relative to teacher criterion raters), were able to recognize the academic and social failures of a child depicted in video clips. If children with ADHD were truly ignorant, they should not have been able to accurately evaluate their own or others’ competence, disconfirming the hypothesis. In addition, in some studies comparing self-perceptions of children with and without ADHD (Dumas & Pelletier, 1999; Owens & Hoza, 2003), children with ADHD have lower self-perceptions of their social, scholastic, and behavioral competence relative to children without ADHD. This is especially true of studies that do not use the SPPC measure (e.g., Horn, Wagner, & Ialongo, 1989; Ialongo, Lopez, Horn, Pascoe, & Greenberg, 1994). Thus, children with ADHD may show some recognition of their difficulties, even if they do have a PIB relative to criterion raters.
Self-protection hypothesis (SPH). This hypothesis posits that children with ADHD inflate their self-perceptions of competence when they face challenges (e.g., difficult tasks) in order to protect their self-esteem (Diener & Milich, 1997). This hypothesis has received support from the above described studies that ask children to predict their performance on social tasks. Specifically, children with ADHD who provide inflated post-task performance predictions no longer do once they are given positive feedback (e.g., Diener & Milich, 1997; Ohan & Johnston, 2002). For example, Diener and Milich (1997) found that children with ADHD who gave overly positive evaluations of how well they believed a peer confederate “liked” them no longer provided inflated self-evaluations once they were given feedback (i.e., were told that their partner enjoyed playing with them) compared to children with ADHD who did not receive such feedback. Therefore, once children with ADHD no longer felt a threat to their self-esteem, they no longer enhanced their self-perceptions (i.e., provided more realistic self-evaluations), supporting self-protection. This hypothesis, however, has not received support in the academic domain (i.e., boys with ADHD continue to enhance even after being given positive feedback; Ohan & Johnston, 2002).

Additional support for the SPH was obtained in the above described 6-year longitudinal study conducted by Hoza and colleagues (2010). Despite participants with ADHD demonstrating a PIB relative to Comparison children, these authors found that the PIB differed over time in adolescents depending on the domain. In the social domain, at age 8, children with ADHD demonstrated a large PIB, which remained high over much of adolescence (with a slight decrease in middle to late adolescence). In the behavioral domain, children with ADHD exhibited a large PIB at age 8, which then declined over adolescence. Hoza and colleagues (2010) claimed that this pattern supported the SPH, as children with ADHD persistently face
social challenges; this would result in the need to self-protect (i.e., need for the presence of a continued PIB) into adolescence. In contrast, they claimed that because non-delinquent aggressive acts are seen as normative in adolescence (Moffit, 1993), there may be less of a need to engage in self-protection in the behavioral domain (i.e., and therefore the decline in the PIB).

Finally, support for the SPH is evident in studies that show a negative association between the PIB and symptoms of depression. Specifically, children with ADHD and comorbid depression are less likely to have a PIB for their appraisals of their self-competencies relative to children with ADHD without comorbid symptoms of depression (Hoza et al., 2002; 2004). Thus, it is possible that the presence of a PIB may be protective against developing symptoms of depression. However, research has not yet established the direction of the relationship between the PIB and depression. While it is possible that the presence of positive illusions may reduce the likelihood of developing depression, it is also possible that the presence of depressive symptoms (resulting in rumination over personal defects; APA, 2000) reduces the likelihood of developing a PIB. Longitudinal research has attempted to establish the direction of this association. For example, Hoza et al. (2010), in their 6 year longitudinal investigation, found a negative association between positive bias and depression; however, the PIB in childhood was not predictive of fewer symptoms of depression over time. In contrast, in another longitudinal investigation, McQuade, Hoza, and colleagues (2011) found that negative changes in self-perceptions of social competence (over a 2-3 year period) was predictive of later symptoms of depression. Although the directionality of the association continues to remain unclear, there is nevertheless considerable evidence for the SPH.

**Neuropsychological deficits.** The neuropsychological deficits hypothesis, proposed by Owens et al., 2007, posits that children with ADHD suffer from “anosognosia”, a neurologically-
based condition characterized by inadequate awareness of personal errors (Stuss & Benson, 1987) and self-awareness (Ownsworth, McFarland, & Young, 2002) due to frontal lobe damage and executive functioning deficits. Based on neuropsychological research, there is evidence that the core brain regions implicated in self-referential/self-evaluative processes in typically developing children and adolescents involve the cortical midline structures, namely regions of the medial prefrontal cortex/MPFC (Pfiefer, Lieberman, & Dapretto, 2007; Pfiefer et al., 2009). The MPFC, along with the posterior cingulate cortex, form the “default mode network” (i.e., active when a person is at wakeful rest and diminished during goal-oriented tasks; Cortese, 2012; Cortese et al., 2012). Recent findings implicate the default network in children and adolescents with ADHD (i.e., decreased suppression during active tasks; Fassbender et al., 2009), which may lend some support to the neuropsychological deficits hypothesis as a possible mechanism for the PIB if irregularities in the default network of children and adolescents with ADHD also impact their awareness of their challenges. Irregularities in regions of the default network (i.e., ventral MPFC) have been found in other clinical populations (Autism Spectrum Disorder; Pfiefer et al., 2013) that show limited awareness of their challenges (Johnson, Fillitier, & Murphy, 2009).

Executive functions (involving the prefrontal-striatal network) are defined as “the product of the coordinated operation of various processes to accomplish a particular goal in a flexible manner” (Funahashi, 2001, p. 147). The core components include set-shifting, working memory, planning, response inhibition, and interference control (Martel, Nikolas, & Nigg, 2007). Research suggests that schizophrenia patients (Shad, Tamminga, Cullum, Haas, & Kashavan, 2006) and patients with acquired brain injuries (Ownsworth et al., 2002) with executive functioning deficits overestimate their abilities and show a lack of insight (Stuss & Benson, 1987). There is evidence that individuals with ADHD demonstrate deficits in executive
functions (Biederman et al., 2004; Toplak, Bucciarelli, Jain, & Tannock, 2009; Toplak, Jain, & Tannock, 2005). Barkley (1997) suggests that executive function deficits in individuals with ADHD results in difficulty holding events in mind, perspective taking, self-reflection, and analysis/synthesis of behaviors, which may explain their PIB. Two studies considered neuropsychological/executive function deficits in relation to the PIB in children with ADHD, one of which supported this hypothesis. McQuade, Tomb, Hoza, Waschbusch, Hurt, and Vaughn (2011) examined the executive functions of 7-12 year old children. They categorized participants into 3 groups: those with ADHD and a PIB, those with ADHD without a PIB, and Comparison. These authors found that participants with ADHD demonstrated poor executive functions (on the Executive Processes, Working Memory, Broad Attention and Cognitive Fluency subtests of the Woodcock-Johnson Tests of Cognitive Abilities – Third Edition; Woodcock, 2007) relative to Comparison participants. Among the ADHD groups, it was notable that those with a PIB in the academic and social domains demonstrated greater deficits in Executive Processes than children with ADHD without a PIB. In the social domain, children with ADHD and a PIB demonstrated significant deficits in Cognitive Fluency, Working Memory, and Broad Attention compared to children with ADHD without a PIB. Furthermore, Executive Processes partially mediated the relationship among ADHD and positive bias in the behavioral conduct, social, and academic domains. In the social domain in particular, several EF/cognitive functions (i.e., Working Memory, Broad Attention, and Cognitive Fluency) partially mediated the relationship between ADHD status and positive bias. In contrast, although Scholtens, Diamantopoulou, Tillman, and Rydell (2012) found an association between neuropsychological/cognitive factors and the PIB in the social domain in children with ADHD symptoms, these factors were not more predictive of positive illusions compared to other factors,
such as the presence of disruptive behaviors, which is now receiving some consideration as a possible contributing factor for the PIB in the social domain.

**Cognitive immaturity.** Related to the neuropsychological deficits hypothesis is cognitive immaturity. The cognitive immaturity hypothesis postulates that the cognitive functions associated with self-awareness in children with ADHD are immature (Milich, 1994), which prevents them from developing realistic self-appraisals commensurate with their age. According to this hypothesis, children with ADHD should be delayed in the development of realistic patterns of thinking compared to children without ADHD.

Neuropsychological studies suggest that children with ADHD experience a “maturation lag” in brain development (El-Sayed, Larsson, Persson, Santosh & Rydelius, 2003) supporting this hypothesis. For instance, 6-16 year olds with ADHD show a delay in brain myelination rates (Seig, Gaffney, Preston, & Hellings, 1995), and 9-12 year olds with ADHD demonstrate delays in cortical activity relative to age-matched children (El-Sayed, Larsson, Persson, & Rydelius, 2002; Mann, Lubar, Zimmerman, Miller, & Muenchen, 1992), with EEG studies showing that children with ADHD show increased slow activity in frontal regions and decreased fast cortical activity in parietal and temporal regions. As well, there is evidence of delayed maturation/reduced connectivity within the default mode network of children and adolescents with ADHD (Fair et al., 2010). Further evidence for a delay in brain maturation comes from a brain imaging study, showing that cortical development in 7-13 year old children with ADHD lags behind typically-developing children by several years (Shaw et al., 2007). The age at which children with ADHD (10.5 years) attain peak cortical thickness in the cerebrum is delayed by 3 years relative to Comparison children (7.5 years), and the most prominent delay (i.e., by 5 years) in cortical maturation occurs in the prefrontal region. The findings suggest that children with
ADHD likely do not achieve the same patterns of thinking that characterize the general population until they are somewhat older.

Only one study has considered the cognitive immaturity hypothesis in relation to the PIB and ADHD. In the longitudinal study by Hoza and colleagues (2010), developmental trajectories for the PIB were compared in children with and without ADHD over the 6 year period. The developmental trajectory for the ADHD and non-ADHD samples differed for perceptions of social competence; the PIB in children without ADHD was initially low (at age 8) but increased over time (due to normative bolstering of social self-views in adolescence) and leveled off, whereas the positive bias score for children with ADHD remained high for the 6 year period, and slightly decreased in middle to late adolescence. Nevertheless, by age 17, it was notable that participants with and without ADHD showed a similar level of positive bias. In terms of behavioral conduct, while 8 year olds in the ADHD group began with a high PIB, this steeply declined over time. In the comparison group, children at age 8 showed a low level of positive bias, which steadily declined and leveled off by mid to late adolescence. By age 17, both participants with and without ADHD showed a similar level of negative bias. Although Hoza and colleagues interpreted the findings in terms of a greater need to self-protect in the social domain and decreased need to self-protect in the behavioral domain, the results also suggest that the gap in self-awareness between individuals with and without ADHD narrows in adolescence, in line with the cognitive immaturity hypothesis.

In summary, each of the above hypotheses has received partial support in terms of explaining the PIB with regard to self-perceptions of competence, with the SPH receiving the most research support and the ignorance of incompetence hypothesis the least support. It is noteworthy that there appears to be some overlap in terms of the neuropsychological deficits and
cognitive immaturity mechanisms, as both involve irregularities in the frontal regions and research indicates that executive functions gradually develop from childhood through early adulthood (Huizinga, Dolan, & van, 2006). Although four main hypotheses have been proposed for the PIB by Owens and colleagues (2007), other explanations for the PIB may be valid. For example, Ohan and Johnston (2011) highlighted the unique role of oppositional defiant disorder (ODD) symptoms in the PIB. They found that 9 to 12 year old girls with ADHD who had co-occurring ODD symptoms overestimated their self-perceptions of social competence (relative to parent and teacher ratings, and blind coders’ ratings during a computerized social interaction task) more than girls with ADHD without co-occurring ODD symptoms. Thus, oppositional symptoms may be a playing a role in exacerbating the PIB.

It is important to highlight that the reason the PIB has received considerable investigation is that researchers are attempting to ascertain whether it is adaptive or maladaptive to have positively biased self-perceptions. Some researchers have raised concern that the PIB may be maladaptive, as it may prevent individuals with ADHD from realizing they need to adjust/change their behaviors (which is important for intervention) and improve their approach to task performance, and it may interfere with them processing negative feedback (Colvin & Block, 1994; Milich & Okazaki, 1991). On the other hand, the PIB may be adaptive because it may spare the confidence and self-esteem of individuals with ADHD, serving as a buffer in the face of challenges (Owens et al., 2007; Taylor & Brown, 1988), encouraging them to persist at tasks (Bjorkland, 1997). Currently, there is some longitudinal evidence that the PIB may be maladaptive in the behavioral conduct domain (i.e., predictive of later aggression over time and of poor social skills; Hoza et al., 2010; Murray-Close et al., 2010). In the social domain, the evidence is mixed; while some studies suggest positive illusions are protective (e.g., Hoza et al.,
2010; McQuade, Hoza, et al., 2011), there is initial evidence that the PIB in the social domain is predictive of aggression one year later (Murray-Close et al., 2010), and is associated with externalizing problems and lower psychosocial adjustment in girls with ADHD (Ohan & Johnston, 2011). Biases in both domains are associated with impaired functioning in the peer group (i.e., rejection) over time (Murray-Close et al., 2010). As well, despite holding a PIB, children with ADHD put in less effort and give up more often on challenging social and academic tasks (Linnea, Hoza, Tomb, & Kaiser, 2012; Milich & Okazaki, 1991), raising some question as to whether the PIB encourages them to persist on tasks.

**PIB for ADHD Symptoms**

The above studies show that the PIB is a robust phenomenon in children and adolescents with ADHD in terms of their self-perceptions of competence; however, research is still needed to determine the extent of their awareness in relation to their ADHD symptoms. To date, only one study by Wiener and colleagues (2012) has investigated this. These authors examined the PIB in terms of underestimation of problems/symptoms. They compared parent ratings from the *Conners Parents Rating Scales-Revised* (Conners, 1997) to child ratings based on a pictorial method of identifying problem behaviors. Children (9 to 14 years) were presented with pictures of a child displaying symptoms of ADHD and associated problem behaviors, and were asked whether they engaged in the same behaviors as the child. A discrepancy score was created by subtracting the total number of symptoms endorsed by the child from the total symptoms endorsed by parents. Using this method, these authors found that children with ADHD significantly underestimated their symptoms of ADHD, relative to parent criterion raters, in comparison to children without ADHD. The findings are of concern, as they suggest that
children have inadequate awareness of the core ADHD symptoms that comprise their disorder, which may then pose a challenge to treatment\(^3\).

At present, less is known about whether adolescents with ADHD, like children with the disorder, also underestimate (i.e., show this discrepancy) their ADHD symptoms. This is of particular importance, as adolescents with ADHD are often asked to provide self-reports of their symptoms and associated problem behaviors (e.g., social problems, academic problems, oppositional symptoms) via standardized rating scales over the course of psychological and other clinical assessments (Conners, 2008). If adolescents are not aware of their difficulties, using their ratings in such assessments may be questionable. In studies (e.g., Hogue, Dauber, Lichvar, & Spiewak, 2013; Mannuzza & Gittelman, 1986) that did not explicitly consider the PIB, disparity/poor cross-informant reliability was found between the self-reports of adolescents with ADHD relative to parents regarding the presence of ADHD symptoms, offering preliminary support that adolescents with ADHD may have a PIB. Further, awareness of symptoms and associated problem behaviors is necessary in order for them to engage in self-advocacy to receive supports and services. Research is needed to establish whether adolescents with ADHD underestimate their symptoms and associated problems using standardized measures that are typically utilized in such psychological/psychoeducational assessments. As well, it will also be important to examine the PIB in adolescents using parent ratings (previous PIB adolescent studies have relied on teacher ratings), given several concerns about using teacher ratings with adolescents with ADHD, including the presence of teacher bias (i.e., women and young teachers provide more severe ratings; Schultz & Evans, 2012), low inter-teacher reliability (Molina,

\(^3\) Although the age range for the Wiener et al. (2012) study was 9 to 14 years, very few 14 year olds were included; thus, their findings are primarily applicable to 9 to 13 year old children with and without ADHD.
Pelham, Blumenthal, & Galiszweski, 1998), and less teacher familiarity with adolescents’ behaviors (compared to elementary school teachers) due to observing their behaviors for short periods of time (e.g., 1 hour per day; Evans, Allen, Moore, & Strauss, 2005). Finally, mechanisms responsible for the PIB (defined as underestimation of symptoms/problems) have not yet been established. Therefore, research is needed to examine whether the mechanisms proposed by Owens et al. (2007) also underlie the PIB for underestimation of ADHD symptoms.

**Causal Attributions**

Attribution Theory

Attributions are an important aspect of self-perceptions. Attributions refer to causal perceptions, or the explanations that individuals ascribe to their actions, successes and failures, or to the actions of others (Weiner, 1985). According to Weiner’s Attribution Theory (1985), attributions guide expectancy for future outcomes (e.g., expectations for future difficulties), motivation, affect, and self-esteem. For example, once causes are assigned to successes and failures, a guide for future courses of action can be determined (Weiner, 1985). In the event of success, an individual may attempt to repeat or replicate the causal sequence, whereas in the event of failure, there may be an attempt to alter the causes that led to the failure to attain a more desirable result (Weiner, 1985).

In his Attribution Theory, Weiner (1985) described four types of causal attributions, globality, stability, controllability, and locus of causality, to explain why an event has occurred. Globality attributions refer to whether an individual views an event as occurring in all situations versus only specific/certain situations. Stability attributions refer to whether an individual views an event as stable or unstable over time. Controllability attributions refer to whether an individual views an event as either within or outside of his/her control. Locus of causality
attributions refer to whether an event is viewed as either internally (i.e., due to something inside the person) or externally caused (i.e., due to something out of the person). Based on Weiner’s (1985) theory, causal ascriptions form in the following sequence: (1) an individual fails to attain a goal (e.g., an individual fails a math test), which is interpreted as negative; (2) a primary appraisal is made, linking the outcome to an emotional reaction (e.g., sadness, frustration); (3) a causal search is then undertaken to determine why the outcome occurred; and (4) an attribution is made.

**Attributions in the General Population**

Within the normative population, the attributions of children and adolescents have received a tremendous amount of attention, given their impact on task analyses, task persistence, and performance (Borowski, Carr, Rekkinger, & Pressley, 1990; Flavell, 1987). In most studies, attributions are examined for success and failure outcomes. Success and failure are either experimentally manipulated during laboratory tasks or are examined for naturally occurring outcomes, with the majority of studies considering academic/cognitive, motor, sports, and social tasks (Whitley & Frieze, 1985). These studies show that attributions vary according to task outcome (Whitley & Frieze, 1985), where individuals take credit for successful task outcomes (i.e., attribute success to internal, global, and stable causes) and deny responsibility for task failure (i.e., attribute failure to external, specific, and unstable causes – considered to be a healthy or “self-serving” attribution style; Alloy & Abramson, 1988; Whitley & Frieze, 1985; Zuckerman, 1979). Based on meta-analytic findings, such self-serving attributions have been demonstrated across samples of various ages, both genders and particularly in individuals from Western cultures (Mezulis, Abramson, Hyde, & Hankin, 2004). Self-serving attributions (similar to the PIB) are associated with less depression (Abramson & Alloy, 1981), and greater self-
reported happiness (Kuiper, 1978). In addition to self-serving attributions, researchers have also identified the presence of a “depressogenic” attributional style (Abramson, Seligman, & Teasdale, 1978); children and adolescents with this attribution style attribute negative outcomes to internal, global, and stable causes (Joiner & Wagner, 1995). Such an attribution style places individuals at risk for low self-esteem, depression, learned helplessness, and is considered maladaptive (Abramson et al., 1978).

Along with varying attribution styles, there is also evidence of developmental differences in attributions. For example, young children (5 to 6 year olds) are more likely to view effort (an unstable and internal attribution) as important in their causal ascriptions, whereas 12 to 13 years olds understand the importance of ability (an internal and stable attribution), and unlike younger children are able to differentiate ability from effort (Chapman & Skinner, 1989; Nicholls & Miller, 1984). There is also some evidence that children, under the age of 8, do not recognize the uncontrollable aspects of situations and outcomes when forming their causal ascriptions (e.g., view luck as controllable; Stipek & DeCotis, 1988; Weisz, 1984). Additionally, Mezulis and colleagues (2004), in their meta-analysis, obtained evidence that adolescents, compared to children, show an attenuated self-serving bias, most likely due to the fact that adolescents have the cognitive capacity to recognize that negative events may be caused by internal, global, stable factors (Stipek & MacIver, 1989).

Within the normative population, the investigation of gender differences in attribution style has yielded inconsistent findings, with some studies indicating no differences in boys’ and girls’ attributions (Sohn, 1982), and some suggesting that girls are more likely to attribute their successes to external causes and attribute their failures to internal causes, with boys showing the opposite pattern (Diener & Dweck, 1978; Ryckman & Peckham, 1987). This has led some
researchers to conclude that girls’ attributions are more “self-derogatory” and boys’ attributions are more “self-enhancing” (Burgner & Hewstone, 1993; Levine, Gillman, & Reiss, 1982; Zuckerman, 1979). Several explanations, such as lower self-esteem and lower performance expectations in females, higher achievement motivation in males, and varying socialization pressures, have been postulated to account for this difference (see Levine et al., 1982 for a review). As well, some researchers (e.g., Eccles, Wigfield, Harold, & Blumenfeld, 1993) highlight the importance of domain (e.g., males tend to perform well in mathematics, making them more likely to attribute success internally/to ability and making females more likely to attribute their success to external causes or failures to lack of ability/internal causes). Finally, some researchers highlight the importance of age (e.g., Hankin et al., 1998), with females being more likely to experience depression in the teenage years and, resulting in more internal attributions for failure in the adolescent phase of development.

**Attributions of Children and Adolescents with ADHD**

An abundance of research has been conducted on the attribution patterns of children with ADHD (primarily boys), age 7 – 12, focusing on their causal ascriptions for success and failure, impact of medication on success and failure attributions, and their general attribution style. Support has been obtained for the presence of both self-serving (i.e., adaptive) and depressogenic (i.e., maladaptive) attributions.

**Attributions for success and failure.** In order to assess causal ascriptions for task performance (success and failure outcomes), children with ADHD are asked to complete tasks (e.g., word puzzles, dyadic social tasks) or are presented with vignettes. Studies show that children with ADHD make more internal attributions for their success than do Comparison children, and are less likely than Comparison children to take responsibility (i.e., hold internal
attributions) for their failures (Hoza, Pelham, Milich, Pillow, & McBride, 1993). Moreover, when judging their own performance relative to another child (in vignettes), both children with and without ADHD attribute negative outcomes (e.g., receiving a poor grade) in the other child as being due to internal causes, whereas negative outcomes regarding their own performance are attributed to external causes (Johnston & Lee, 2005). The findings suggest the presence of self-serving attributions, although some children with ADHD externalize their success (i.e., “due to luck”) after experiencing initial failure (Hoza et al., 2001).

**Medication and attributions for success and failure.** Numerous studies have been conducted on the impact of stimulant medication on attribution patterns. Irrespective of taking medication, the majority of these studies show that 7 to 12 year old boys with ADHD attribute successful outcomes to internal causes (i.e., effort, ability) and failure outcomes to external causes (i.e., task difficulty) when asked to complete academic tasks/word puzzles and when their behaviors are assessed in naturalistic settings (i.e., classroom/summer treatment daily behavioral report cards; Carlson, Pelham, Milich, & Hoza, 1993; Milich, Carlson, Pelham, & Licht, 1991; Pelham et al., 1992; Pelham, Hoza, Kipp, Gnagy, & Trane, 1997; Pelham et al., 2002). This has been shown irrespective of the medication condition children are in (i.e., medication, placebo, no pill), medication dosage, and medication expectancies (i.e., told they are taking a “real” or “fake” pill; Carlson et al., 1993; Pelham et al. 1992; 1997; 2002). The results suggest that self-serving attributions continue to be present when children take their ADHD medication. Furthermore, boys with ADHD appear to make more internal attributions for their successful behaviors when they are medicated (Pelham et al., 2002). However, when asked to specifically think of their problematic ADHD behaviors, children with ADHD attribute both positive outcomes (e.g., being
able to sit still, make friends) to external causes (medication) and unsuccessful outcomes to external causes (not taking medication; Treuting & Hinshaw, 2001).

**Depressogenic attributions.** Despite the presence of self-serving attributions, there is also some evidence for depressogenic attributions in children with ADHD. In terms of their general attribution style, relative to children without ADHD, children with ADHD view negative events as more stable and global (Hoza et al., 1993), and view positive events as less internally caused, global, and stable (Carlson, Mann, & Alexander, 2000; Collet & Gimpel, 2004). Additionally, some outcome studies indicate that children with ADHD attribute their social successes to external and uncontrollable causes (i.e., being “lucky” or task ease) and social failures to internal causes (Hoza et al., 2000). As well, Pelham and colleagues (1992) found that a subset of boys with ADHD that made high pill attributions for success tended to internalize blame on failure days (i.e., receiving a negative daily behavioral report card), suggesting that attributions may be useful for identifying children with ADHD at risk for depression.

**Adolescents with ADHD.** Compared to children, less research has been conducted on the attribution patterns of adolescents with ADHD. The adolescent research base includes qualitative and quantitative studies, and females have been included in the samples. Qualitative (in-depth interviews with small samples) and quantitative (using vignettes) studies show that 11 to 17 year olds with ADHD view their challenges (i.e., argumentative behaviors, concentration problems, compliance/non-compliance) as being stable over time (Cooper & Shea, 1999; Ohan & Johnston, 1999). Moreover, they view their behavioral challenges (compliance and non-compliance) as more controllable when they take stimulant medication (Ohan & Johnston, 1999). Relative to adolescents without ADHD, Neiderhofer (2008) found that 12 to 18 years old with ADHD attributed their school successes to external causes (e.g., luck) and failures to internal and
uncontrollable causes (i.e., lack of ability). Despite offering initial insight into attributions for some of the associated behaviors that co-occur with ADHD (mainly academic and compliance issues), adolescents’ attributions for their ADHD symptoms need to be better understood.

As well, most of the ADHD adolescent studies above have not considered gender differences in males’ and females’ attributions, perhaps due to insufficient numbers of females in the samples. However, one quantitative study by Rucklidge and Tannock (2001) specifically focused on the attributions of 13 to 16 year old girls, showing that girls with ADHD attribute negative life events to global and stable causes compared to girls without ADHD. Compared to boys with ADHD, girls with ADHD held greater external locus of control attributions than boys, although this difference disappeared after controlling for ADHD symptom severity (as the girls in this study demonstrated more severe symptoms). Given these findings, there is a need to explore gender differences.

**Attributions for problem behaviors.** There continues to be a limited understanding of the causal ascriptions children and adolescents with ADHD make for the behavioral symptoms of ADHD that impact their day-to-day functioning. To address this question, Kaidar, Wiener, and Tannock (2003) and Wiener et al. (2012) presented 7 to 14 year olds, with and without ADHD, pictures of a character depicting symptoms of ADHD and problems that often co-occur with ADHD (symptoms of oppositionality, academic problems). They were asked to identify which behavior or symptom was the most problematic for them. These authors found that children with ADHD viewed their self-identified most problematic behaviors (mainly symptoms of inattention and hyperactivity-impulsivity) as more uncontrollable and global than children without ADHD. Given the continued presence of ADHD symptoms into adolescence and evidence of developmental changes in attribution styles over adolescence, there is a strong need
to understand the attribution patterns of adolescents with ADHD beyond the age of 14. In particular, developmental research is needed in order to understand how the attributions of adolescents with ADHD differ from children with ADHD with regard to their problem behaviors.

**Stigma**

Weiner, Perry and Magnussen (1988) also considered stigma. They defined stigma as a view that deviations in physical attributes, characteristics, and behaviors are undesirable qualities, which are perceived as negative outcomes (Weiner et al., 1988). When a negative outcome occurs, an individual engages in an attributional search to determine the perceived causes of the stigma. According to Weiner and colleagues (1988), both the stigmatized person and observers may engage in this causal search. They claimed that perceived causes of a stigma determine affective responses (e.g., anger, pity), future expectations, and behavioral responses towards the stigmatized person. For instance, previous research has shown that when observers perceive the cause of the potentially stigmatizing behavior as controllable, anger is directed towards the person, whereas if the cause of the behavior is viewed as uncontrollable, pity and help-giving behaviors will be directed towards the person (Weiner, 1985). The core feature of stigma is that individuals who possess attributes that vary from societal norms are devalued and marked as different (Major & O’Brien, 2005).

There is evidence that mental-behavioral stigmas (e.g., drug addiction, obesity, child abuse) are perceived as onset-controllable by observers; individuals with onset-controllable stigmas receive less sympathy and helping behaviors from others than do individuals with physical-based stigmas (e.g., blindness, cancer; Weiner et al., 1988). These findings are of concern, as outcomes associated with stigma include poor self-esteem, achievement problems,
and greater risk of experiencing mental health and physical health problems (Major & O’Brien, 2005). Moreover, the stigma may become internalized by the target person (Corrigan, Watson, & Barr, 2006). Corrigan and Watson (2002) distinguished between public stigma (i.e., stereotypes/reactions that the general public has towards individuals with mental illness including prejudice and discrimination, p. 37) and self-stigma (i.e., internalization of stigma or applying society’s negative stereotypes to oneself, p.38), which differ from stigma awareness (i.e., the stigmatized person is aware of negative beliefs towards mental illness in their society/culture; Corrigan et al., 2006, p. 875). In the present dissertation, the term “self-perception of stigma” is used, as the focus will be on the extent to which children and adolescents with ADHD feel embarrassed by their problem behaviors (part of self-stigma) and the extent to which they perceive individuals in their environment are bothered by their behaviors.

**Stigma Theories**

Several theories have been proposed to explain how stigmatization affects the target or stigmatized person (see Major & O’Brien, 2005 for a review). These include: Labels and Discrimination, Expectancy Confirmation, Automatic Stereotype Activation Behavior, and Stigma-Induced Identity Threat. Each is briefly reviewed below.

**Labels and discrimination.** According to modified labeling theory (Link, Cullen, Struening, Shroot, & Dohrenwend, 1989), individuals with mental health disorders are likely to experience societal discrimination, to be seen as inferior, and are devalued. Major and O’Brien (2005) similarly suggest that stigmatized persons/persons with labels are directly affected by discrimination. For example, members of stigmatized groups experience discrimination in employment, educational, and health care settings (Sidanius & Pratto, 1999).
**Expectancy confirmation.** According to this theory, the presence of negative stereotypes and expectations results in individuals behaving towards stigmatized persons in ways that affect the thoughts, feelings, behaviors of the stigmatized person (Major & O’Brien, 2005), and in turn results in them behaving in ways that confirm others’ negative expectations, such that a self-fulfilling prophesy occurs (Darley & Fazio, 1980; Deaux & Major, 1987, Jussim, Palumbo, Chatman, Madon, & Smith, 2000). The stigmatized person does not necessarily need to be aware of the other person’s stereotypes, prejudiced beliefs, and expectations in order for this process to occur (Snyder, Tanke, & Berscheid, 1977; Vorauer & Kumhyr, 2001).

**Automatic stereotype activation behavior.** Stereotype activation is defined as the “increased accessibility of a constellation of attributes that are believed to characterize members of a given social category” (Wheeler & Petty, 2001, p. 797). This theory proposes that dominant stereotypes are known in society and are automatically activated (Steele, 1997), as associations form in memory between stereotypes and certain behaviors (Bargh, Chen, & Burrows, 1996). Activation of stereotypes (by others or the self) can automatically result in assimilation behaviors consistent with the stereotype (Bargh et al., 1996). In order for the process to occur, Major and O’Brien (2005) noted that the target person must be aware of the contents of the stereotype, and the stereotype must be activated in a given situation.

**Stigma-induced identity threat.** Major and O’Brien (2005) conceptualized a model of stigma that considers the target person’s understanding of how others view them. In this model, the authors propose that having a stigma (or a devalued identity) increases a person’s vulnerability to situations that potentially threaten their identity. These authors considered personal characteristics (e.g., sensitivity to stigma), perceptions of situational cues (signaling a risk that one may be devalued), and knowledge of societal representations (e.g., knowledge of
how dominant groups view their identity) that impact their vulnerability to stigma. In view of these factors, an identity threat appraisal is undertaken. A stigma-induced identity threat is perceived when a person’s appraisal of a stigma-related stressor is seen as harmful to his/her identity, and exceeds his/her resources to cope (Major & O’Brien, 2005). Of note, appraisals may occur automatically and unconsciously (Smith, 1991).

In summary, a number of theories have been proposed to account for how stigmatization affects a person. Inherent in each of these theories is that stigmatization occurs in the context of social power, in which a group with greater power devalues a group with less power (Hinshaw & Stier, 2008). According to Hinshaw (2005), a key reason for the pervasive stigmatization of mental health disorders is that societies form “ingroups” (defined as persons linked together by community, shared values, or family heritage, p. 716) that are differentiated from “outgroups” (defined as persons existing outside those boundaries, p. 716). Ingroup members are portrayed in a positive light and as having individualized identities, whereas outgroup members are seen negatively and as having homogenous identities (Hinshaw & Stier, 2008). Furthermore, due to behaviors deviating from the ingroup, outgroup members are at risk for experiencing automatic stigma and stereotypes (Hinshaw & Stier, 2008). The presence of mental health labels and disordered behaviors intensify stigma, with the disordered/deviant behavior eliciting greater stigma (than the label) when the two are compared directly (Hinshaw, 2005).

Like adults, there is evidence that children and youth form cliques with ingroups and outgroups (Adler & Adler, 1995), make judgments about their peers (Kirchler, Palmonari, & Pombeni, 1994), and develop attitudes that remain stable from childhood onwards (Weiss, 1994). A considerable amount of research shows that compared to typically developing children, children and adolescents with ADHD are frequently rejected by their peers, excluded from the
peer group after brief interactions, are less socially accepted and are more often victimized by peers (Bagwell, Molina, Pelham, & Hoza, 2001; Hinshaw, 2002; Hoza et al., 2005; Pelham & Bender, 1982; Timmermanis & Wiener, 2011; Wiener & Mak, 2009). A higher proportion of their friendships are with other children with learning and behavioral difficulties (Marton, Wiener, Rogers, & Moore, in press). Thus, there are concerns that children and adolescents with ADHD are at risk for being stigmatized.

**Stigma Directed towards Children and Adolescents with ADHD**

There is evidence that children and adolescents with ADHD are stigmatized by others. According to Hinshaw (2005), there are four main reasons that individuals with mental health disorders, such as ADHD, encounter stigma. First, since ADHD is not immediately visible (unlike a medical condition such as blindness), reasons for the presence of behavioral problems are not obvious to others in the environment of the stigmatized person. Second, as ADHD is a lifelong condition, individuals with this disorder are more likely to encounter stigma than individuals with short-term conditions. Third, ADHD is often portrayed negatively in the media. Last, as mental-behavioral disorders are viewed as controllable by others, individuals with ADHD are more likely to experience stigma.

Most stigma findings pertaining to children and adolescents with ADHD are based on survey research (e.g., 2002 National Stigma Study-Children conducted in the United States), presentation of hypothetical children in vignettes, and dyadic laboratory tasks. These studies show that adults prefer that their children/family members do not befriend a child/adolescent with ADHD (compared to a child with “normal troubles” or a physical condition; Martin, Pescosolido, Olafsdottir, & McLeod, 2007). Similarly, typical peers view children with ADHD (compared to a child with asthma or “normal troubles”) in vignettes as “violent,” “getting into
“trouble,” “dangerous,” and prefer to keep their distance (Pescolido et al., 2007; Walker, Coleman, Lee, Squire, & Friesen, 2008). In another study, peers (particularly adolescents) viewed children and adolescents with ADHD (compared to those with depression) in vignettes more negatively, had greater feelings of anger towards them, and viewed them as more responsible for their condition (O’Driscoll, Heary, Hennessy, & McKeague, 2012). During dyadic work and play tasks, hyperactive children are seen as less desirable work partners than non-hyperactive peers (Grenell, Glass, & Katz, 1987), and peers behave in a less prosocial manner towards children labeled as ADHD (Harris, Milich, Corbitt, Hoover, & Brady, 1992). Studies show that adults and peers tend to blame children with ADHD for their condition (Coleman, Walker, Lee, & Friesen, 2009; Martin et al., 2007).

A few studies directly compare stigmatization attitudes for behavioral features of the disorder versus the diagnostic label of ADHD. Law, Sinclair, and Fraser (2007) used hypothetical vignettes and asked peers if they would engage with a child. These authors found that the presence of behavioral symptoms in the child negatively impacted peers’ attitudes to engage with the child in the vignette; however, the addition of the diagnostic label (i.e., being told the child had ADHD) did not worsen peers’ desire to engage with the child, suggesting that behavioral symptoms were sufficient to elicit stigma. Cornett-Ruiz and Hendricks (1993) obtained similar findings. They asked primary school teachers and Grade 4 to 6 students to view brief videoclips of children displaying “normal behaviors” or behaviors characteristic of ADHD; children were either labeled as “normal” or ADHD. The presence of ADHD behaviors (rather than the ADHD label) negatively impacted teachers’ and peers’ first impressions towards the children and predictions for long-term success in the children. These findings are in line with
Hinshaw’s (2005) observation that deviations in behavior are more salient than diagnostic labels. As well, the results indicate that teachers stigmatize children with ADHD.

In addition to children and adolescents with ADHD, there is evidence that their family members are negatively affected. Both parents of children with ADHD (i.e., mothers; Norvilitis, Scime, & Lee, 2002) and of adolescents with ADHD (i.e., mothers and fathers; Koro-Ljungberg & Bussing, 2009) experience “courtesy stigma,” a process in which people close to the individual are stigmatized (Goffman, 1963). For instance, parents of children with ADHD are more likely to receive negative feedback about their parenting styles than parents of children without ADHD (Norvilitis et al., 2002). Moreover, 77% of parents with newly diagnosed children and adolescents with ADHD report feeling stigmatized (dosReis, Barksdale, Sherman, Maloney, & Charach, 2010).

**Stigma Self-Perceptions of Children and Adolescents with ADHD**

There is less research on stigma self-perceptions of children and adolescents with ADHD. Nevertheless, there is some evidence to suggest that they may perceive the stigma directed towards them by others. In focus group research, 9 to 14 year olds with ADHD shared that they experience stigma in relation to their diagnosis and behavioral symptoms, feel exposed by the need to take medication at school, and report that teachers, peers, parents, and parents of peers are not empathic (Singh et al., 2010). In a quantitative study, Wiener and colleagues (2012) found that 9 to 14 year olds with ADHD felt stigmatized by their most problematic behaviors (i.e., symptoms of inattention and hyperactivity) relative to children without ADHD. Moreover, they viewed their most problematic behaviors as more stigmatizing (i.e., embarrassing and bothersome to others) than their disorder. This is consistent with Law et al.’s (2007), Cornett-
Ruiz and Hendricks’ (1993), and Hinshaw’s (2005) findings that disordered or deviant behaviors trigger greater stigma than the diagnostic label.

There is also some research on adolescents with ADHD. In studies that consider the stigmatization of outpatients with mental health disorders, adolescents report feelings of being “different,” shame, and embarrassment in relation to their diagnosis, medication usage, and have a fear of being disliked by others (Elkington, Hackler, McKinnon, Borges, & Wright, 2012; Kranke, Floersch, Townsend, & Munsun, 2010; Moses, 2009). However, it is not clear to what extent these findings uniquely reflect the stigma experiences of adolescents with ADHD, given the various disorders in these studies. In qualitative studies (Cooper & Shea, 1999; Krueger and Kendall, 2001) that specifically considered adolescents with ADHD, 13-19 year olds felt stigmatized by their disorder, developed a view of being “different” or “damaged,” had an “ADHD identity”, and felt that they disappointed teachers and parents due to their disruptive behaviors. Collectively these studies offer some insight into the experiences of adolescents with ADHD; however, quantitative research that specifically considers the stigmatization self-perceptions of adolescents with ADHD would further solidify these findings. In addition, it has not been established whether adolescents with ADHD, like children, view their behaviors as more stigmatizing than their disorder.

**Developmental Differences in Stigma**

It is not clear whether there are developmental differences in stigma self-perceptions of children and adolescents with ADHD. Thus far, studies have primarily considered developmental differences in stigma perceptions directed at individuals with mental health conditions (without considering separate disorders). Some authors have found that attitudes of peers towards individuals with mental illness become stable in childhood and endure over time
(Weiss, 1994), and others have obtained evidence of a developmental increase in negative attitudes towards individuals with mental illness (Wahl, 2002). Other studies show that older children have less negative stereotypes towards children with mental health conditions than younger children (Whalen, Henker, Dotemoto, & Hinshaw, 1983).

In studies that specifically consider stigma towards individuals with ADHD, mixed findings have emerged. Martin and colleagues (2007) found that adults preferred their family/children to keep greater social distance from adolescents with ADHD than children, and O’Driscoll and colleagues (2012) found that adolescent peers, relative to child peers, are less accepting and are more prejudiced towards a person with ADHD. The latter authors felt the age differences reflected adolescents’ greater desire for social order in their peer group. In contrast, Swords, Heary, and Hennessy (2011) found that older peers provide higher ratings of acceptance towards children and adolescents with ADHD. Regarding their own self-perceptions, in a study of 12 to 18 year old youth with various mental health disorders (that included adolescents with ADHD), older adolescents experienced greater stigma, which was interpreted as being due to greater social awareness associated with development (Moses, 2009); however children were not part of this study. Factors such as taking a high number of psychotropic medications and receiving treatment at a young age may have also played a role in the age findings. A significant gap within this research is whether children and adolescents with ADHD, from their own perspectives, experience age-related differences in their self-perceptions of stigmatization.

**Gender**

There is some research to suggest that peers in the general population, depending on their gender, differ in their stigmatizing attitudes towards children and adolescents with ADHD. Male peers tend to view ADHD peers (in vignettes) as more responsible for their condition (O’Driscoll
et al., 2012), whereas females are more accepting (Swords et al., 2011). However, this is not a consistent finding, as some studies found no differences in male and female peers’ attitudes towards a child with ADHD (Law et al., 2007). In studies that do not consider ADHD separately from other mental health conditions, few gender differences emerge in stigma attitudes (Cohen, Budesheim, MacDonald, & Eymard, 1997; Zahn-Wexler & Smith, 1992). However, the gender of the stigmatized person may play a role. For example, parents prefer their children do not befriend a male child (versus a girl) with ADHD (i.e., stronger desire for social distance; Martin et al., 2007), suggesting that males with ADHD may be seen as more dangerous (Lebowitz, 2013). Further research may be needed to explore whether males and females with ADHD report experiencing stigma differently (i.e., differ in their stigmatization self-perceptions).

**Rationale and Objectives of the Current Dissertation**

The above literature review highlights the research conducted on the self-perceptions of adolescents with ADHD. Comparatively speaking, while less research has focused on the self-perceptions of adolescents relative to children with ADHD, there is a modest body of research suggesting they show limited awareness of their difficulties compared to objective raters and have unhealthy attributions for some of their associated problems. There is initial evidence that they experience stigma. However, more information is needed to better understand their awareness of their ADHD symptoms and associated problem behaviors, their causal ascriptions for their ADHD symptoms, and the extent to which they feel stigmatized by their ADHD symptoms and disorder. As adolescence is a time of transition and identity formation, where the demands to develop new relationships and autonomy increase, it is particularly important to consider how the self-perceptions of adolescents with ADHD differ from children with ADHD. Such findings will have important implications regarding how clinicians and mental health
practitioners tailor assessment and treatment programs to the unique needs of adolescents with ADHD. Thus, the overall goal of this dissertation was to better understand the self-perceptions of adolescents with ADHD in terms of their ADHD symptoms and associated problems from a developmental perspective.

In order to address some of the gaps from the previous research, two studies were conducted. The objectives of the first study were: (1) to determine whether adolescents with ADHD underestimate (i.e., hold a PIB) their ADHD symptoms and their associated symptoms of oppositionality, academic, and social problems relative to parent raters in 74 13 to 18 year old adolescents (40 ADHD, 34 Comparison); and (2) to determine whether the mechanism of ignorance of incompetence underlies the PIB for underestimation of problems. The objectives of the second study were to compare the self-perceptions of 66 14-to-18 year old middle-to-late aged adolescents (31 ADHD, 35 Comparison) to 107 9-to-12 year old children (65 ADHD, 42 Comparison), using a cross-sectional developmental design, in terms of the: (1) PIB for ADHD symptoms (as a test of the cognitive immaturity hypothesis); (2) attribution patterns; and (3) stigmatization self-perceptions for ADHD behaviors.
THE POSITIVE ILLUSORY BIAS (PIB) IN ADOLESCENTS WITH ADHD FOR THEIR ADHD SYMPTOMS AND ASSOCIATED PROBLEM BEHAVIORS

CHAPTER 2

STUDY 1

Abstract

Examining the positive illusory bias (PIB) as underestimation of problems, this study investigated the PIB in adolescents with ADHD in relation to the ignorance of incompetence hypothesis. Participants were 74 13 to 18 year old adolescents (40 ADHD, 34 Comparison). Adolescents with ADHD demonstrated a PIB in that they underestimated their symptoms of ADHD, oppositionality, academic problems, and social difficulties in comparison to parent ratings. In spite of having a PIB, adolescents with ADHD were cognizant of the patterns of their problems in many areas relative to Comparison adolescents; low achievers reported more academic difficulties than average achievers, and those with clinical levels of parent-rated social problems reported greater social difficulties. The only area in which adolescents with ADHD showed limited awareness was for oppositionality symptoms. Exploratory analyses showed that adolescents with ADHD with external locus of causality attributions had a higher PIB for oppositionality symptoms than adolescents with ADHD with internal locus of causality attributions. Clinical implications of these findings are discussed.
Introduction

It is well documented that children with ADHD experience significant academic challenges, externalizing behavioral problems, and social relationship difficulties (Bagwell et al., 2001; Frazier, Youngstrom, Glutting, & Watkins, 2007). Despite these difficulties, they tend to report higher self-perceptions of their competencies in these areas relative to external sources (e.g., parents; Hoza et al., 2004). This has been termed a “positive illusory bias” (PIB) and is defined as the disparity between self-reported competence and actual competence, such that self-reported competence is substantially higher (Hoza et al., 2002; 2004). While the PIB has been extensively researched in children with ADHD, fewer studies have considered adolescents. Given that 50-80% of children with ADHD continue to meet diagnostic criteria for ADHD as teenagers (Barkley, 2004) and continue to encounter a number of academic, behavioral, and social challenges (e.g., Bagwell et al., 2001), the goal of the current study was to investigate the presence of a PIB in adolescents with ADHD and to better understand some of the mechanisms that contribute to the PIB.

Previous PIB Findings

The finding that children with ADHD between the ages of 7 and 12 have a PIB is robust. In studies that employ discrepancy analysis, involving computation of difference scores between children’s self-ratings of competence versus a criterion rater’s (i.e., parents, teachers), children with ADHD give overly positive ratings relative to their typically developing peers (e.g., Hoza et al, 2002; 2004; Owens & Hoza, 2003). Similarly, in studies employing pre-task and post-task predictions of performance on social and academic tasks, children with ADHD give overly optimistic predictions relative to children without ADHD despite similar or worse performance (e.g., Hoza et al., 2000; Milich & Okazaki, 1991). The presence of a PIB in children with...
ADHD has been demonstrated in boys and in girls (e.g., Hoza et al., 2004; Ohan & Johnston, 2011; Owens & Hoza, 2003). Co-occurring depressive symptoms are associated with a reduction in the PIB in children with ADHD (Hoza et al., 2002; 2004) and co-occurring oppositional symptoms are associated with an enhanced PIB in the social domain in girls with ADHD (Ohan & Johnston, 2011).

A key reason for the substantial amount of research on the PIB arises from a need to establish whether having biased self-perceptions are adaptive or maladaptive for this population. Enhanced self-perceptions may serve as a buffer when children with ADHD experience failure, sparing their confidence and self-esteem (Owens et al., 2007; Taylor & Brown, 1988). On the other hand, a PIB may be maladaptive, as positive illusions may prevent children with ADHD from processing negative feedback and recognizing the need for improvement (Milich & Okazaki, 1991). The evidence is presently mixed; some findings suggest that biased self-perceptions may be protective in the social domain (i.e., Hoza et al., 2010; McQuade, Hoza, et al., 2011) and some findings suggest it is predictive of subsequent aggression (Murray-Close et al., 2010), and is associated with externalizing symptoms and poor psychosocial well-being (Ohan & Johnston, 2011). Children with a PIB in the social domain also exhibit fewer prosocial behaviors (i.e., are rated as less friendly, less responsive, and less engaged during laboratory dyadic social interaction tasks; Linnea et al., 2010). In the behavioral domain, the evidence is more consistent; positive bias in the behavioral domain is a later risk factor for aggression and poor social skills (Hoza et al., 2010; Murray-Close et al., 2010).

It is important to examine the presence of positive illusions in adolescents with ADHD for several reasons. First, adolescent self-ratings are frequently used in school-based clinical assessment (Conners, 2008). If adolescents with ADHD do not provide accurate self-ratings due
to a PIB, the validity and use of their self-reports in such assessments may be questionable.

Second, there are implications for treatment. If a PIB prevents individuals with ADHD from recognizing the need to improve their difficulties, they may not comply with or resist treatment.

To my knowledge, there are only two published studies that consider the PIB in adolescents with ADHD, above the age of 13. Hoza and colleagues (2010) assessed positively biased self-perceptions in the social and behavioral domains in 8-to-13 year old children with and without ADHD over a 6-year period (age 14-to-19 years at study completion). In both domains, children with ADHD overall exhibited a larger bias over time relative to comparison children when teachers were the criterion raters. McQuade, Hoza, and colleagues (2011) obtained evidence that 8-to-12 year old boys with ADHD exhibiting a PIB continued to overestimate their competencies in the scholastic, behavioral, and social domains relative to teacher ratings at 9-to-15 years of age (i.e., after 2-3 years). Together, both these studies provide initial support for a PIB in adolescents with ADHD using teacher ratings. The current study examines the PIB in both male and female adolescents with ADHD in similar domains of functioning (i.e., academic, social, and oppositional behavioral problems) and for ADHD symptoms using parent criterion raters. It is important to investigate the PIB in adolescents with ADHD using parent raters given several concerns involving use of teacher ratings at the secondary school level, including low inter-teacher reliability (Molina et al., 1998), presence of teacher bias (i.e., women and young teachers provide more severe ratings of adolescents’ behaviours; Schultz & Evans, 2012), and fewer opportunities for secondary school teachers to observe adolescents (relative to elementary school teachers; Evans et al., 2005).

Additionally, the present study extends research on biased self-perceptions by assessing them in terms of underestimation. Previous research on the PIB has mainly focused on
overestimation of competence (i.e., how well a child rates himself as doing in a given domain) relative to a criterion rater. From a clinical standpoint, since mental health professionals rely heavily on standardized rating scales during clinical assessment (where a higher score is indicative of a greater problem; Conners, 2008), it is also necessary to consider the PIB as underestimation of symptoms or problems relative to criterion raters. Defining the PIB in this way, Wiener and colleagues (2012) found that 9 to 14 year old children with ADHD had a PIB for their ADHD symptoms; they tended to underestimate the extent of their symptoms compared to parent ratings, and this discrepancy between parent-child reports was greater for children with ADHD than for children without ADHD. As it is not known whether the same findings would be true for adolescents with ADHD beyond age 14, the first study objective was to investigate whether male and female adolescents with ADHD have a PIB (defined as underestimation) for their symptoms of inattention, hyperactivity-impulsivity, oppositionality, and for their associated academic and social problems relative to parent ratings in comparison to adolescents without ADHD.

**Ignorance of Incompetence Mechanism for the PIB**

In addition to determining whether adolescents with ADHD hold a PIB, this study explored why they may be underestimating their problems. Owens and colleagues (2007) proposed four hypotheses to explain enhanced self-perceptions in children with ADHD, one of which is explored in the current study. The ignorance of incompetence hypothesis postulates that individuals who have poorly developed skills in a given domain are unable to recognize their incompetence in that domain (i.e., are not aware of what they do not know), and as a result overestimate their performance (Kruger & Dunning, 1999). Evidence supporting the ignorance of incompetence hypothesis in children with ADHD is that the PIB is most evident in their
domains of greatest deficit (Hoza et al., 2002; 2004). There is also some evidence to counter this hypothesis in children with ADHD. In some studies, children with ADHD have been found to have lower absolute self-perceptions of scholastic competence and behavioral conduct (Dumas & Pelletier, 1999; Owens & Hoza, 2003) than children without ADHD (in absence of a criterion rater), suggesting that at least to some extent, they recognize their relatively low level of competence in these areas, even if they do inflate them in comparison to parent and teacher ratings. Furthermore, Evangelista and colleagues (2008) found that children with ADHD who overestimated their own competence relative to teacher ratings were able to accurately rate the scholastic and social competence of other children, suggesting some ability to evaluate competence in these domains. At present, it is not known if ignorance of incompetence could be responsible for the PIB in adolescents with ADHD. Thus, the second objective of this study was to investigate whether adolescents with ADHD would not only underestimate their problems compared to parent and teacher ratings, but also would not be cognizant of the patterns of their difficulties.

**Objectives and Hypotheses**

The present study was guided by two objectives. The first objective was to determine whether 13-to-18 year old adolescents with ADHD have a PIB, defined as underestimation of problems, for their symptoms of inattention, hyperactivity-impulsivity, oppositionality, academic problems, and social problems relative to parent ratings compared to adolescents without ADHD. Consistent with previous PIB research in children and initial adolescent studies, it was hypothesized that adolescents with ADHD would underestimate their problems in these areas relative to parent ratings compared to adolescents without ADHD. The second objective was to examine the ignorance of incompetence hypothesis in adolescents with ADHD. In line with
ignorance of incompetence, it was hypothesized that adolescents with ADHD would not acknowledge that they have more difficulties in their areas of deficit (i.e., academic achievement on standardized tests, oppositional behaviors and social problems as rated by parents) than adolescents with ADHD without these deficits.

Method

Participants

A total of 94 adolescents (51 male, 43 female) between the ages of 13 and 18 years participated in this study. Data gathered from adolescents who scored below a standard score of 80 on a standardized measure of intellectual functioning or who were suspected of having Pervasive Developmental Disorders, Intellectual Disabilities, Psychotic Disorders, Bipolar Disorder, Tourette’s Disorder were excluded from the analyses. Participants were recruited through advertisements and flyers placed in community-based newspapers, magazines, websites, and local schools. In addition, a number of participants previously took part in studies and agreed to be contacted for future research studies. Brochures were distributed to mental health agencies and to various physicians’ and mental health professionals’ offices to specifically recruit adolescents with ADHD.

For inclusion in the ADHD sample, participants were required to have a previous diagnosis of ADHD from a physician or mental health professional. In order to ensure that symptoms were still present in at least two settings, parents and teachers were asked to complete the Conners 3 Parent Long Form (Conners 3-P) and Conners 3 Teacher Long Form (Conners 3-T) of the Conners 3 scales (Conners, 2008). According to Pelham, Fabiano, and Massetti (2005), empirically and rationally derived ADHD rating scales, such as the Conners scales (completed by parents and teachers), are reliable measures that demonstrate concurrent validity with
diagnostic structured interview schedules. Using the Conners 3, ADHD symptomatology was confirmed if the participant was rated within the clinically significant range (T ≥ 70) by one informant and within the borderline (T ≥ 61) or clinical range by the second informant on the ADHD core subscales (DSM-IV Inattentive, DSM-IV Hyperactive-Impulsive) of the Conners 3-P and Conners 3-T. For inclusion in the Comparison sample, participating adolescents were required to have no previous or current diagnosis of ADHD or other behavioral disorder. Parents and teachers were asked to complete the Conners 3-P and Conners 3-T to ensure that adolescents in the Comparison group did not display a significant number of ADHD symptoms. Adolescents in the Comparison group who received a T-score of 60 or below (i.e., non-clinical range) on both the DSM-IV ADHD subscales of the Conners 3-P and the Conners 3-T were included in the sample.

By employing the above mentioned criteria, three participants with a previous ADHD diagnosis were dropped due to low IQ scores, one because a diagnosis of Pervasive Developmental Disability was suspected, and one did not have T-scores above 70 on the relevant subscales of the Conners 3-P or Conners 3-T. Two participants were dropped because they were not diagnosed with ADHD by a physician or mental health professional. In the Comparison group, 13 adolescents were dropped because they received T-scores above 60 on at least one of the relevant DSM-IV subscales of the Conners 3-P or Conners 3-T. Through this process of exclusion, data for 74 adolescents remained for analysis. The final ADHD sample consisted of 40 adolescents (23 male, 17 female) and the Comparison sample consisted of 34 adolescents (16 male, 18 female). At the time of data collection, 26 of the 40 participants (65%) with ADHD were taking psychostimulant medication (i.e., Ritalin, Concerta, Adderall, Dexedrine, or Vyvanse). As typically found in samples with ADHD, 70% had at least one (parent-reported)
comorbid diagnosis (22 Learning Disabilities, 8 Anxiety Disorder, 3 Oppositional Defiant Disorder, and 2 Mood Disorder).

Chi-square and \(t\)-tests were computed to determine whether there were any demographic differences between adolescents with and without ADHD. These analyses revealed no significant differences in gender \(\chi^2 (1, N = 74) = .80, p = .370\) or languages spoken in the home (English or other) \(\chi^2 (1, N = 67) = 1.15, p = .283\) between the two groups. Parents of adolescents with ADHD were also more likely to have a diagnosis of ADHD or suspect that they had ADHD (72.50%) than parents of adolescents without ADHD (11.76%), \(\chi^2 (1, N = 74) = 27.44, p < .001\).

As Table 2.1 shows, adolescents with and without ADHD did not differ with respect to age or level of parent education (i.e., SES). Adolescents with ADHD obtained lower scores than Comparison adolescents on the reading, writing, and mathematics subtests of the Woodcock-Johnson Tests of Achievement - Third Edition (WJ-III ACH), as well as a lower Full Scale IQ score on the Wechsler Abbreviated Scale of Intelligence (WASI). Adolescents with ADHD attained higher scores on all of the DSM-IV ADHD subscales of the parent and teacher forms of the Conners 3.

**Measures**

**Conners-3** (*Conners 3-P, Conners 3-T, Conners 3-SR*; Conners, 2008). These norm-referenced measures are commonly used to screen for ADHD in children and adolescents. Parents, teachers, and adolescents make ratings on a 4-point scale from 0 (*Not at all/Seldom, Never*) to 3 (*Very Much True/Very Often, Very Frequent*) to evaluate symptoms of inattention and hyperactivity (as well as oppositionality, peer relationship difficulties, and learning problems). The two DSM-IV ADHD subscales (i.e., DSM-IV Inattentive, DSM-IV Hyperactive-Impulsive) demonstrate high internal consistency (Parent: .93, .92; Teacher: .94, .95; Self-
Report: .89, .85) and moderate to high test-retest reliability (Parent: .78, .75; Teacher: .80, .81; Self-Report: .70, .71). The parent (Conners 3-P) and teacher (Conners 3-T) long forms, containing 108 and 113 items respectively were used to verify ADHD classification of adolescents. Adolescent ratings on the DSM-IV Inattentive, DSM-IV Hyperactive-Impulsive, Oppositional Defiant Disorder, and Learning Problems scales of the 97-item self-report form (Conners 3-SR) were compared to ratings on the parent form (Conners 3-P) for investigating the presence of a PIB. In the case of adolescents who regularly took medication for their ADHD, raters were asked to think of the adolescents’ behaviors when they were off their medication while completing the forms.

**Child Behavior Checklist (CBCL) and Youth Self-Report (YSR) Forms** (Achenbach & Rescorla, 2001). The CBCL and YSR are well-established measures that assess the frequency and intensity of behavioral and emotional problems exhibited by children and adolescents. On the 113-item CBCL and 112-item YSR, parents and adolescents respectively rate how true an item is at the present time or within the past 6 months using the following scale: 0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true. Both parent and adolescent forms demonstrate adequate to high internal consistency for the subscales (i.e., CBCL: .72 - .94; YSR: .67 - .95) and adequate to high test-retest reliability (i.e., CBCL: 82 - .94; YSR: .67 - .89). The CBCL and YSR were used to investigate the presence of a PIB in the social domain by comparing parent and adolescent ratings on the Social Problems subscale.

**Wechsler Abbreviated Scale of Intelligence** (WASI; Wechsler, 1999). The WASI, a standardized abbreviated test of intelligence with strong internal consistency (.93) and test-retest reliability (ranging from .88 to .93), was administered to obtain an estimate of adolescents’ cognitive functioning.
Woodcock-Johnson Test of Achievement-Third Edition (WJ-III ACH; Woodcock, McGrew, & Mather, 2001). The WJ-III ACH is a comprehensive standardized measure of academic achievement, with high internal consistency (.88) and test-retest reliability (.89). The core Reading, Writing, and Mathematics subtests were administered to assess adolescents’ academic functioning.

Procedure

This investigation was approved by the University Research Ethics Board. Individual testing sessions with adolescents were conducted by graduate students trained in school and clinical child psychology. Prior to testing sessions, parents of adolescents provided demographic and medical information about their adolescent and completed the Conners 3-P. Each testing session began by obtaining parent and adolescent consent. Sessions occurred in a private room and lasted approximately 5 hours (as additional measures were administered for other studies). Adolescents were medication-free on the day of study participation. The Conners 3-T was sent to teachers, who completed them and returned them to the ADHD Laboratory in a self-addressed envelope. Parents and adolescents received a written educational and social-emotional report outlining the adolescent’s functioning and adolescents received a choice between earning a community service certificate or financial remuneration.

Data Analysis Strategy

As SES did not significantly differ among adolescents with and without ADHD and was not significantly correlated with the PIB discrepancy scores, it was not included as a covariate in the analyses. Although group differences were detected on standardized IQ and achievement scores, these variables were not co-varied because they reflect attributes that are commonly associated with ADHD (e.g., Dennis et al., 2009) and controlling for pre-existing group
differences in a nonrandom research design violates the assumption that covariates are statistically independent from the grouping variable (Miller & Chapman, 2001). Assumptions underlying each statistical test were evaluated, including normality of distributions, independence of observations, homogeneity of co-variance (for MANOVA) or variance (for t-test) as appropriate. Two outliers were found (on the Parent-Adolescent Social Problems discrepancy score). Since the same results were obtained with and without these cases, they were retained in the sample to maximize power.

The first set of analyses examined whether adolescents with and without ADHD differed in their self-perceptions of their problem behaviors relative to parent ratings. (i.e., group differences in the PIB). Parent-Adolescent discrepancy scores were computed by subtracting adolescent self-report T scores from parent T scores on the Conners 3 DSM-IV Inattentive, DSM-IV Hyperactive-Impulsive, Oppositional Defiant Disorder, Learning Problems, and Achenbach Social Problems subscales. A higher subscale discrepancy score is indicative of a greater PIB. Due to significant moderate to high correlations among discrepancy scores on the above noted subscales (ranging from $r = .45$ to $.81$), a 2 x 2 MANOVA, with ADHD Group Status and Gender as the independent variables, was computed to examine adolescent discrepancy scores relative to parent criterion raters. Univariate ANOVAs were conducted as follow-up tests to the MANOVA at the .01 level using the Bonferroni procedure where multivariate effects were significant.

To investigate the ignorance of incompetence hypothesis, a one-way MANOVA was conducted to compare absolute self-report ratings (i.e., without parent criterion raters) of adolescents with and without ADHD. Univariate ANOVAs were conducted as follow-up tests to the MANOVA at the .01 level using the Bonferroni procedure. To investigate the ignorance of
incompetence hypothesis for specific areas of deficit in adolescents within the ADHD sample, three \( t \)-tests of independence were employed to compare self-reports of adolescents with clinical levels of achievement, social, and oppositionality problems to adolescents with average levels of these problems.

**Results**

**Objective 1: Group Differences in PIB**

The MANOVA yielded a significant multivariate effect for Group Status, Wilks’s \( \lambda = .73, F(5, 61) = 4.56, p = .001, \eta^2 = .272 \), but not for Gender, \( \lambda = .95, F(5, 61) = .65, p = .666, \eta^2 = .050 \) or for the Group Status x Gender interaction, Wilks’s \( \lambda = .88, F(5, 61) = 1.70, p = .148, \eta^2 = .122 \). As Table 2.2 indicates, adolescents with ADHD significantly underestimated their problem behaviors (reflected in their higher discrepancy scores) on the DSM-IV Inattentive, DSM-IV Hyperactive-Impulsive, Oppositional Defiant Disorder, and Learning Problems subscales relative to parents more than Comparison adolescents, \( p < .01 \). The univariate Group Status effect for the Social Problems subscale approached significance, \( p = .032 \) (based on the Bonferroni procedure), with adolescents with ADHD obtaining higher discrepancy scores than Comparison adolescents. These results provide evidence for a PIB in terms of symptoms of inattention, hyperactivity-impulsivity, oppositionality, academic problems, and to a lesser extent social problems in adolescents with ADHD relative to parent criterion raters.

**Objective 2: Ignorance of Incompetence**

Due to the non-significant gender effect in the analysis above, gender was not included as a variable in the analyses that follow. The Group Status multivariate effect comparing absolute self-report ratings of adolescents with and without ADHD was significant, Wilks’s \( \lambda = .64, F(5, 68) = 7.59, p < .001, \eta^2 = .358 \). In spite of demonstrating a PIB relative to parent criterion raters,
adolescents with ADHD perceived themselves as having significantly more problems on the Conners 3-SR DSM-IV Inattentive, DSM-IV Hyperactive-Impulsive, Oppositional Defiant Disorder, Learning Problems, and the YSR Social Problems subscales than adolescents without ADHD, $p < .001$ (Table 2.3). The T scores of adolescents with ADHD on the DSM-IV Inattentive and DSM-IV Hyperactive-Impulsive were in the Borderline Clinical range (i.e., between 61 to 68), suggesting some recognition of their core ADHD symptoms. Regarding their associated problem behaviors, adolescents in the ADHD group also obtained significantly higher T scores on the Learning Problems (i.e., falling in the Borderline Clinical range; T score of 64.15) and Oppositional Defiant Disorder and Social Problems subscales (i.e., though falling within the Average range; T scores of 57.95 and 59.60 respectively) relative to Comparison adolescents, $p < .001$. However, as the analyses involving the Learning Problems, Oppositional Defiant Disorder, and Social Problems subscales did not distinguish adolescents with ADHD who actually experience these problems from adolescents with ADHD who do not experience these problems, more fine-grained analyses were conducted.

**Achievement problems.** Among adolescents in the ADHD group, 25 were classified as low achievers (ADHD + LA) and 15 were average achievers (ADHD – LA). Average achievement was defined as a Standard Score $\geq 85$ on all of the six core subtests of the WJ-III ACH, and low achievement was defined as a Standard Score $< 85$ on at least one of these subtests. The adolescents with ADHD + LA ($M = 69.24$, $SD = 11.13$) obtained significantly higher T scores on the Conners 3-SR Learning Problems subscale than adolescents with ADHD – LA ($M = 55.67$, $SD = 11.21$), $t(38) = -3.73$, $p = .001$, $d = 1.22$, suggesting that low achieving

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4 The $t$-test assumption of normality was violated in the ADHD + LA group. However, Green and Salkind (2005) state that $t$-test of independence is robust to this violation and significant results may be trusted with at least $n = 15$ in the group.
adolescents with ADHD perceive themselves as having more academic problems than average achievers with ADHD.

**Social problems.** Within the ADHD group, 11 adolescents were rated by their parents as falling in the Clinical range (T ≥ 70) on the Social Problems subscale of the CBCL (ADHD + SP) and 27 adolescents were rated in the Average range (T ≤ 60) (ADHD – SP). Adolescents with ADHD + SP (M = 64.55, SD = 5.79) had higher self-report T scores on the YSR Social Problems subscale than adolescents with ADHD – SP (M = 57.52, SD = 7.93), t(36) = -2.66, p = .012, d = 1.03, indicating that adolescents with ADHD with clinically significant social problems (as rated by their parents) perceived themselves as having more social problems than those with average levels of these problems.

**Oppositional problems.** In the ADHD group, 25 adolescents were rated by their parents to be in the Clinical range (T ≥ 70) on the Oppositional Defiant Disorder subscale of the Conners 3-P (ADHD + OPP), and 15 were rated to be in the Average range (T ≤ 60) (ADHD – OPP). Independent samples t-tests indicated that adolescents with ADHD + OPP (M = 58.84, SD = 12.95) and adolescents with ADHD – OPP (M = 56.47, SD = 12.82) did not differ in their self-reports of these problems on the Conners 3-SR Oppositional Defiant Disorder subscale, t(38) = -.56, p = .577, d = .184, indicating limited awareness of their problems with oppositionality. Only 15% (6/40) of adolescents with ADHD reported clinical levels of oppositional symptoms compared to 62.5% (25/40) of their parents.

**Exploratory Analyses**

Exploratory analyses were conducted, involving data from additional measures, to better understand why adolescents with ADHD showed limited awareness of their oppositional symptoms. These analyses addressed the relationship between Locus of Causality (i.e., holding
external or internal locus of causality attributions for problem behaviors) and the PIB for oppositionality symptoms.

**Measures.** The Alex, developed by the author of the present study, is a 79-item structured interview consisting of pictures of an adolescent, Alex (appearing to be approximately 15 years of age), displaying DSM-IV symptoms of ADHD and of conditions/difficulties that commonly co-occur with ADHD. It consists of the following pictures: 18 ADHD, 5 ODD, 5 CD, 10 learning difficulty, 3 internalizing symptoms, 13 social difficulties, 6 risk-taking situations, and 10 positive character traits. Adolescents were serially presented with pictures from either male or female Alex. For each picture, they were asked if they were like Alex (e.g., “Like Alex, do you lose things?). Of the “YES” ADHD pictures endorsed, they were asked to identify the picture that was “the most like them” or the “biggest problem for them.” In the event adolescents did not endorse any of the ADHD pictures, they were asked to identify their biggest problem from the remaining “YES” pictures that they endorsed. The Alex demonstrates high internal consistency reliability (Cronbach’s α = .94). After adolescents identified their most problematic behavior on the Alex, they were asked whether they viewed their most problematic behavior as internally or externally caused (“Is it something around you like people OR something inside of you that makes you have problematic behavior?”). This question was taken from the Attributions for ADHD Questionnaire (Kaidar et al., 2003).

**Results.** Within the ADHD group, five independent samples t-tests were conducted with External/Internal Locus of Causality and each of the PIB Discrepancy scores. The t-test was significant for the PIB Discrepancy for Oppositional Defiant Disorder symptoms, t(38) = 2.11, p = .041, d = 0.71, showing that adolescents with ADHD who viewed their most problematic

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5 The Alex and AAQ measures will be described in more detail in Study 2.
behaviors as externally caused had a larger PIB score for oppositionality symptoms \((M = 21.07,\ SD = 14.76)\) than did adolescents with ADHD who viewed their problem behaviors as internally caused \((M = 9.46,\ SD = 17.43)\). The \(t\)-tests examining the effect of Locus of Causality on the remaining PIB Discrepancy scores were not significant (refer to Appendix A for non-significant results), indicating that the Locus of Causality results are unique to oppositionality symptoms. Furthermore, Fisher’s Exact test showed that adolescents with ADHD with clinical levels of parented-reported oppositional symptoms \((T \geq 70,\ based\ on\ the\ Conners\ 3-P)\) were more likely to hold external locus of causality attributions (85.7%) than adolescents with ADHD with Average levels \((T \leq 60)\) of oppositional symptoms (14.3%), \(p = .040^6\).

**Discussion**

Defining the PIB as underestimation of problems, and compared to parent criterion raters, the present study demonstrated that 13 to 18 year old male and female adolescents with ADHD, relative to Comparison adolescents, have a PIB for their symptoms of inattention, hyperactivity-impulsivity, oppositionality, and for their associated academic and social problems. Despite having a PIB, adolescents with ADHD perceived themselves as having more difficulties with symptoms of inattention, and hyperactivity-impulsivity than Comparison adolescents and were aware of their patterns of specific deficits in terms of social problems and achievement. The only area in which they were relatively unaware of their difficulties was in relation to symptoms of oppositionality. In addition, adolescents with ADHD who tended to view their problem behaviors as externally caused had a larger PIB for oppositionality symptoms than adolescents with ADHD who viewed their problems as internally caused.

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\(^6\) Fisher’s Exact test was the preferred test (over chi-square), as one of the cells in the 2 by 2 contingency analysis had expected count less than 5.
Previous studies have consistently shown that 7 to 12 year old children with ADHD inflate their estimates of competence in the academic, social, and behavioral domains relative to parent and teacher ratings and on performance-based tasks (e.g., Diener & Milich, 1997; Hoza et al., 2002; 2004), and 9 to 14 year olds underestimate their ADHD symptoms relative to parents (Wiener et al., 2012). Support has also been obtained for the presence of the PIB in adolescents with ADHD in terms of inflated self-perceptions of competence relative to teacher ratings (Hoza et al., 2010; McQuade, Hoza, et al., 2011). The present findings add to the previous research by showing that both male and female adolescents with ADHD engage in positive illusory thinking when compared to parent ratings on standardized scales; they underestimate their academic problems, social problems, and symptoms of oppositionality along with their core ADHD symptoms. This was shown across a large age span of adolescents with ADHD (13 to 18 years), covering the periods of early to late adolescence.

The current study offered limited support for ignorance of incompetence as a possible mechanism for the PIB. Contrary to this hypothesis, in the absence of a criterion rater, adolescents with ADHD perceived themselves as having greater difficulties in several areas relative to Comparison adolescents, including symptoms of inattention, hyperactivity-impulsivity, and academic problems. Their T scores on subscales assessing these concerns fell in the Borderline range, suggesting that to some extent they recognize their patterns of difficulties even if the discrepancy between their ratings and parent ratings is higher than for comparison adolescents. In these areas, the PIB may then reflect a difficulty with understanding the extent of these difficulties rather than complete unawareness of their presence. Also, counter to ignorance of incompetence theory, adolescents with ADHD were cognizant of their patterns of specific deficits in terms of social problems and achievement. This pattern of findings differs
considerably from previous studies by Hoza and colleagues (2002; 2004), in which children with ADHD were unaware of their deficits in the social and academic domains, which may be due to the different measures that were used (i.e., Conners standardized ratings scales in present study versus SPPC measure by Hoza and colleagues) or that ignorance of incompetence may operate differently for underestimation of problems versus overestimation of competence.

There was one exception to this pattern in the present study. Adolescents with ADHD showed limited awareness for their symptoms of oppositionality. Relatively few adolescents with ADHD reported clinical levels of oppositional symptoms compared to their parents. Additionally, the self-report scores of adolescents with ADHD with clinical levels of oppositional symptoms did not differ from adolescents with ADHD without clinical levels of oppositional symptoms. The oppositionality findings, therefore, may lend some support to the ignorance of incompetence hypothesis.

Additional exploratory analyses were conducted to better understand the limited awareness of oppositionality symptoms in adolescents with ADHD. Adolescents with ADHD who viewed their problematic behaviors as externally caused (due to something outside of them) were more likely to underestimate their oppositionality symptoms than adolescents with ADHD who viewed their problems as internally caused (due to something inside of them). It is therefore likely that they may believe that environmental factors, such as people around them cause their argumentative behaviors, loss of temper, defiance, and non-compliance, which may result in under-reporting of symptoms relative to parents. To my knowledge, this is the first study to link external locus of causality with the PIB in an ADHD sample; the association appears to be uniquely the case for oppositionality (i.e., locus of causality was not related to the PIB in the other domains). This finding is consistent with the description of ODD in the DSM-IV-TR
(APA, 2000, p. 102), which includes external locus of causality in the form of blaming others for mistakes and misbehaviors. Thus, it is possible that external locus of causality for one’s own problematic behaviors among adolescents with ADHD and clinical levels of parent-rated oppositional symptoms is associated with limited self-awareness, ignorance of incompetence for oppositional symptoms, and the PIB.

The current locus of causality results are also consistent with research on the “hostile attribution bias” (Milich & Dodge, 1984), where hyperactive-aggressive individuals tend to assign blame to others for undesirable events, perceiving others’ actions as intentional and hostile, rather than seeing themselves as blameworthy. Although it is not known if adolescents with ADHD in this study had clinical symptoms of aggression, the adolescents with ADHD with clinical levels of parent-report oppositionality were more likely to have this external locus of causality, which could be part of viewing others as more blameworthy. In non-ADHD populations (e.g., rejected children, unpopular children), overestimation of competence has also been linked with aggression/oppositionality (deCastro, Brendgen, Van Boxtel, Vitaro, & Schaepers, 2007; Hymel, Bowker, & Woody, 1993; Patterson, Kupersmidt, & Griesler, 1990). Additionally, Scholtens et al. (2012) found a link between disruptive behaviors and the PIB, showing that the combination of ADHD (inattention and hyperactive-impulsive) and oppositional symptoms are more predictive of the PIB in the social domain compared to cognitive/executive functions. As well, Ohan and Johnston (2011) found that the presence of co-occurring ODD in girls with ADHD (compared to girls without co-occurring ODD) was associated with greater overestimation of social competence. Collectively, there does appear to be something unique about oppositionality/aggressive behaviors and limited awareness, which warrants further study.
While locus of causality and/or ignorance of incompetence could be responsible for the PIB for oppositionality in adolescents with ADHD in the present study, other explanations for this limited awareness may need to be considered. Due to the effects of social desirability (i.e., denying socially undesirable traits to present oneself in a favorable light; Nederhof, 1985), it is possible that adolescents with ADHD may have under-reported their oppositionality symptoms. Another explanation is that adolescents with ADHD may be less aware of their oppositional symptoms than other problem behaviors, as non-delinquent aggressive acts tend to become more normative in adolescence (Moffitt, 1993) and may be indicators of popular status within peer groups (Parkhurst & Hopmeyer, 1998). Additionally, adolescents with ADHD tend to spend time with other adolescents who engage in deviant peer acts (Bagwell et al., 2001), which may also make these acts seem more normative. Despite the limited awareness for oppositional symptoms, it is important to note that adolescents with ADHD do show some recognition of their core ADHD symptoms and their patterns of academic and social difficulties.

**Limitations**

The present study has some limitations. First, while the results showed that adolescents with ADHD as a group have a PIB for their difficulties, there was variability in the data. The standard deviations for the PIB discrepancy scores were high, particularly for the participants with ADHD (see Table 2.2), which would suggest that not all adolescents with ADHD had a PIB. Similarly, the standard deviations in discrepancy scores for oppositionality were still high when adolescents with ADHD with internal and external locus of causality attributions were compared. It was beyond the scope of this study to address the variability in the data; it will be important in future research to consider co-occurring variables (e.g., clinical depression, presence of aggression) that may reduce or increase the PIB. Second, although a statistically
significant effect for the PIB was present for social problems, the discrepancy scores in this domain were considerably smaller than in the other domains (based on approximately 2 points in the positive direction for adolescents with ADHD and 2 points in the negative direction for Comparison adolescents). Thus, there is some question as to whether these results are clinically significant. Third, since the adolescents in the sample could not be categorized into ADHD subtypes, it was not possible to determine if subtype plays a role in the expression of the PIB when defined as underestimation of problems, as Owens and Hoza (2003) found when inflated self-perceptions of scholastic competence were assessed in children with ADHD. Finally, examining the PIB, defined as underestimation of problem behaviors, using a developmental design would clarify if the PIB, though still present, is reduced in adolescents with ADHD and whether it changes by domain, as Hoza and colleagues (2010) found, when examined as inflation of competence.

Although the current findings support previous research that has found positive illusory thinking in adolescents with ADHD relative to parent raters, indicate that ignorance of incompetence is not associated with the PIB in most domains, and that clinical levels of oppositionality and external locus of causality are plausible mechanisms for the PIB, it is also possible that neuropsychological deficits and self-protection play a role and therefore should be examined in future research. While this study generated some insight into why adolescents with ADHD may be underestimating their oppositional symptoms, further research is needed to better understand the factors that contribute to this limited awareness (e.g., whether there is a link between ignorance of incompetence, external locus of causality, and hostile attributions bias for oppositional symptoms).
Clinical Implications

The study findings have implications for mental health professionals who engage in assessment and treatment planning with adolescents with ADHD. With regard to assessment, because adolescents with ADHD have a PIB for their symptoms of ADHD, oppositionality, academic problems, and social problems, self-report questionnaires that ask them to rate their difficulties should be interpreted cautiously. Multi-source assessment (as suggested by Mash & Hunsley, 2007), which necessitates the use of multiple raters, clinical observations, clinical interviews, and performance-based measures, is therefore crucial for these adolescents. In addition, clinicians may need to assess external locus of causality in adolescents with ADHD while planning for intervention with those exhibiting oppositional symptoms, as this could potentially increase resistance to treatment.

The present findings suggest that intervention with adolescents with ADHD may be difficult, especially for treatment of oppositional symptoms as they may not perceive the need for treatment or be willing to engage in the treatment process. It has been shown that children with ADHD with a PIB are less responsive to treatment than those without a PIB (Mikami, Calhoun, & Abikoff, 2010); the same may be true of adolescents with ADHD. Therefore, adolescents may need assistance with recognizing the importance of changing their behaviors. As part of the treatment process for oppositional behaviors, it may be important to consider whether external locus of causality (i.e., blaming others) reflects a defense reaction rather than limited awareness. Treatment may, in part, need to be focused on reducing this potential defensive stance (as suggested by Mikami et al., 2010). If treatment is provided to adolescents with ADHD, it will need to be done in a sensitive manner, as they may not be aware of the extent of their difficulties.
Table 2.1

*Descriptive Information about Sample by Group Status*

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADHD Group</th>
<th>Comparison Group</th>
<th></th>
<th>df</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M</td>
<td>SD</td>
<td>N</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Age</td>
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<td>15.48</td>
<td>1.77</td>
<td>34</td>
<td>15.49</td>
<td>1.44</td>
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<tr>
<td>Parent SES(^a)</td>
<td>36</td>
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<td>1.47</td>
<td>31</td>
<td>8.81</td>
<td>1.49</td>
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<tr>
<td>WASI Full Scale IQ</td>
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<td>100.08</td>
<td>7.19</td>
<td>34</td>
<td>109.59</td>
<td>9.18</td>
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<td>WJ-III ACH Scores</td>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td>Letter-Word Identification</td>
<td>40</td>
<td>98.08</td>
<td>9.65</td>
<td>34</td>
<td>108.32</td>
<td>10.35</td>
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<tr>
<td>Passage Comprehension</td>
<td>40</td>
<td>90.73</td>
<td>9.45</td>
<td>34</td>
<td>104.88</td>
<td>11.57</td>
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<td>Spelling</td>
<td>40</td>
<td>95.28</td>
<td>12.02</td>
<td>34</td>
<td>110.50</td>
<td>11.94</td>
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<tr>
<td>Writing Samples(^a)</td>
<td>39</td>
<td>97.82</td>
<td>10.59</td>
<td>34</td>
<td>111.91</td>
<td>11.44</td>
</tr>
<tr>
<td>Calculation(^b)</td>
<td>40</td>
<td>83.55</td>
<td>18.67</td>
<td>34</td>
<td>109.18</td>
<td>12.87</td>
</tr>
<tr>
<td>Applied Problems</td>
<td>40</td>
<td>94.13</td>
<td>9.63</td>
<td>34</td>
<td>107.35</td>
<td>9.57</td>
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<td>Conners 3-P DSM Scales</td>
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</tr>
<tr>
<td>Inattentive</td>
<td>40</td>
<td>82.23</td>
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<td>34</td>
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<td>6.41</td>
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<td>Hyperactive-Impulsive(^b)</td>
<td>40</td>
<td>78.72</td>
<td>12.22</td>
<td>34</td>
<td>49.91</td>
<td>6.54</td>
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<td>Conners 3-T DSM Scales</td>
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<tr>
<td>Inattentive(^ab)</td>
<td>35</td>
<td>71.29</td>
<td>13.22</td>
<td>30</td>
<td>46.20</td>
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<tr>
<td>Hyperactive-Impulsive(^ab)</td>
<td>35</td>
<td>69.57</td>
<td>16.96</td>
<td>30</td>
<td>47.80</td>
<td>4.87</td>
</tr>
</tbody>
</table>

\(^a\)Due to unreturned/missing data, sample sizes differed in the analyses of the following demographic variables: Parent SES/highest education of mother or father (7 protocols), WJ-III ACH Writing Samples (1 protocol), and Conners 3-T subscales (9 protocols).

\(^b\)Since Levene’s test for Equality of Variances was significant, the equal variances not assumed t was reported.
Table 2.2

*Multivariate Analysis of Discrepancy between T Scores by Group Status*\(^a\)

<table>
<thead>
<tr>
<th>Discrepancy Scores</th>
<th>ADHD (N = 38)</th>
<th></th>
<th>Comparison (N = 31)</th>
<th></th>
<th>F</th>
<th>p</th>
<th>(\eta^2)</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM Inattentive</td>
<td>14.74</td>
<td>18.31</td>
<td>-1.41</td>
<td>10.12</td>
<td>18.72</td>
<td>.000</td>
<td>.224</td>
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<tr>
<td>DSM Hyperactive-Impulsive</td>
<td>14.18</td>
<td>20.40</td>
<td>-1.22</td>
<td>9.23</td>
<td>15.40</td>
<td>.000</td>
<td>.192</td>
</tr>
<tr>
<td>Oppositional Defiant Disorder</td>
<td>12.97</td>
<td>17.57</td>
<td>2.16</td>
<td>8.53</td>
<td>10.72</td>
<td>.002</td>
<td>.142</td>
</tr>
<tr>
<td>Learning Problems(^b)</td>
<td>13.31</td>
<td>14.12</td>
<td>0.74</td>
<td>8.53</td>
<td>18.17</td>
<td>.000</td>
<td>.218</td>
</tr>
<tr>
<td>Social Problems</td>
<td>2.08</td>
<td>10.17</td>
<td>-2.16</td>
<td>6.37</td>
<td>4.78</td>
<td>.032</td>
<td>.069</td>
</tr>
</tbody>
</table>

\(^a\)Although the assumption of homogeneity of covariance was violated in the above MANOVA, significant results may be trusted with a large sample (Tabachnick & Fidell, 2007).

\(^b\)The number of questions differed on the Learning Problems subscale of the Conners 3-SR (8 questions) and Conners 3-P (9 questions). Five questions were identical; differing questions pertained to homework, memory, and learning style. Therefore, the above MANOVA was conducted twice using subscale discrepancy T scores and discrepancy scores of sums of the 5 identical items. Since the same results were obtained, T score discrepancies are reported.
Table 2.3

*Multivariate Analysis of Adolescent Self-Report Subscale Scores by Group Status*<sup>a</sup>

<table>
<thead>
<tr>
<th>Subscale</th>
<th>ADHD (N = 40)</th>
<th></th>
<th>Comparison (N = 34)</th>
<th></th>
<th>F</th>
<th>p</th>
<th>η²</th>
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</thead>
<tbody>
<tr>
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<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM Inattentive</td>
<td>67.12</td>
<td>13.95</td>
<td>50.91</td>
<td>9.37</td>
<td>33.19</td>
<td>.000</td>
<td>.316</td>
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<tr>
<td>DSM Hyperactive-Impulsive</td>
<td>64.38</td>
<td>16.41</td>
<td>51.00</td>
<td>8.79</td>
<td>18.14</td>
<td>.000</td>
<td>.201</td>
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<tr>
<td>Oppositional Defiant Disorder</td>
<td>57.95</td>
<td>12.79</td>
<td>49.09</td>
<td>7.23</td>
<td>12.82</td>
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<td>.151</td>
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<tr>
<td>Learning Problems</td>
<td>64.15</td>
<td>12.87</td>
<td>50.62</td>
<td>8.92</td>
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<td>.270</td>
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<tr>
<td>Social Problems</td>
<td>59.60</td>
<td>7.81</td>
<td>53.50</td>
<td>5.12</td>
<td>15.17</td>
<td>.000</td>
<td>.174</td>
</tr>
</tbody>
</table>

<sup>a</sup>Although the MANOVA assumptions of multivariate normality and homogeneity of covariance were violated, significant results may be trusted with a large sample (Green & Salkind, 2005; Tabachnick & Fidell, 2007)
CHAPTER 3

STUDY 2

Abstract

This cross-sectional study investigated developmental differences in the PIB, attribution patterns, and stigmatization self-perceptions of children and adolescents with and without ADHD for their problematic behaviors. The sample comprised 96 participants with ADHD (65 9–12 year olds; 31 14 – 18 year olds) and 77 Typically Developing (TD) Comparison participants (42 9 – 12 year olds; 35 14 – 18 year olds). Participants with ADHD demonstrated a PIB for their ADHD symptoms relative to Comparison participants; however, the magnitude of the PIB for ADHD symptoms, particularly hyperactivity-impulsivity, was reduced in adolescents with ADHD, providing support for the cognitive immaturity hypothesis. Participants with ADHD viewed their problem behaviors as more pervasive and uncontrollable than participants without ADHD. Adolescents viewed their problem behaviors as more uncontrollable and pervasive than children, and girls had more pervasive and internal locus of causality attributions than boys. Participants with ADHD felt more stigmatized by their problem behaviors than participants without ADHD, and adolescents viewed their problem behaviors as more stigmatizing than children; within the ADHD group, problem behaviors were not viewed as more stigmatizing than ADHD as a disorder. Clinical implications of these findings are discussed.
**Introduction**

This cross-sectional developmental study addresses the question of whether the self-perceptions of children and adolescents with ADHD for their problematic behaviors differ from their counterparts without ADHD. This question is important due to research suggesting that children with ADHD are behaviorally and cognitively immature (Whalen, 1989). There is also neuropsychological evidence that children with ADHD experience a “maturation lag” in brain development with regard to brain myelination rates (Seig et al., 1995), cortical thickness (Shaw et al., 2007), patterns of cortical activity (El-Sayed et al., 2002), and reduced connectivity in the default mode network (Fair et al., 2010). In addition, it is important to compare the self-perceptions of adolescents with ADHD to children with ADHD, as adolescents with the disorder continue to experience numerous behavioral (e.g., noncompliance, aggression), academic (e.g., low achievement), social (e.g., peer relationships, social interaction), and emotional difficulties (e.g., anxiety, feelings of isolation; Barkley et al., 1991; Dumas, 1998; Kendall, Hatton, Beckett, & Leo, 2003; Litner, 2003; Wilson & Marcotte, 1996). Although there is a symptom decline in hyperactivity, risk-taking behaviors, organizational, and time management difficulties tend to increase in adolescents with ADHD (Barkley, 2004). The difficulties of adolescents with ADHD may further be heightened by the significant new developmental tasks (e.g., formation of new relationships, increased autonomy from parents, identity formation) they face during this time. Given these challenges, understanding how the self-perceptions of adolescents with ADHD differ from both their younger counterparts and typically-developing peers will increase our understanding of how mental health professionals may provide support and treatment to this population at this stage in development.
In the general population, young children (ages 3 to 6) tend to overstate their abilities, over-predict their future performance, and judge themselves as more capable than their peers on a variety of academic and physical tasks (Ruble, Eisenberg, & Higgins, 1994; Schneider, 1998). Cognitive limitations such as limited ability to hold multiple pieces of information in mind (Trzesniewski, Kinal, & Donnellan, 2011), difficulty separating desire from reality (Stipek & MacIver, 1989) distinguishing ability from effort (Stipek, 1981), and limited experience with absolute failure (Bjorklund, 2007) contribute to young children’s self-enhancements. All-or-none thinking, concrete descriptions, and disjointed accounts characterize young children’s overly positive representations (Harter, 1999; 2012). As cognitive advances occur and children engage in the process of social comparison (Harter, 1999; 2012), enhanced self-representations tend to decline over the elementary school years (Harter, 2012; Stipek & MacIver, 1989).

According to Harter (1999; 2012), in middle to late childhood, a significant change is evident in that children are able to recognize that they can simultaneously possess both positive and negative attributes. This allows them to become more accurate at assessing their competencies. Young adolescents begin to construct abstract compartmentalized generalizations about themselves, although overgeneralizations are evident. While shifting self-evaluations are normative in mid-adolescence due to it being a time of self-questioning, these adolescents are able to detect contradictions in their abstractions. However, they are not yet able to resolve contradictions, contributing to distress. By late adolescence, along with increased capacity for abstraction, individuals develop a more balanced, stable view of their positive and negative attributes, resulting in greater accuracy of self-representations and acceptance of limitations. By this age, self-representations also tend to become more internalized.
Using a cross-sectional design, the present study investigated the development of awareness of children and adolescents with ADHD for their ADHD symptoms, their attributions for their problem behaviors (i.e., primarily ADHD symptoms), and whether they perceive their behaviors as stigmatizing. In this study, 9 to 12 year old children were compared with 14 to 18-year old adolescents.

**Awareness of Problem Behaviors**

Both children, primarily ages 9 to 13 (Wiener et al., 2012), and adolescents, ages 13 to 18 (Chapter 2) with ADHD underestimate their ADHD symptoms in comparison with parent ratings. This is analogous to Hoza et al.’s (2002; 2004) concept of a positive illusory bias (PIB) that refers to the tendency of children with ADHD to inflate their estimates of their competence relative to parent or teacher ratings. One of the hypotheses described by Owens et al. (2007) in relation to the PIB is that due to cognitive immaturity and similar to younger children, children with ADHD enhance their reports of their competencies and underestimate the extent of their problem behaviors. If a cognitive immaturity explanation of the PIB were to be supported, the gap in the PIB between children with and without ADHD would decrease over time. This hypothesis was supported in part by one published study (Hoza et al., 2010).

Hoza et al. (2010) followed 8-to-13 year old children with and without ADHD for a 6-year period (i.e., 14-to-19 years at study completion), comparing developmental trajectories in the PIB (child versus teacher ratings) in terms of self-perceptions of social acceptance and behavioral conduct. Although children and adolescents with ADHD consistently had a PIB

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Note: In this study, attributions and stigmatization were primarily examined for ADHD symptoms; however, some participants identified a non-ADHD symptom as their most problematic behavior. Hence, the terms “problematic behaviors” or “problem behaviors” are used while discussing attributions and stigma.
compared to those without ADHD, the developmental trajectory for the ADHD and non-ADHD samples differed over time for social acceptance; the positive bias score for children without ADHD was initially low but increased over time and leveled off, whereas the positive bias score for children with ADHD was high, remaining so over the 6 year period, and slightly decreased in middle to late adolescence. Nevertheless, by age 17, individuals with and without ADHD showed a similar level of positive bias for social acceptance. Regarding behavioral conduct, while 8 year olds in the ADHD group began with a high level of positive bias, this steeply declined over time. In the comparison group, children at age 8 showed a level of positive bias lower than the ADHD group; the positive bias of the comparison group steadily declined and leveled off by middle to late adolescence, when they reported a negative bias. Although Hoza and her colleagues interpreted the findings regarding behavioral conduct as reflecting the relative acceptability of externalizing behaviors in adolescence (Moffitt, 1993), the data are also consistent with the notion that over time, the gap in self-awareness between individuals with and without ADHD narrows, suggesting that cognitive immaturity may explain the self-enhancement of children with ADHD. The current study examined the development of self-awareness of children and adolescents with ADHD of their ADHD symptoms relative to parent raters. Given that teachers may be less familiar with the behaviors of their students in secondary school due to working with them for a smaller portion of the day than elementary school teachers (Evans et al., 2005), having parents as the criterion raters may be more appropriate as children get older. Should the gap in underestimation of ADHD symptoms by children with ADHD found by Wiener et al. (2012) decrease in adolescence, this would provide evidence in support of the cognitive immaturity hypothesis.
Attributions

Attributions refer to causal perceptions, or the explanations that individuals ascribe to their actions, successes and failures, or to the actions of others (Weiner, 1985). Attributions guide expectancy for future outcomes, motivation, affect, and self-esteem (Weiner, 1985). Weiner’s (1985) Attribution Theory focuses on causal attributions of globality (an event is viewed as occurring in all situations versus only in certain situations), stability (an event is viewed as stable or unstable over time), controllability (an event is viewed as either within or outside of an individual’s control), and locus of causality (an event is viewed as either internally or externally caused). Individuals who view negative events, behaviors, and characteristics as uncontrollable and pervasive (global and stable) are less likely to feel they can change and are less motivated to put forth effort into changing (Weiner, 1994).

Research comparing children with and without ADHD suggests that children with ADHD view their self-reported most problematic behavior (i.e., inattention and hyperactivity-impulsivity symptoms) as more global across situations and uncontrollable (Kaidar et al., 2003; Wiener et al., 2012). The majority of children with ADHD attribute negative outcomes/failures as being due to external causes as part of a self-enhancing attribution style (e.g., Johnston & Lee, 2005; Pelham, Waschbusch, Hoza, Pillow, & Gnagy, 2001), although a subset of children with ADHD hold “depressogenic” attributions (Abramson et al., 1978), where they attribute failure to internal causes (e.g., Pelham et al., 1992). Qualitative and quantitative studies indicate that adolescents with ADHD view their challenges/negative events as global and stable over time (Cooper & Shea, 1999; Krueger & Kendall, 2001; Rucklidge & Tannock, 2001), and their failures as being due to external and uncontrollable factors (Niederhofer, 2008), with these findings being especially applicable to adolescent girls with ADHD (Rucklidge & Tannock,
In studies of typical populations, girls tend to attribute negative outcomes to internal causes whereas males attribute failure to external causes, suggesting that girls’ attributions are more self-derogatory than boys’ (Levine et al., 1982; Zuckerman, 1979).

A meta-analysis of studies (Mezulis et al., 2004), which included clinical and non-clinical samples, showed that attributions for positive events are viewed as less internally caused, stable, and global in adolescence. Mezulis and colleagues postulated that this was the case because during adolescence, individuals realize that negative events may be more internally caused, stable, and global. Compared to children, adolescents have the ability to recognize their stable traits and infer internal causes (Stipek and MacIver, 1989). However, I was not able to find published studies that developmentally compared the attributions of children and adolescents with ADHD for their problematic behaviors, which was an objective of the current study.

Stigma

Weiner and colleagues (1988) indicated it is important to consider stigma. A stigma is a view that deviations in physical attributes, characters, and behaviors are undesirable qualities, and are perceived as negative outcomes (Weiner et al., 1988). Individuals who possess attributes that vary from the norm are devalued and marked as different (Major & O’Brien, 2005). An expectancy confirmation process may occur such that negative stereotypes lead to people in the environment behaving towards the stigmatized person in ways that affect the stigmatized person’s behaviors, thoughts, and feelings, thereby confirming people’s disparaging expectations (Major & O’Brien, 2005).

There is considerable evidence that individuals with ADHD and the behaviors associated with it are stigmatized (Hinshaw, 2005; Pescolido, 2007). Peers view children with ADHD in vignettes as “violent,” “getting into trouble,” and prefer to keep their distance from them (Walker
et al., 2008) and adults prefer their children/family not befriend a child with ADHD, especially if the child is an adolescent (Martin et al., 2007). Further, compared to children with other mental health conditions (i.e., depression), peers (especially adolescent peers) view children and adolescents with ADHD in vignettes more negatively, have greater feelings of anger towards them, and view them as more responsible for their own condition (O’Driscoll et al., 2012). Moreover, during dyadic work and play tasks, hyperactive children are viewed as less desirable work partners than non-hyperactive peers (Grenell et al., 1987), and peers behave in a less prosocial manner towards children labeled as ADHD (Harris et al., 1992). Parents of children and adolescents with ADHD experience “courtesy stigma” (Koro-Ljungberg & Bussing, 2009; Norvilitis et al., 2002), a process in which people close to the individual are stigmatized (Goffman, 1963).

Findings from previous studies suggest that adolescents with ADHD might perceive the stigmatization of their disorder present in society. Adolescent outpatients in samples that include adolescents with ADHD experience feelings of being “different,” shame, and embarrassment in relation to their diagnosis and medication usage, and have a fear of being disliked by others (Elkington et al., 2012; Kranke et al., 2010; Moses, 2009). Interviews from focus groups of 9 to 14 year olds with ADHD show that they experience stigma in relation to the diagnosis and behavioral symptoms; children also feel exposed by the need to take medication at school, and feel that teachers, peers, parents, and parents of peers are not empathic (Singh et al., 2010). Based on interviews analyzed qualitatively, Krueger and Kendall (2001) concluded that adolescents with ADHD (ages 13 to 19) felt stigmatized by their disorder, had an “ADHD identity”, and felt they disappointed teachers and parents due to their disruptive behaviors. In a quantitative study, Wiener and colleagues (2012) confirmed that 9 to 14 year old children with
ADHD feel stigmatized by their most problematic behaviors (i.e., viewed their behaviors as bothersome to others, embarrassing) in comparison to children without ADHD and viewed their most problematic ADHD behavior as more stigmatizing than their disorder. Law and colleagues (2007) similarly found that the presence of behavioral symptoms impacted peers’ attitudes to engage with a hypothetical child presenting with symptoms of ADHD; moreover, the addition of the diagnostic label of ADHD did not affect peers’ desire to engage with the child, indicating that behavioral symptoms were sufficient to elicit stigma. Additionally, Cornett-Ruiz and Hendricks (1993) found that the presence of ADHD behaviors (rather than the ADHD label) negatively impacted teachers’ and peers’ first impressions and predictions of long-term success of children in videoclips. These findings are in line with Hinshaw’s (2005) observation that while labels trigger stigma, deviations in behavior are more salient.

Developmental differences in the stigmatization self-perceptions of children and adolescents with ADHD have not been examined. In the general population of children, there is some evidence of a developmental increase in negative attitudes towards individuals with mental illness (Wahl, 2002), whereas other studies suggest children are more accepting of individuals with ADHD as they get older (Swords et al., 2011). In a study of 12 to 18 year old youth with mental health disorders, age was associated with greater stigma self-perceptions; however, mitigating factors such as taking a high number of psychotropic medications and receiving initial treatment at a young age partially accounted for the findings (Moses, 2009). Given the inconsistent study findings, it is not known whether children and adolescents with ADHD would feel more or less stigmatized with increased age. This study, therefore, explored whether developmental differences would emerge between children and adolescents with ADHD regarding the stigma they experience for their problem behaviors and disorder.
Objectives and Hypotheses

The present study was guided by three objectives. The first objective was to examine the cognitive immaturity hypothesis in relation to the PIB in children and adolescents with ADHD for their ADHD symptoms. It was predicted that participants with ADHD would have a PIB (i.e., underestimate their ADHD symptoms compared to parent ratings) relative to comparison participants, and, in accordance with the cognitive immaturity hypothesis, that the magnitude of the PIB would be reduced in adolescents with ADHD.

The second objective was to compare the attributions of children and adolescents with and without ADHD for their self-reported most problematic behavior. Relative to participants without ADHD, it was predicted that participants with ADHD would view their most problematic behavior as more uncontrollable and pervasive than participants without ADHD, in line with previous studies that considered attributions for self-reported problem behaviors of children with ADHD (Kaidar et al., 2003; Wiener, et al., 2012). Consistent with the findings of Harter’s (1999; 2012) model of normative development of self-representations, it was predicted that adolescents would be more likely than children to attribute their most problematic behavior to internal causes and to view that behavior as pervasive. Due to inconsistent group differences in previous studies, no predictions were made for locus of causality.

The third objective of this study was to compare the stigmatization self-perceptions of children and adolescents with and without ADHD for their self-identified most problematic behavior, and within the ADHD sample to compare stigmatization self-perceptions for the most problematic behavior with stigmatization self-perceptions for ADHD as a disorder. In line with previous research (Wiener et al., 2012), it was predicted that participants with ADHD would view their most problematic behavior as more stigmatizing than participants without ADHD.
Consistent with Hinshaw’s (2005) argument that behavioral symptoms associated with a mental health disorder are salient, it was hypothesized that the most problematic behavior would be perceived as more stigmatizing than the disorder. As age differences in stigmatization self-perceptions of children and adolescents with ADHD have not been previously investigated, no predictions were made.

**Method**

**Participants**

Participant data were obtained from two databases. The first database consisted of 152 children, between 9 and 14 years of age, obtained from Wiener and colleagues’ (2012) child self-perception study. The second database consisted of 74 adolescents, between 13 and 18 years of age, from Chapter 2 of this dissertation. To create a cross-sectional design, the databases were combined and participants were categorized into two age groups: 9-12 year olds and 14-18 year olds. Thirteen year olds were excluded from the analyses to ensure that the two groups were distinct in age.

Participants in the age groups were further classified by ADHD status (i.e., ADHD or typically developing Comparison). For inclusion in the ADHD sample, participants were required to have a previous diagnosis of ADHD from a physician or mental health professional and symptoms were still present in at least two settings. Parents and teachers from the Child database completed the CPRS-R:L and CTRS-R:L of the Conners’ Rating Scales-Revised (CRS-R; Conners, 1997) to confirm ADHD status.\(^8\) Parents and teachers of the adolescents completed the Conners 3-P and Conners 3-T of the Conners 3 scales (Conners, 2008) respectively to ensure they continued to present with symptoms. ADHD symptomatology was confirmed if a

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\(^8\) The CRS-R (Conners, 1997) precedes the most recent version of the Conners 3 (2008) scales.
participant was rated within the clinically significant range \((T \geq 70)\) by one informant and within the borderline or clinical range \((T \geq 61)\) by the second informant on the ADHD core subscales (DSM-IV Inattentive, DSM-IV Hyperactive-Impulsive). For inclusion in the Comparison sample, participants were required to have no previous or current diagnosis of ADHD or other behavioral disorder and had non-clinical levels of ADHD symptoms (i.e., received a \(T\)-score \(\leq 60\) on both the DSM-IV ADHD subscales of the CPRS-R/Conners 3-P).

Participants who scored below a standard score of 80 on a standardized measure of intelligence, or who were suspected of having Pervasive Developmental Disorders, Intellectual Disabilities, Psychotic Disorders, Bipolar Disorder, and Tourette’s Disorder were not included in the analyses, as behaviors characteristic of these disorders less commonly co-occur with ADHD (Barkley, 2006). However, due to high comorbidity rates, participants who had co-occurring learning disabilities (LD), conduct disorder (CD), oppositional defiant disorder (ODD), anxiety, or depression were included in the sample. By employing these criteria, the final sample for the study consisted of 173 participants: 96 ADHD (68 male, 28 female), 77 Comparison (46 male, 31 female), 107 9-12 year olds (65 ADHD, 42 Comparison), and 66 14-18 year olds (31 ADHD, 35 Comparison).

There were significantly more males in the 9-12 year old ADHD group (43.9%) than the other groups (Comparison 9-12 years: 26.3%, ADHD 14-18 years: 15.8%, Comparison 14-18 years: 14.0%), and significantly more females in the 14-18 year old Comparison group (32.2%) than the other groups (9-12 years ADHD: 25.4%, 9-12 years Comparison: 20.3%, 14-18 years ADHD: 22.0%), \(\chi^2(3, N = 173) = 11.28, p = .01\). Significant differences did not emerge among the four groups regarding languages spoken in the home (English versus Other), \(\chi^2(3, N = 163) = 6.80, p = .078\). Within the ADHD sample, 70.83% of the participants (9-12 years: \(n = 48\); 14-18 years
years: \(n = 20\) were regularly taking psychostimulant medication (i.e., Ritalin, Concerta, Adderall, Dexedrine, or Vyvanse) at the time of data collection and 44 of the 96 participants (45.83\%) had previous diagnoses of at least one comorbid condition: 29 LD (9-12 years: \(n = 10\); 14-18 years: \(n = 19\)), 11 ODD (9-12 years: \(n = 10\); 14-18 years: \(n = 1\)), 5 CD (9-12 years: \(n = 5\); 14-18 years: \(n = 0\)), 8 anxiety disorder (9-12 years: \(n = 2\); 14-18 years: \(n = 6\)), and 2 depression (9-12 years: \(n = 0\); 14-18 years: \(n = 2\)). Other than a learning disability diagnosis (i.e., 3 of the 14-18 year olds), none of the Comparison participants had a diagnosis of a psychiatric disorder.

A series of 2 x 2 between subjects ANOVAs, with ADHD Status and Age (child versus adolescent), were computed to examine demographic differences among the groups (Table 3.1). Parents of participants with ADHD were more likely to have a lower level of education (i.e., SES) than Comparison parents. Participants with ADHD obtained a lower Full Scale IQ score than Comparison participants and 9-12 year olds had a higher Full Scale IQ score than 14-18 year olds. Participants with ADHD attained higher scores on both the Conners Parent DSM-IV Inattentive and Hyperactivity-Impulsivity scales than Comparison participants and parents rated their 14-18 year olds higher in inattentive symptoms than did parents of 9-12 year olds. As teacher data was not available for the 9-12 year old Comparison group, one-way ANOVAs were computed comparing 14-18 year olds by Group Status, and Age Groups among the participants with ADHD on the Conners Teacher DSM-IV scales; relative to 14-18 year old Comparison adolescents (IA: \(M = 47.00, SD = 5.74\); HI: 48.08, \(SD = 5.46\)), 14-18 year olds with ADHD attained significantly higher scores \((p < .001)\) on the DSM-IV Inattentive \((M = 70.96, SD = 12.51)\) and Hyperactivity-Impulsivity scales \((M = 66.39, SD = 16.21)\). Among ADHD participants, age differences did not emerge on the Conners Teacher DSM-IV scales (Children IA: \(M = 70.60, SD = 9.16\); HI: 70.57, \(SD = 12.20\)).
Measures

**Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV, Wechsler, 2003) and Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999).** Both the WISC-IV and WASI are commonly used measures of intelligence that demonstrate good test-retest reliability and construct validity (Sattler, 2008). The correlation between the measures is high \( r = .82, \) Sattler, 2008). Of the 115 participants from the Child database included in the current study, 22 (19.13%) completed the WISC-IV, and 93 (80.86%) completed the WASI. All of the participants from the Adolescent database completed the WASI. The full scale WISC-IV and WASI IQ scores were used to obtain a measure of participants’ intelligence.

**Conners’ Rating Scales-Revised (CRS-R, Conners, 1997) and Conners Third Edition (Conners 3, Conners, 2008).** The CRS-R and Conners 3 are norm-referenced measures, which are commonly used to screen for ADHD in children and adolescents. Raters use a 4-point scale from 0 (*Not at all/Seldom, Never*) to 3 (*Very Much True/Very Often, Very Frequent*) to evaluate symptoms of inattention and hyperactivity, along with oppositionality, peer relationship/social difficulties, learning problems (on the Conners 3) and anxiety (on the CRS-R). The internal consistency of the CPRS-R DSM-IV ADHD subscales ranges from .85 to .94, and the internal consistency of the CTRS-R DSM-IV ADHD subscales ranges from .80 to .94 (Conners, 1997). Test-retest reliability of the scales is adequate (Conners, 1997). Reliability of the Conners 3 DSM-IV ADHD Inattentive and Hyperactivity-Impulsive subscales is high to moderate; internal consistency (Parent: .93, .92; Teacher: .94, .95); test-retest reliability (Parent: .78, .75; Teacher: .80, .81). Parents and teachers from the Child database completed the CRS-R, and parents and teachers from the Adolescent database completed the Conners 3. Parents and
teachers were asked to rate children’s and adolescents’ behaviors when they were off their ADHD medication.

Adapted Dominic-R (Wiener et al., 2012). The Dominic-R (Valla, Bergeron, Bidault-Russell, St. Georges, & Gaudet, 1997) is a 95-item structured interview consisting of pictures and accompanying statements of a gender-neutral pre-pubescent child, Dominic/Dominique, displaying symptoms of prevalent Axis I DSM-III-R diagnoses. Children are asked to indicate whether they are like Dominic/Dominique by indicating yes or no. Wiener and colleagues (2012) adapted this measure to assess children’s self-reports of ADHD symptoms by selecting 24 items describing ADHD behavioral characteristics and common co-occurring conditions (i.e., 13 ADHD, 7 conduct problems, 2 anxiety, 2 depression, and 7 learning difficulty) consistent with DSM-IV diagnoses. The 31-item Adapted Dominic-R shows high internal consistency (Cronbach’s α = .88) as do the ADHD items (Cronbach’s α = .85; Wiener et al., 2012). Participants from the Child database were administered the Adapted Dominic-R. Refer to Appendix B for sample pictures and a list of behaviors that comprise the Adapted Dominic-R.

Alex. The Alex, developed by the author of the present study, was modeled after the Dominic-R (Valla et al., 1997). This instrument consists of a series of 79 pictures of an adolescent, Alex, appearing to be approximately 15 years of age, and was administered to participants in the Adolescent database. Both male and female pictures of Alex were used with same gender-participants. The behaviors shown in the pictures are based on DSM-IV symptoms. Among the 79 items, 18 depict symptoms of ADHD (9 hyperactivity-impulsivity, 9 inattentive) and 33 depict symptoms of disorders that commonly co-occur with ADHD (5 ODD, 5 CD, 19 learning difficulty, and 3 internalizing symptoms – 1 anxiety, 2 depression). In addition, 13 pictures depict Alex showing social difficulties, 6 engaging in risk-taking situations, and 10
pictures depict positive character traits of Alex (e.g., having a good sense of humor, being a loyal friend). The Alex demonstrated high internal consistency reliability (Cronbach’s $\alpha = .94$) based on the 69 problem pictures (i.e., without the positive pictures). With the exception of the internalizing items (Cronbach’s $\alpha = .42$), internal consistency reliability of items corresponding to specific problems was moderate to high; ADHD = .89, LD = .86, ODD = .64, CD = .66, social difficulties = .65, and risk-taking = .69. The ADHD items were primarily used in this study.

Sample pictures from the Alex, as well as a list of the behaviors, are shown in Appendix B.

Administration of the Adapted Dominic-R (Wiener et al., 2012) and Alex was similar. First, a participant was shown pictures of Dominic/Alex behaving in various ways and was asked whether he/she is like Dominic/Alex (e.g., “Are you easily distracted, like Dominic/Alex?”). The examiner sorted the pictures into two piles: a “Yes” pile consisting of the pictures the participant endorsed as being like themselves, and a “No” pile consisting of the pictures the participant did not endorse. Second, of the “Yes” ADHD pictures the participant endorsed, the examiner asked them to select the picture that was “the most” like them or the “biggest problem” for them (i.e., their most problematic behavior). In the event participants did not endorse any of the ADHD pictures, they were asked to identify their biggest problems from the remaining “YES” pictures they endorsed. This pictorial method of presenting behaviors was considered advantageous for several reasons. In addition to reducing working memory and language processing demands (Wiener et al., 2012), participants self-identified their own problem behaviors. This method of presentation may also have helped normalize the difficulties seen in the pictures, as participants were asked whether they were like the character.

**Attributions for ADHD Questionnaire (AAQ; Kaidar, Wiener, & Tannock, 2003).**

The AAQ (see Appendix B) is a 19-item measure that was developed to assess children’s
attributions of Controllability, Pervasiveness, Locus of Causality, and Stigmatization perceptions for the behavior children identified as the most problematic to them on the Adapted Dominic-R. This questionnaire is repeated a second time for children who are aware of their ADHD diagnostic status to assess their attributions for ADHD as a disorder. Items forming the Controllability scale (3 items – e.g., “If you try really hard, do you think you can stop yourself from problematic behavior”), Pervasiveness scale (3 items – e.g., “Have you been problematic behavior (a) only a short time, (b) a few years, (c) as long as you can remember?”; “Do you have difficulty with problematic behavior (a) almost never, (b) only some of the time, (c) all the time?”), and Stigmatization scales (10 items – e.g., “Do your teachers treat you differently from other students because of your problematic behavior; Are you embarrassed because of your problematic behavior (a) never, (b) a little, (c) a lot?”) show adequate internal consistency reliability in 9 to 14 year old children (ranging from .60 - .69 for the most problematic behavior and from .50 - .76 for ADHD as a disorder; Wiener et al., 2012). In addition, the scales show a valid factor structure (Wiener et al., 2012). 9. Locus of Causality is assessed by a single item that examined whether children viewed their most problematic behavior as internally or externally caused (“Is it something around you like people OR something inside of you that makes you have problematic behavior?”). 10

To ensure that the AAQ was reliable with an adolescent sample, internal consistency reliability estimates (Cronbach’s α) were computed with the Adolescent sample in the current study (Controllability Problem Behavior/Disorder: .75/.74; Pervasiveness Problem

9 The pervasiveness scale represents items that focus on both stability and globality, as findings by Wiener et al. (2012) indicate that these dimensions load better onto a pervasiveness dimension, rather than individual scales.

10 While the AAQ overall consists of 19 items, 17 items were used by Wiener and colleagues (2012) based on the factor analysis and internal consistency reliability of the items.
Behavior/Disorder: .70/.61; Stigmatization Problem Behavior/Disorder: .72/.77). The AAQ was administered to participants immediately after the Adapted Dominic-R/Alex, with participants’ self-identified most problematic behavior inserted into the questions.

**Procedure**

This investigation was approved by the University of Toronto Research Ethics Board. ADHD participants from both databases were recruited through notices/flyers placed in physicians’ offices and mental health centres that provide support to individuals with ADHD, advertisements placed in local newspapers, and from a pool of participants who previously took part in studies at the ADHD Laboratory at OISE/UT that agreed to be contacted. Additionally, ADHD participants from the Child database were recruited from hospital settings. Comparison participants from both databases were recruited through flyers placed in schools, community centres, libraries, and advertisements placed in community-based newspapers, magazines, websites, and local schools.

Data collection procedures were similar for both Child and Adolescent databases. If participants met study criteria based on the CPRS-R/Conners 3-P, parents and children/adolescents were invited to participate. Sessions occurred in private testing rooms at OISE/UT. After obtaining parent consent and child assent/adolescent consent as appropriate, measures were administered by trained clinical research assistants during 4-5 hour sessions (as additional measures were administered for other studies). ADHD participants from both databases were medication-free on the day of study participation. If permission was obtained, teachers were sent the CTRS-R/Conners 3-T, and were asked to mail the completed rating scale back in a self-addressed, stamped envelope. Parents and children/adolescents received a written educational and social-emotional report and financial remuneration in exchange for study
participation. Adolescents were given a choice between financial remuneration and obtaining a community service certificate.

**Data Analysis Strategy**

Statistical analyses were computed using SPSS version 20. Assumptions underlying each statistical test were evaluated, including normality of distributions, independence of observations, homogeneity-of-slopes, and homogeneity of variance. Outliers were examined for each dependent variable. Only one outlier was found on the PIB discrepancy score for Total ADHD symptoms; as the same results were obtained with and without this case, it was retained in the analyses.

ADHD and Comparison participants differed in parent education and Full Scale IQ, and 9-12 year olds obtained higher Full Scale IQ scores than 14-18 year olds. Parent Education (i.e., SES) was correlated with PIB discrepancy score for Total ADHD symptoms ($r = -.31, p < .001$), and Pervasiveness attributions for most problematic behavior ($r = .19, p = .01$). Full Scale IQ was correlated with PIB discrepancy score for Total ADHD symptoms ($r = -.19, p = .02$) and Stigmatization for most problematic behavior ($r = -.22, p = .007$). Where Parent Education (SES) and Full Scale IQ were significantly correlated with the dependent variables, they were entered as covariates in the analyses. Prior to conducting the ANCOVAs, preliminary analyses evaluating the homogeneity-of-slopes assumptions were conducted. In all cases, the relationship between the covariates and the dependent variable did not significantly differ as a function of the independent variables.

Gender was included as an independent variable in the analyses where significant differences on the dependent variables emerged based on independent samples $t$-tests and/or chi squares tests of independence. Although examining gender differences was not an objective of
the study, it was important to include it in the analyses because of the disproportionate gender
distribution in the ADHD and Comparison samples. Gender differences were found for
Pervasiveness attributions (Boys:  $M = 5.65$, $SD = 1.67$; Girls:  $M = 6.64$, $SD = 1.71$) $t(167) = 3.64$, $p < .001$ and Locus of Causality for the most problematic behavior (75.9% of boys made external attributions compared to 24.1% of females), $\chi^2(N = 1) = 5.45$, $p = .020$.

The analyses that were conducted comparing children and adolescents with and without ADHD in terms of PIB Discrepancy score, Pervasiveness and Controllability attributions, and Stigmatization for most problematic behavior were 2 by 2 between subjects ANOVAs or ANCOVAs with Group status (ADHD versus Comparison) and Age (9 to 12 versus 14 to 18) as the independent variables. Gender was included as a variable for Pervasiveness attributions. Regarding Locus of Causality attributions for the most problematic behavior, loglinear analysis was performed using hierarchical modeling with Group Status, Age, Gender, and Locus of Causality (i.e., external versus internal locus) to examine possible interactions among the variables. Within the ADHD sample, a 2 by 2 mixed-methods ANOVA, with Problematic Behavior versus Disorder (as the within subjects variable) and Age (as the between subjects factor), was computed to compare Stigmatization self-perceptions for the most problematic behavior to ADHD as a disorder.

The PIB discrepancy score was computed using the method described by Wiener and colleagues (2012): 1) Twelve Adapted Dominic-R/Alex items representing DSM-IV ADHD (inattentive and hyperactive-impulsive) symptoms were matched with 12 corresponding items on the CPRS-R/Conners 3-P (refer to Table 3.2 for the list of items). 2) Parents rated their children’s/adolescents’ behavior on either the CPRS-R/Conners 3-P using a 4-point Likert scale. This 4-point scale was collapsed into a dichotomous scale with 0/1 indicating “No” (the behavior
does not occur frequently or is not a concern), and 2/3 indicating “Yes” (the behavior is frequent and is a concern). It was necessary to create a dichotomous scale on the CPRS-R/Conners 3-P, because children and adolescents gave Yes/No answers on Adapted Dominic-R and Alex. 3) The total number of ADHD symptoms endorsed by parents and by children/adolescents were calculated; based on the recommendation of Owens et al. (2007), these scores were standardized (Z scores). 4) The discrepancy score was calculated by taking the difference between the standardized total parent ADHD score and the standardized total child/adolescent score.

**Results**

**Objective 1: Awareness of Problem Behaviors (PIB for ADHD Symptoms)**

Consistent with the cognitive immaturity hypothesis, there was a significant group-by-age interaction effect for Total ADHD Symptoms ($p = .028$) and for Hyperactive-Impulsive ($p = .009$) Symptoms (Table 3.3); PIB discrepancy scores were significantly lower in 14 to 18 year olds with ADHD (Total ADHD: $M = -.206$, $SE = .198$; HI: $M = -.362$, $SE = .214$) than in 9 to 12 year olds with ADHD (Total ADHD: $M = .567$, $SE = .130$; HI: $M = .541$, $SE = .140$). As shown in Table 3.3, children with ADHD underestimated the extent of their symptoms compared to parent raters, whereas adolescents with ADHD and Comparison children and adolescents reported higher symptomatology than parents. A significant Group Status effect was evident (Total ADHD: $p = .002$; HI: $p = .042$), as participants with ADHD had higher discrepancy scores for Total ADHD Symptoms ($M = .181$, $SE = .118$) and Hyperactive-Impulsive Symptoms ($M = .089$, $SE = .128$) than participants without ADHD (Total ADHD: $M = -.381$, $SE = .116$; HI: $M = -.299$, $SE = .126$). There was also a significant Age effect (Total ADHD: $p = .012$; HI: $p = .013$); the discrepancies for children (Total ADHD: $M = .110$, $SE = .096$; HI: $M = .118$, $SE = .104$) were higher than for adolescents (Total ADHD: $M = -.310$, $SE = .129$; HI: $M = -.328$, $SE = .139$).
With regard to Inattentive Symptoms, there were significant Group Status \((p < .001)\) and Age effects \((p = .049)\) but the interaction effect was not significant \((p = .306)\). The discrepancy between participant and parent ratings was higher in the ADHD sample \((M = .309, SE = .118)\) than in the Comparison sample \((M = -.479, SE = .114)\), and higher in 9 to 12 year olds \((M = .077, SE = .095)\) than in 14 to 18 year olds \((M = -.247, SE = .128)\). As indicated in Table 3.3, ADHD children underestimated their Inattentive Symptoms relative to parents but rated themselves similarly to parents in adolescence. Comparison children and adolescents overestimated their Inattentive Symptoms relative to parents (i.e., reported more symptoms than parents resulting in negative discrepancy scores).

**Objective 2: Attributions for the Most Problematic Behavior**

As shown in Table 3.4, the ADHD group viewed their most problematic behavior as significantly less within their control \((M = 6.56, SD = 1.60)\) than the Comparison group \((M = 7.26, SD = 1.37, p = .002)\) and 14 to 18 year olds \((M = 6.63, SD = 1.51)\) viewed their most problematic behavior as less within their control relative to 9 to 12 year olds \((M = 7.02, SD = 1.54, p = .035)\). The interaction between Group Status and Age was not significant \((p = .743)\). The ADHD group \((M = 6.63, SE = .187)\) had higher Pervasiveness attributions for their self-reported most problematic behavior relative to the Comparison group \((M = 5.60, SE = .193, p < .001)\), 14 to 18 year olds \((M = 6.78, SE = .203)\) had higher Pervasiveness attributions relative to 9 to 12 year olds \((M = 5.45, SE = .173, p < .001)\), and females \((M = 6.50, SE = .209)\) had higher Pervasiveness attributions than males \((M = 5.73, SE = .164, p = .004)\). None of the interactions between Group Status and Age \((p = .513)\), Group Status and Gender \((p = .528)\), Age and Gender \((p = .104)\), and Group, Age, and Gender \((p = .668)\) were significant for Pervasiveness.
Most participants viewed their self-reported most problematic behavior as internally caused (9-12 ADHD: 64.4%; 9-12 Comparison: 61.1%; 14-18 ADHD: 67.7%; 14-18 Comparison: 60.6%). None of the four-way, $\chi^2(1) = 1.78$, $p = .181$, and three-way interactions, $\chi^2(5) = 1.94$, $p = .858$, from the loglinear analysis were significant. The model was only significant for a two-way interaction, $\chi^2(11) = 20.78$, $p = .036$, between Locus of Causality and Gender (parameter estimate = -.227, $SE = .094$, $z = -2.43$, $p = .015$). A higher proportion of males (75.9%) attributed their most problematic behavior to external causes relative to females (24.1%), and a higher proportion of females attributed their most problematic behavior to internal causes (75.4%), $\chi^2(1) = 5.45$, $p = .020$. See Appendix C for a list of most problematic behaviors endorsed by participants.

**Objective 3: Stigma**

In terms of Stigmatization for the self-reported most problematic behavior, the ADHD group ($M = 15.45$, $SE = .341$) had significantly higher Stigmatization self-perceptions than the Comparison group ($M = 13.05$, $SE = .342$), $F(1, 154) = 22.22$, $p < .001$, $\eta^2 = .126$). The main effect of Age was significant, $F(1, 154) = 5.30$, $p = .023$, $\eta^2 = .033$; 14 to 18 year olds ($M = 14.79$, $SE = .357$) had higher Stigmatization self-perceptions than 9 to 12 year olds ($M = 13.71$, $SE = .294$). The interaction between Group Status and Age was not significant, $F(1, 154) = 3.14$, $p = .079$, $\eta^2 = .020$.11 Within the ADHD sample, stigmatization self-perceptions did not differ for the most problematic behavior ($M = 15.56$, $SD = 3.39$) compared to ADHD as a disorder ($M = 14.87$, $SD = 3.71$), $\lambda = .96$, $F(1, 71) = 2.63$, $p = .109$, $\eta^2 = .036$. There was no Age effect $F(1$, $p = .079$, $\eta^2 = .020$).

Note: The assumption of homogeneity of variance and normality of distributions was violated for Stigmatization for the most problematic behavior within the full sample; however, results may be trusted with $n = 15$ per cell according to Green and Salkind (2005).
71) = .113, \( p = .738, \eta^2 = .002 \), and no interaction between Stigmatization for behavior/disorder and Age, \( \lambda = .99, F(1, 71) = .333, \ p = .566, \eta^2 = .005^{12} \).

**Exploratory Analyses: Relationships between PIB, Attributions, and Stigma**

Additional exploratory analyses were conducted to explore possible relationships between PIB Discrepancies, attributions, and stigma within the ADHD sample. In the first set of analyses, three 2 by 2 between subjects ANOVAs were conducted with Age and Locus of Causality attributions (external/internal) as the independent variables and PIB Discrepancy scores as the dependent variables. For both Total ADHD and Hyperactive Impulsive-Symptoms, there were no effects of Locus of Causality (Total: \( F(1, 84) = 2.59, \ p = .111, \eta^2 = .030; \) HI: \( F(1, 84) = 1.01, \ p = .318, \eta^2 = .012 \)) or interactions between Age and Locus of Causality (Total: \( F(1, 84) = 1.23, \ p = .271, \eta^2 = .014; \) HI: \( F(1, 84) = 2.15, \ p = .146, \eta^2 = .025 \)). For Inattentive Symptoms, a significant main effect emerged for Locus of Causality, indicating that participants with ADHD who viewed their problem behaviors as externally caused had higher PIB Discrepancy scores (\( M = .675, SD = 1.11 \)) than participants with ADHD who viewed their problem behaviors as internally caused (\( M = .205, SD = .99, F(1, 84) = 3.98, p = .049, \eta^2 = .045 \)). There was no interaction effect between Age and Locus of Causality, \( F(1, 84) = .073, p = .788, \eta^2 = .001 \) for inattentive symptoms\(^{13} \).

In the second set of analyses, Pearson’s correlations were computed between the PIB Discrepancy Score for Total ADHD Symptoms and Pervasiveness, Controllability attributions, and Stigmatization for the most problematic behaviors in the ADHD sample. Significant

\(^{12}\) Within the stigma analysis, the total Stigmatization score was prorated for 12 participants, as these participants did not have siblings and 1 of the 10 questions pertained to stigma experienced relative to siblings.

\(^{13}\) Although significant Age effects emerged in each of the above ANOVAs, they were not reported as the findings did not differ from Objective 1 showing that the PIB Discrepancy is lower in 14 to 18 year olds with ADHD.
positive correlations were found between Controllability attributions and the PIB Discrepancy score \( (r = .285, p = .006) \). Significant negative correlations were found between Pervasiveness attributions and the PIB Discrepancy score \( (r = -.386, p < .001) \) and between Stigmatization perceptions for problematic behaviors and the PIB Discrepancy score \( (r = -.251, p = .018) \).

**Discussion**

The present study investigated developmental differences in the self-perceptions of 9 to 12 year old children and 14 to 18 year old adolescents, with and without ADHD, for their problem behaviors. Defining the PIB as underestimation of symptoms, this cross-sectional study demonstrated that participants with ADHD have a PIB for their ADHD symptoms relative to Comparison participants, and the magnitude of the PIB (particularly for hyperactive-impulsive symptoms) is reduced in adolescents with ADHD compared to children with ADHD, thereby supporting the cognitive immaturity hypothesis. ADHD participants viewed their most problematic behavior as more uncontrollable and pervasive than Comparison participants. Irrespective of group status, adolescents viewed their problematic behaviors as more uncontrollable and pervasive than children. Girls had more pervasive and internal locus of causality attributions than boys, whereas boys attributed their problem behaviors to external causes. Participants with ADHD felt more stigmatized by their most problematic behavior than participants without ADHD, but did not view their most problematic behavior as more stigmatizing than their disorder. Regardless of group status, adolescents viewed their problem behaviors as more stigmatizing than children.

Exploratory analyses showed a relationship between the PIB with attributions and stigma; participants with ADHD who attributed their problem behaviors to external causes had a higher PIB for their inattentive symptoms than participants with ADHD who attributed their behaviors
to internal causes. As well, a higher PIB for ADHD symptoms was associated with problem behaviors being viewed as more controllable, less pervasive, and less stigmatizing.

**Awareness of Problem Behaviors**

Previous studies have shown that children (Wiener et al., 2012) and adolescents with ADHD (Chapter 2) hold a PIB for their ADHD symptoms. The present findings confirmed that 9 to 12 year old children and 14 to 18 year old adolescents with ADHD underestimate their symptoms in comparison to parent raters (i.e., hold a PIB) relative to a normative Comparison group. Moreover, the PIB for Total ADHD symptoms, within the ADHD group, was substantially reduced in 14 to 18 year olds compared to 9 to 12 year olds. The reduction in the PIB in adolescents with ADHD was particularly evident for hyperactive-impulsive symptoms. This is in line with the developmental course of the disorder, as an observable decline occurs in hyperactive behaviors in adolescence (Barkley, 2004; Biederman et al., 2000; Hart et al., 2005). These findings are consistent with the findings from Hoza et al.’s (2010) longitudinal study suggesting that cognitive immaturity is a plausible mechanism for the PIB in children and adolescents with ADHD with regard to their self-perceptions of social and behavioral competence relative to teacher ratings.

Compared to the PIB for hyperactive-impulsive symptoms, a somewhat different pattern emerged for inattentive symptoms in the present study. While there was evidence of a PIB for inattentive symptoms in participants with ADHD compared to non-ADHD participants, adolescents, irrespective of their group status, demonstrated a smaller PIB than children, suggesting there is overall greater awareness of inattentive symptoms in adolescence. This awareness may be reflective of increased organizational, academic, and time management demands expected of adolescents in secondary school (Gureasko-Moore, DuPaul, & White,
2006; Snyder & Bambara, 1997; Jacobsen, Williford, & Pianta, 2011), which may make inattentive symptoms more salient in mid to late adolescence. The results are nevertheless consistent with greater developmental awareness of these problems.

It is noteworthy that both ADHD and typically-developing adolescents in this study generally reported more ADHD symptoms than their parents (resulting in negative PIB discrepancy scores). The tendency to self-report more symptoms may partly be a reflection of certain symptoms such as hyperactivity-impulsivity presenting as inner “subjective feelings of restlessness” in the teenage years (American Psychiatric Association, DSM-IV-TR, 2000), which adolescents may be more attuned to than their parents. Furthermore, adolescents are more autonomous from parents than children during the teenage years (Feldman & Quatman, 1988; Peterson, Bush, & Supple, 1999), which may contribute to lower parent awareness of these problems at this point in development. Another possibility is that participants endorsed difficulties on either the Adapted Dominic-R/Alex and were asked if they were “like” the character in the pictures; this may have helped normalize the behaviors depicted in the pictures, making typically-developing children and adolescents, and adolescents with ADHD more willing to acknowledge symptoms.

**Attributions for Problematic Behaviors**

Consistent with previous findings (Kaidar et al., 2003; Wiener et al., 2012), participants with ADHD viewed their most problematic behaviors as more pervasive and uncontrollable than participants without ADHD. This pattern emerged regardless of age of ADHD participants. There were no ADHD group or age differences in locus of causality; the majority of participants viewed their problem behaviors as internally caused.
Developmental differences in attribution patterns were evident irrespective of group status. Adolescents overall viewed their problem behaviors as more pervasive and uncontrollable than 9 to 12 year olds. This is in line with Harter’s (1999; 2012) model of normative development of self-representations and findings (Stipek & MacIver, 1989) suggesting that adolescents are cognitively better able to recognize their stable and global (i.e., pervasive) traits compared to children. Although Harter (1999; 2012) did not explicitly consider developmental differences in controllability attributions, based on the present study, it appears that problematic behaviors are viewed as less controllable in adolescence. One plausible explanation for this finding is that adolescents (especially in middle adolescence) engage in ongoing self-questioning about who they are and experience distress over their difficulty resolving contradictions in their self-attributes and self-perceptions (Harter, 1999; 2012). When applied to problem behaviors (e.g., I can focus with my friends but not with my parents), this may contribute to adolescents’ perceptions that their behaviors are less under their control.

Boys in the current study were more likely to view their most problematic behaviors as externally caused and less likely to view them as pervasive than girls. These findings are consistent with previous research showing that girls’ attributions are more self-derogatory than boys’ (Levine et al., 1982; Zuckerman, 1979). Gender differences in attribution patterns may reflect the differing socialization experiences of boys and girls. Boys, in their growth towards autonomy, self-reliance, and independence, are pushed towards extremes of toughness and separation (Pollack, 1998). Moreover, as a result of shame-based socialization, boys are directed towards being strong and dominant (i.e., not show vulnerability, weakness, or helplessness; Pollack, 1998), which may contribute to males developing external attributions (i.e., due to something outside of them) for their problematic behaviors relative to females. In contrast,
females develop identities that are relationally defined, and they are judged by standards of responsibility and care (Gilligan, 1982); this may contribute to females developing more internal attributions (or internalized sense of responsibility) for their failures or problematic behaviors. Additionally, it should be noted that boys and girls in the present study were asked to identify their most problematic ADHD behaviors, which may have also played a role in the gender differences that emerged. Inattentive and, especially, hyperactive-impulsive behaviors are seen as more normative and socially acceptable in boys than in girls (Abikoff et al., 2002), which may have contributed to girls’ more self-derogatory attributions.

**Stigma**

The present findings showed that individuals with ADHD view their problematic behaviors as more stigmatizing than individuals without ADHD. Both 9 to 12 and 14 to 18 year olds with ADHD perceive that their behaviors are stigmatized by individuals in the environment and feel embarrassed by their behaviors. While previous findings (Cornett-Ruiz & Hendricks, 1993; Hinshaw, 2005; Law et al., 2007) indicate that deviations in behavior elicit greater stigma towards the stigmatized person than diagnostic labels, the present study suggests that participants with ADHD perceive similar levels of stigmatization for both their problem behaviors and their disorder. These findings are of concern, as stigma is associated with low self-esteem (Major & O’Brien, 2005).

Within the age groups studied, developmental differences were evident, regardless of group status, for perceptions of stigma; adolescents viewed their problematic behaviors as more stigmatizing than children. This is line with Harter’s (1999; 2012) model of normative development, which suggests that greater social awareness in adolescence results in increased
awareness of how one’s attributes are viewed by others. This may have resulted in adolescents perceiving that their behaviors are more bothersome to others than children.

Collectively, the current findings add to a growing body of research that individuals with ADHD indeed perceive stigma regarding their behaviors and disorder (e.g., Wiener et al., 2012). However, further research is needed to determine which specific experiences contribute to stigmatization self-perceptions in children and adolescents with ADHD. Wiener and colleagues (2012) suggested that the uncontrollable behaviors of individuals with ADHD draw negative attention towards them, social exclusion and punitive reactions from others (e.g., parents, teachers), contributing to their self-perceptions of stigmatization for their problematic behaviors.

**Relationship between PIB, Attributions, and Stigma**

Exploratory analyses were conducted to determine whether the PIB was related to attributions and stigma. Participants with ADHD, regardless of their age, who viewed their problem behaviors as externally caused had a higher PIB for inattentive symptoms than participants with ADHD who viewed their problems as internally caused (being due to something inside of them). The findings suggest that individuals with ADHD who take more responsibility for their difficulties are less likely to underestimate their inattention (lower PIB), whereas those with external locus of causality take less responsibility for their inattention problems (i.e., view them as being caused by something around them), and may consequently have a higher PIB. A similar pattern was found in Study 1 (Chapter 2) for the PIB for oppositionality symptoms. One explanation for these findings is that the ADHD sample in the present study may have had high levels of oppositional problems, contributing to the relationship between external locus of causality and a greater PIB. The findings could also be due to the presence of hostile attributions (Milich & Dodge, 1984), in which individuals assign blame to
others for undesirable events rather than seeing themselves as responsible. Due to the absence of directionality in the data, it is also possible that lower awareness of difficulties (i.e., a greater PIB) results in an external locus of causality. A third possibility for the findings may be unique to inattentive symptoms (as the locus of causality finding was not present for the PIB for Total ADHD or Hyperactive-Impulsive symptoms). Research indicates that the two dimensions of ADHD differ in distinct ways, such that individuals with predominantly inattentive symptoms experience more internalizing symptoms (e.g., depression, anxiety) than individuals with predominantly hyperactive-impulsive or combined symptoms (Lahey & Carlson, 1991; Wolraich, Hannah, Pinnock, Baumgaertel, & Brown, 1996). Internalizing symptomology (i.e., depression) is associated with attenuation of the PIB in children with ADHD (Hoza et al., 2002; 2004), and individuals with depression tend to attribute negative events to internal causes (Abramson et al., 1978). Thus, it is possible that the PIB for inattentive symptoms in the present study was associated with depressive symptoms and internal locus of causality for problem behaviors, contributing to a lowered PIB for inattention.

Among participants with ADHD, the exploratory analyses showed a positive association between the PIB for ADHD symptoms with controllability attributions and a negative association with pervasiveness attributions and stigma self-perceptions. The findings suggest that adolescents who underestimate their symptoms are likely to view their problem behaviors as more controllable, less pervasive over time and contexts, and less stigmatizing. The directionality of these associations is not clear. Taken together, the findings indicate that there may be a relationship between attributions/stigma and the PIB that needs to be better understood.
Limitations

The present study has some limitations that warrant discussion. This cross-sectional investigation provided support for the cognitive immaturity hypothesis in relation to the PIB for ADHD symptoms. These findings would further be supported by longitudinal research that examines developmental trajectories of change across individuals with and with ADHD, as Hoza and colleagues (2010) did when examining self-perceptions of social and behavioral competence. Second, although support was obtained for cognitive maturity in children and adolescents with ADHD in relation to awareness of their behaviors and for developmental differences in pervasiveness, controllability, and stigmatization self-perceptions in adolescents, further research is required to determine at which specific age this shift in self-perceptions occurs. As the current study combined mid and late adolescent data in order to achieve sufficient statistical power, it was not possible to answer this question. Third, attributions and stigmatization self-perceptions were assessed for the behaviors (primarily symptoms of inattention and hyperactivity-impulsivity) that participants identified as most problematic to them on the Adapted Dominic-R/Alex, which did not allow for a direct one-to-one comparison of each of the behaviors in the analyses. Such analyses could only be conducted if a sufficient number of participants endorsed each problem behavior, which was not the case. In addition, the Pervasiveness and Controllability attribution scales from the AAQ were based on only 3 items and Locus of Causality was based on a single item. While this study offered some initial insight into a possible relationship between attributions and stigma with the PIB, replication and further research is needed to further elucidate the direction of the association, and mechanisms for the relationship between the PIB for inattentive symptoms and locus of causality. Finally, the statistical assumption of homogeneity of variance was violated in the ANCOVAs that were
computed. However, essentially the same results emerged when the analyses were conducted without covariates.

**Clinical Implications**

The findings of the present investigation have implications for mental health professionals who provide treatment to children and adolescents with ADHD. Due to the presence of biased self-perceptions within this population, practitioners often face the difficult task of determining how to make them aware of the need to change their problematic behaviors. While the current results suggest there is greater awareness of ADHD symptomatology in adolescents with the disorder, the findings also showed that individuals with ADHD view their problem behaviors as pervasive and uncontrollable. Individuals who tend to view negative behaviors and characteristics as uncontrollable and pervasive are less likely to feel they can change and are less motivated to put forth effort into changing (Weiner, 1994). Thus, despite the increased awareness of adolescents with ADHD, the presence of such attributions, in combination with their stigmatization self-perceptions, may make them reluctant to seek treatment and/or to engage in the intervention process. As the motivation levels of individuals with ADHD may hinder treatment, motivational enhancement techniques may be helpful. Additionally, individuals with ADHD may benefit from mindfulness interventions (Haydicky, Wiener, Badali, Milligan, & Ducharme, 2012; van de Weijer-Bergsma, Formsma, de Bruin, & Bogels, 2012), a treatment approach that focuses on acceptance of limitations and increasing distress tolerance. While planning for treatment with individuals with ADHD, it may also be necessary to understand the relationship between their attribution patterns and awareness of their challenges. For example, external locus of causality and higher controllability attributions may be associated with lower awareness of ADHD (inattention) symptoms, which could pose a
hindrance during treatment. As girls may particularly be at risk for experiencing psychological problems (e.g., depression, low self-esteem) due to their internal and pervasive attribution style (Abramson et al., 1978; Sweeney et al., 1986; Fitch, 1970), therapeutic intervention is needed to address their concerning attributions.

It is also necessary to help children and adolescents with ADHD deal with issues of stigmatization. Elkington and colleagues (2012) recommend a multi-level intervention approach, at the level of the individual, family (e.g., management of courtesy stigma), and community. For example, anti-stigmatization programs may be needed to increase public understanding of the disorder. Within this effort, it will be crucial to educate the public that the behaviors often associated with ADHD are not easily controlled and are not necessarily destructive. Media messages that portray individuals with mental health disorders as dangerous also need to be addressed in this regard (Hinshaw, 2005). Supportive family members, peers, and school environments may also help to neutralize the stigma experienced by youth with mental health disorders (Kranke et al., 2010).
Table 3.1

*Descriptive Information about Sample by Group Status and Age*

<table>
<thead>
<tr>
<th></th>
<th>9-12 years</th>
<th></th>
<th>14-18 years</th>
<th></th>
<th>Group Status</th>
<th>Age</th>
<th>Group Status x Age</th>
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<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>Comparison</td>
<td>ADHD</td>
<td>Comparison</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>M(SD)</td>
<td>N</td>
<td>M(SD)</td>
<td>N</td>
<td>M(SD)</td>
<td>F</td>
</tr>
<tr>
<td>Age</td>
<td>65</td>
<td>10.91(1.26)</td>
<td>42</td>
<td>11.22(1.13)</td>
<td>31</td>
<td>16.15(1.46)</td>
<td>35</td>
</tr>
<tr>
<td>Parent SES</td>
<td>63</td>
<td>7.24 (1.54)</td>
<td>42</td>
<td>8.29 (1.29)</td>
<td>27</td>
<td>7.93 (1.41)</td>
<td>32</td>
</tr>
<tr>
<td>Full Scale IQ</td>
<td>59</td>
<td>104.51 (11.03)</td>
<td>41</td>
<td>114.73 (9.42)</td>
<td>29</td>
<td>100.10 (6.92)</td>
<td>35</td>
</tr>
<tr>
<td>Conners Parent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM Inattentive</td>
<td>65</td>
<td>74.92 (9.29)</td>
<td>42</td>
<td>44.76 (4.27)</td>
<td>31</td>
<td>82.90 (7.37)</td>
<td>35</td>
</tr>
<tr>
<td>DSM Hyper-Imp</td>
<td>65</td>
<td>79.46 (10.05)</td>
<td>42</td>
<td>47.98 (5.45)</td>
<td>31</td>
<td>79.16 (12.58)</td>
<td>35</td>
</tr>
</tbody>
</table>

* p < .05, ** p <.01, *** p < .001

*Note. Age = in years; SES = highest education of mother or father; Full Scale IQ = overall standard score from WASI or WISC-IV*
Table 3.2

Matched Items of Adapted Dominic-R and Alex with CPRS-R/Conners 3-P

<table>
<thead>
<tr>
<th>Adapted Dominic-R</th>
<th>Alex</th>
<th>CPRS-R</th>
<th>Conners 3-P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inattentive</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Is it hard for you to follow directions?</td>
<td>• Is it hard for you to follow directions?</td>
<td>• Does not follow through on instructions</td>
<td>• Does not follow through on instructions</td>
</tr>
<tr>
<td>• Is it hard for you to keep your mind on your work?</td>
<td>• Is it difficult for you to concentrate/keep your mind on your work?</td>
<td>• Difficulty sustaining attention in task or play activities</td>
<td>• Has trouble keeping mind on work or play for long</td>
</tr>
<tr>
<td>• Are you easily distracted?</td>
<td>• Are you easily distracted?</td>
<td>• Inattentive/easily distracted</td>
<td>• Is easily distracted by sights or sounds</td>
</tr>
<tr>
<td>• Is it hard for you to pay attention when people are talking to you?</td>
<td>• Is it difficult for you to listen when people are speaking to you?</td>
<td>• Does not seem to listen to what is being said to him/her</td>
<td>• Does not seem to listen to what is being said to him/her</td>
</tr>
<tr>
<td>• Do you lose things?</td>
<td>• Do you lose things?</td>
<td>• Loses things necessary for tasks and activities</td>
<td>• Loses things</td>
</tr>
<tr>
<td><strong>Hyperactive-Impulsive</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Do you call out the answers before the question is completed?</td>
<td>• Do you call out answers before the question is completed?</td>
<td>• Blurs out answers to questions before questions completed</td>
<td>• Blurs out answers before the question has been completed</td>
</tr>
<tr>
<td>• Is it hard for you to wait your turn?</td>
<td>• Do you find it difficult to wait for your turn?</td>
<td>• Difficulty waiting in lines/games/group situations</td>
<td>• Has difficulty waiting for turn</td>
</tr>
<tr>
<td>• Do you disturb other children when they are playing?</td>
<td>• Do you interrupt others?</td>
<td>• Disturbs other children</td>
<td>• Disturbs other children</td>
</tr>
<tr>
<td>• Do you have difficulty playing quietly?</td>
<td>• Is it hard for you to do leisure activities quietly?</td>
<td>• Difficulty playing or engaging in leisure activities quietly</td>
<td>• Noisy and loud when playing or using free time</td>
</tr>
<tr>
<td>• Do you find it difficult to remain in your seat?</td>
<td>• Do you find it difficult to remain seated?</td>
<td>• Leaves seat in class/situations in which remaining seated is expected</td>
<td>• Leaves seat when he/she should stay seated</td>
</tr>
<tr>
<td>• Do you talk too much?</td>
<td>• Do you talk too much?</td>
<td>• Talks excessively</td>
<td>• Talks too much</td>
</tr>
<tr>
<td>• Do you fidget with your hands and feet? Do you squirm in your seat?</td>
<td>• Do you fidget with your hands or feet? Do you squirm in your seat?</td>
<td>• Fidgets with hands or feet or squirms in seat</td>
<td>• Fidgets or squirms in seat</td>
</tr>
</tbody>
</table>
Table 3.3

Comparison of PIB Discrepancy Scores of 9-12 and 14-18 year olds by Group Status

<table>
<thead>
<tr>
<th>Discrepancy</th>
<th>9-12 years</th>
<th>14-18 years</th>
<th></th>
<th>Group Status x Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>Comparison</td>
<td>ADHD</td>
<td>Comparison</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>M(SE)</td>
<td>N</td>
<td>M(SE)</td>
</tr>
<tr>
<td>Total ADHD Symptoms(^b)</td>
<td>56</td>
<td>.567(.130)</td>
<td>40</td>
<td>-.347(.153)</td>
</tr>
<tr>
<td>Hyper-Imp Symptoms(^b)</td>
<td>56</td>
<td>.541(.140)</td>
<td>40</td>
<td>-.305(.165)</td>
</tr>
<tr>
<td>Inattentive Symptoms(^b)</td>
<td>56</td>
<td>.553(.129)</td>
<td>41</td>
<td>-.398(.152)</td>
</tr>
</tbody>
</table>

\(^*\) p < .05, ** p < .01, *** p < .001

a. Discrepancy of standard scores for Child/Adolescent Total (Adapted Dominic-R/Alex) and Parent Total (CPRS-R/Conners 3-P) ADHD symptoms, Hyperactive-Impulsive symptoms, and Inattentive symptoms

b. The assumption of normality of distributions was violated in the Comparison group; however, results may be trusted with n = 15 per cell according to Green and Salkind (2005). The assumption of homogeneity of variance was violated.
Table 3.4

Comparisons of Attributions for Problem Behaviors (AAQ) by Age and Group Status

<table>
<thead>
<tr>
<th>Attribution</th>
<th>9-12 years</th>
<th>14-18 years</th>
<th>Group Status</th>
<th>Age</th>
<th>Group Status x Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>Comparison</td>
<td>ADHD</td>
<td>Comparison</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N M(SD/SE)</td>
<td>N M(SD/SE)</td>
<td>N M(SD/SE)</td>
<td>N M(SD/SE)</td>
<td>F η²</td>
</tr>
<tr>
<td>Controllability</td>
<td>65</td>
<td>6.69(1.58)</td>
<td>42</td>
<td>7.52(1.35)</td>
<td>30</td>
</tr>
<tr>
<td>Pervasiveness</td>
<td>61</td>
<td>5.88(.233)</td>
<td>41</td>
<td>5.02(.262)</td>
<td>27</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

Note: Although the assumption of normality of distributions was violated for dependent variables, results may be trusted with n = 15 in each cell (Green & Salkind, 2005).

a. Variances among groups significantly differed (i.e., Levene’s test of equality of error variances was significant).
CHAPTER 4

General Conclusions and Implications

The overarching goal of this dissertation was to acquire a more comprehensive understanding of the self-perceptions of adolescents with ADHD with regard to their core ADHD symptoms and associated problem behaviors. Self-perceptions were specifically examined in relation to adolescents’ awareness of their problem behaviors (i.e., whether they perceive they have a symptom or some form of impairment), attribution patterns, and stigmatization self-perceptions. Several theoretical perspectives were considered to better understand the mechanisms that underlie the self-perceptions of adolescents with ADHD. These included ignorance of incompetence, cognitive immaturity, normative developmental differences in self-perceptions in accordance with Harter’s (1999, 2012) model of the self, and Weiner’s (1985) attributional framework. Based on this dissertation, seven main conclusions can be derived.

First, the results of the current dissertation indicated that 13 to 18 year old adolescents with ADHD have a positive illusory bias (PIB), such that they underestimate their problem behaviors, in comparison to adolescents without ADHD when their self-ratings are compared to parent raters. These findings are in accordance with previous studies indicating that adolescents with ADHD hold a PIB when it is examined as inflation of self-perceptions of competence in the social, scholastic, and behavioral conduct domains (Hoza et al., 2010; McQuade, Hoza, et al., 2011). The present findings advance our knowledge by demonstrating that adolescents with ADHD also demonstrate a PIB in terms of underestimation of ADHD symptoms and related behaviors. Not only do adolescents with ADHD underestimate their associated symptoms of oppositionality, academic problems, and (to a lesser degree) social difficulties, they also
underestimate the core behavioral features of their disorder (i.e., symptoms of inattention and hyperactivity-impulsivity). The findings, thus, raise concern that adolescents with this disorder demonstrate inadequate awareness of their symptoms and associated problems relative to individuals in their environment (i.e., parents) who observe these difficulties.

The second major finding of this dissertation was that despite demonstrating a PIB for their core ADHD symptoms and associated difficulties relative to external raters, adolescents with ADHD did not lack complete awareness of their challenges. Compared to typically developing peers, they reported having more (i.e., Borderline Clinical level self-ratings) symptoms of inattention, hyperactivity-impulsivity, and academic problems. As well, adolescents with ADHD who were low achieving acknowledged having more academic problems than adolescents with ADHD who were not low achieving. Similarly, adolescents with ADHD who had clinical levels of social problems rated themselves as having more social problems than adolescents with ADHD without clinically significant social problems. These findings pose a challenge to the ignorance of incompetence hypothesis, which posits that individuals with poorly developed skills in a given domain are unable to recognize their incompetence in that domain (Kruger & Dunning, 1999). If this were the case, adolescents with ADHD should not have been cognizant of their patterns of difficulty, raising concern about the plausibility of this theoretical explanation for the PIB. Rather, the findings suggest that adolescents with ADHD may have difficulty recognizing the extent of their difficulties relative to parent raters, but they generally realize that they experience several challenges.

Nevertheless, there was one notable exception based on the results of this dissertation. In terms of oppositionality, adolescents with ADHD rated themselves as having normative levels of oppositional symptoms. Further, when classified (by parent raters) as having clinically
significant symptoms of oppositionality, adolescents with ADHD with clinical levels of symptoms did not differ in their oppositionality self-ratings from adolescents with ADHD without clinical levels of oppositional symptoms. The findings indicate that adolescents with ADHD show limited awareness of their problems with oppositionality such as argumentativeness, loss of temper, and non-compliance with adult requests, which could be construed as ignorance of incompetence in this specific domain. Thus, there may be something unique about oppositionality symptoms that contributes to adolescents’ underestimation or limited awareness.

The present research offered new insight into why adolescents with ADHD may be showing limited awareness of their oppositionality symptoms. Holding external locus of causality attributions for problem behaviors was associated with more underestimation of oppositionality symptoms (i.e., larger PIB) than internal locus of causality attributions. The findings suggest that adolescents with ADHD who view themselves as less responsible for their behaviors and assign responsibility to environmental factors, such as people around them, for their challenges are more likely to under-report their oppositionality symptoms. The common feature between external locus of causality and ODD symptoms is blaming others for mistakes and misbehaviors (DSM-IV-TR, APA, 2000), which may be why the association regarding external locus of causality was primarily present for ODD symptoms. Thus, it may be important to consider the relationship between oppositionality symptoms and external locus of causality in further studies.

Fourth, this dissertation showed that while the PIB was present across children and adolescents with ADHD (relative to parent raters), 14-to-18 year olds with ADHD underestimated their ADHD symptoms less than 9-to-12 year olds with ADHD, indicating there
is a reduction in the PIB (i.e., greater awareness of symptoms) in middle-to-late adolescence. This was particularly the case for hyperactivity-impulsivity symptoms. The results supported the cognitive immaturity hypothesis, which proposes that the cognitive functions of children with ADHD are immature and prevents them from accurately judging their difficulties (Milich, 1994; Owens et al., 2007), and stipulates that more realistic self-perceptions develop with increased age. The findings are also in line with the one other study (Hoza et al., 2010) that showed that the magnitude of the difference in the PIB in individuals with and without ADHD is reduced in adolescence. Furthermore, the dissertation results lend support to Harter’s (1999, 2012) model of the self, which suggests there are normative developmental differences in self-perceptions such that individuals develop a more stable view of their positive and negative attributes, show greater accuracy in their self-representations, along with greater acceptance of their limitations by late adolescence. While Harter (1999, 2012) previously demonstrated this in typically developing populations, the current research indicated the presence of developmental differences in awareness of problem behaviors in ADHD populations (i.e., greater acknowledgement of both inattentive and hyperactive-impulsive symptoms in adolescence).

Fifth, the present research indicated that while adolescents with ADHD underestimate the extent of their difficulties, when instructed to identify their most problematic behaviors, they ascribed their behaviors (i.e., mainly symptoms of inattention and hyperactivity-impulsivity) to pervasive and uncontrollable causes based on Weiner’s (1985) attributional framework. This is much like the attribution patterns of children with ADHD (Kaidar et al., 2003; Wiener et al., 2012). As well, the majority of adolescents with ADHD attributed their behaviors to internal causes. The findings suggest that adolescents with ADHD recognize the pervasive aspect of their behaviors in multiple contexts over time (a key diagnostic requirement; APA, 2000). They
also appear to hold themselves as responsible for having the behaviors, which is consistent with the biological basis of the disorder (Farone & Biederman, 1998). These findings addressed an important area in this literature by demonstrating adolescents’ attribution style primarily for their ADHD symptoms, whereas previous studies primarily focused on attributions for academic issues (Neiderhofer, 2008), non-compliance (Ohan & Johnston, 1999), success/failure (Hoza et al., 1993), and medication (Carlson et al., 1993; Milich et al., 1991), especially in children with ADHD (Pelham et al., 1997; 2002). However, the results are concerning because individuals with an internal and pervasive attributional style (described as “depressogenic” by Abramson and colleagues, 1978) are at risk for facing self-esteem problems, affective problems, and learned helplessness (Abramson et al., 1978; Weiner, 1985).

Sixth, this dissertation showed that 14-to-18 year old adolescents with ADHD view their problem behaviors as stigmatizing (i.e., embarrassing and bothersome to others), which indicates that they perceive the stigma that others direct towards them due to the presence of their inattentive and hyperactive-impulsive behaviors. They experience similar levels of stigma for both their problem behaviors and their disorder. The results addressed an important issue that has not been investigated in previous studies by specifically quantifying how adolescents with ADHD feel, as most studies have focused on stigmatizing attitudes towards individuals with ADHD (Martin et al., 2007; Walker et al., 2008) and stigma experienced by children with ADHD (Singh et al., 2010; Wiener et al., 2012). At the same time, outcomes associated with stigma include increased risk of experiencing mental and physical health problems, low self-esteem, and discrimination (Major & O’Brien, 2005), indicating that adolescents with ADHD are at risk for experiencing a host of additional challenges. Parents of adolescents with ADHD are also at risk for experiencing stigma (Koro-Ljungberg & Bussing, 2009).
Finally, this dissertation showed that there was an association between the PIB for inattentive symptoms with locus of causality attributions in individuals with ADHD. Those with internal locus of causality attributions underestimated their inattentive symptoms less than individuals with ADHD who held external locus of causality attributions. The findings again suggest that there is a relationship between locus of causality and the PIB that needs to be better understood. For example, it is possible that the link between locus of causality and the PIB may be due to the presence of certain co-occurring symptoms in individuals with ADHD. Perhaps the co-occurrence of depression symptoms with internal locus of causality results in less underestimation of inattention. Alternately, the presence of co-occurring oppositionality symptoms with external locus of causality may result in greater underestimation.

**Implications for Future Research**

Although the current research revealed several important findings regarding the self-perceptions of adolescents with ADHD for their core ADHD symptoms and associated problem behaviors, further research is required to continue to advance our knowledge in several areas.

First, additional research is needed to increase our understanding of the mechanisms that are involved in the PIB. Of Owens et al.’s (2007) proposed mechanisms, only two were examined in this dissertation; it would also be useful to examine the self-protection and neuropsychological deficits mechanisms for the PIB defined as underestimation of symptoms/problems. Additionally, the overlap between the cognitive immaturity and neuropsychological deficits mechanisms for the PIB warrants investigation, as support (Hoza et al., 2010; McQuade, Tomb, et al., 2011; Chapter 3 of this dissertation) has been obtained for both theoretical explanations. The neuropsychological deficits hypothesis proposes that inadequate awareness of personal errors and poor self-awareness are caused by deficits in...
executive functioning and frontal lobe damage (Owens et al., 2007). Based on
neuropsychological studies (El-Sayed et al., 2002; Shaw et al., 2007), there is evidence of a
“maturation lag” in brain development in the frontal regions (i.e., slow cortical activity in frontal
regions and delays in cortical maturation in the prefrontal region) in individuals with ADHD.
Furthermore, age-related changes are present in executive functions, with many components of
executive functioning gradually developing from childhood through adolescence and early
adulthood (Huizinga et al., 2006). The above findings are compatible with both the cognitive
immaturity and neuropsychological mechanisms for the PIB. Given the overlap in these
theoretical explanations, the intersection needs to be better understood, as it is possible that the
cognitive immaturity mechanism is part of a broader neuropsychological deficit. The role of the
default network (important in self-evaluative processes), which shows irregularities in
individuals with ADHD (Fair et al., 2010) may need to be further studied, to better understand if
it plays a role in the PIB.

A second avenue pertains to better understanding the reasons for adolescents’ limited
awareness of their oppositionality symptoms (even in the absence of an external rater). This
dissertation suggested that external locus of causality may be a plausible explanation; however,
replication is required. Further, investigation is needed to understand potential links between
ignorance of incompetence, external locus of causality, presence of hostile attributions and the
PIB for oppositionality. Other explanations could also be considered for underestimation of
oppositionality such as non-delinquent aggressive behaviors becoming more normative in
adolescence (Moffit, 1993). Moreover, a small body of research (in addition to the present
dissertation) now suggests that the presence of oppositional symptoms is associated with more
limited awareness in children and adolescents with ADHD (i.e., increases the PIB in girls with
ADHD regarding their perceptions of social competence; Ohan & Johnston, 2011, and a combination of ODD and ADHD symptoms is predictive of the PIB; Scholtens et al., 2012). Collectively, there appears to be something unique about oppositional behaviors (perhaps external locus) and limited awareness in individuals with ADHD, requiring further study.

Third, given that adolescents with ADHD underestimate their challenges (although reduced compared to childhood), future research will need to ascertain at what stage in development the self-reports of individuals with ADHD reflect a reliable and valid representation of their difficulties. This is especially important given that reports of external raters (parents and teachers) are also prone to bias. For instance, there is evidence that mothers of children with ADHD who experience depression rate their children’s ADHD-related symptoms and general behavioral problems quite negatively, with maternal depression symptoms predicting negative rating bias (Chi & Hinshaw, 2002). Additionally, parents of children and adolescents with ADHD experience high levels of parenting stress (Anastopoulos, Guevremont, Shelton, &DuPaul, 1992) and conflict with their adolescents (Edwards, Barkley, Laneri, Fletcher, & Metevia, 2001; Markel & Wiener, 2012), which has the potential to contribute to greater negativity in ratings. Similarly, secondary school teachers’ ratings are prone to bias (low interteacher reliability; Molina et al., 1998, more severe ratings provided by women and younger teachers; Schultz & Evans, 2012). As well, a recent study by Swanson et al. (2012) indicated that the PIB was not present when the self-reports of girls with ADHD were compared to peers’ ratings (regarding social acceptance) and to objective achievement measures (regarding scholastic competence), whereas it was present when girls’ self-reports were compared to parent and teacher ratings. Moreover, though there was numerical evidence for a PIB relative to adult raters, the self-reports of girls with ADHD were not “positive in the absolute sense” (p. 995), as
their self-reports were in the negative direction (as were parents’ and teachers’), but not quite as low as the adult ratings. Based on this research, Swanson et al. (2012) therefore wondered whether adults who are aware of a child’s diagnostic status may associate ADHD with low competence, resulting in more negative ratings from adult sources. In summary, given the potential for biased ratings in various raters including adults, it will be important to determine at what developmental stage self-reports of individuals with ADHD can be employed.

Fourth, further research is needed to establish which types of factors place individuals at risk for developing a PIB. Although many studies indicate the presence of a PIB in children and adolescents with ADHD at the level of the group, it is important to note that not all children and adolescents underestimate their challenges or overestimate their competence. Recent studies (e.g., Linnea et al., 2012; McQuade, Tomb, et al., 2011) categorize participants with ADHD into those with a PIB and those without a PIB. There was also evidence of variance in the current dissertation with regard to the PIB. It is possible that a combination of individual risk factors (e.g., oppositionality symptoms/aggressive behavior, certain subtypes, presence/absence of depression), personality characteristics, attribution patterns, vulnerability to stigma, and environmental risk factors may operate together in development of the PIB in individuals with ADHD. Thus, it is important to determine which compilations of risk factors are involved.

A fifth issue pertains to considering alternative explanations for the PIB (i.e., beyond the four explanations proposed by Owens et al., 2007). Some of the core features of ADHD (according to the DSM-IV-TR) are failure to give close attention to details and making careless mistakes while completing tasks; thus, while completing rating scales, it is possible that the symptoms of the disorder (e.g., not pausing to carefully think through the questions) may interfere with adolescents judging the extent of their difficulties. In addition, it may be important
to consider the reference group to which adolescents with ADHD compare themselves to. Both proximity and similarity to peers are important predictors of developing friendships (Schneider, Wiener, & Murphy, 1994). When applied to adolescents with ADHD, their local peer group may therefore consist of individuals who present with similar challenges as them (as found by Marton et al., in press) and who may be receiving supports (e.g., placement in special education classes, classroom-based accommodations for their challenges) as they may be. As people typically evaluate their performance to their local comparison group rather than the general comparison group (e.g., population of typically developing peers; Zell & Alicke, 2010), adolescents with ADHD may not perceive their problems as significant areas of concern within their local peer group and may consequently underestimate their challenges. Given these possibilities, in future research, it will therefore be important to examine whether alternative explanations exist for the PIB.

Sixth, while a number of mechanisms have been proposed to understand the limited awareness of children and adolescents with ADHD for their problem behaviors relative to external raters, future research could focus on gaining more insight directly from children/adolescents on why they choose to rate themselves as they do. For instance, while completing rating scales or making post-task performance predictions, adolescents could be asked what factors they considered when rating themselves (e.g., open-ended questions or a list of options asking “did you compare yourself to your close friends?”). It may also be of value to ask parents the factors they consider when rating their adolescents. Qualitative research may be helpful in this regard.

Seventh, while this dissertation showed an association between limited awareness of ADHD symptoms with attribution patterns and stigma in individuals with ADHD, the
relationships between these differing aspects of self-perceptions needs to be clarified. In addition to replication, the direction of the relationship should be specified. Alternatively, consideration could be given to variables that co-vary with both the PIB and attributions/stigma (e.g., depression symptoms may be related to both the PIB and internal locus of causality).

Finally, as adolescents with ADHD attribute their problem behaviors to pervasive and uncontrollable causes, and experience stigma, it will be important to investigate the long-term implications of their attributional style (e.g., impact on self-esteem, affect, future outlook, likelihood of developing depression, general adjustment). Mechanisms for the development of stigma self-perceptions may also need to be considered in adolescents with ADHD. For instance Major and O’Brien’s (2005) stigma-induced identity threat model may need to be investigated. This model suggests that personal characteristics (e.g., sensitivity to stigma), perceptions of situational cues, along with societal representations of outgroups, impact an individual’s vulnerability to stigma. Factors that could mitigate stigma in adolescents with ADHD should also be considered (e.g., parental support may reduce stigma as suggested by Kranke et al., 2010).

Clinical Implications of Present Research

The results of the current dissertation have several assessment and treatment implications for mental health practitioners and clinicians that work with adolescents with ADHD.

Assessment Implications

In terms of assessment, as both children and adolescents with ADHD underestimate their problem behaviors, it is questionable to utilize the self-ratings of children on standardized measures during psychoeducational assessments. However, as the PIB is reduced in adolescents with ADHD, it may be possible to cautiously utilize their self-ratings in the context of multi-method and multi-source assessments (as suggested by Mash & Hunsley, 2007), involving the
use of multiple raters, clinical observations, interviews, and objective performance-based measures. Although such an assessment approach would require a significant time commitment from mental health professionals, it will provide a more holistic picture of adolescents’ functioning from various perspectives, including adolescents’ own perspectives (as they are able to acknowledge to some extent that they experience challenges).

Over the course of assessment work, it will also be necessary to assess the attribution patterns and stigmatization self-perceptions of adolescents with ADHD. Though adolescents with ADHD have inadequate awareness of their challenges compared to external raters, the fact that they view their problem behaviors as pervasive, uncontrollable, and stigmatizing relative to Comparison adolescents suggests that they realize they possess difficulties that are impacting them. In contrast, those with external locus of causality attributions and with clinical levels of oppositionality symptoms may be less aware of their challenges. Thus, information about attribution patterns may be useful information in guiding and developing treatment plans tailored to the specific self-perceptions of adolescents with ADHD.

Another area that may need to be considered during assessment work with this population is the types of impairments adolescents with ADHD experience. According to the DSM-IV-TR (APA, 2000), individuals with ADHD typically experience clinical impairments in the social, academic, or occupational domains. Based on the large body of literature (including this dissertation) suggesting that the PIB is a robust phenomenon in children and adolescents with ADHD, it may be necessary to consider whether difficulties with self-appraisals of their own challenges is another aspect of the clinical impairment they face.
Treatment Implications

There are several concerns regarding providing treatment to adolescents with ADHD for their difficulties, as adolescents with ADHD are less receptive to seeking treatment (e.g., psychotropic medication, behavioral therapy, counseling) than their parents (Bussing et al., 2012) due to perceptions that mental health treatments are stigmatizing, ineffective, and burdensome (i.e., require a great deal of commitment; Bussing, Zima, Mason, Porter, & Garvan, 2011; Bussing et al., 2012). Nevertheless, it is crucial that they receive treatment to address their difficulties, as adolescents with ADHD experience numerous challenges and there is now considerable evidence that the PIB may be maladaptive (Hoza et al., 2010; Murray-Close et al., 2010; Ohan & Johnston, 2011). Based on this dissertation, several additional issues could arise that may pose further obstacles to treatment. Some suggestions to assist in this regard are discussed.

As adolescents with ADHD underestimate the extent of their challenges and have a pervasive and uncontrollable attribution style (i.e., associated with low motivation to put forth effort into changing; Weiner, 1994), and feel stigmatized, willingness to receive treatment from mental health professionals and commitment to engage in the treatment process may be more difficult than previously thought. This may especially be a concern for adolescents with ADHD who have clinical levels of oppositional symptoms in combination with an external locus of causality for their problem behaviors, which could make them make guarded or resistant during the treatment process. As such, mental health professionals will need to utilize and develop a treatment approach that increases the awareness of problem behaviors and acceptance of these behaviors in adolescents with ADHD. Professionals may need to incorporate motivational enhancement techniques into treatment. A treatment approach such as mindfulness-based
interventions may be of use; mindfulness treatments focus on processes of increasing an individual’s awareness of their challenges, acceptance of difficulties, exposure, developing self-compassion, and self-regulation skills through the deliberate focusing of attention on sensations, thoughts, and feelings as they arise on a moment-to-moment basis (Allen, Chambers, Knight, & Melbourne Academic Mindfulness Interest Group, 2006; Baer 2003; Williams, Teasdale, Segal, & Kabat-Zinn, 2007). Mindfulness-based interventions indeed have successfully been employed with adolescents with ADHD (Bogels, Hoogstad, van Dun, deSchutter, & Restifo, 2008; Haydicky et al., 2012). Over treatment, it will be very important to address the issues of adolescents with ADHD in a gentle and sensitive manner. A key part of treatment then will be developing trust with adolescents, likely over the course of multiple sessions, with the therapeutic alliance playing an important role.

Another essential part of treatment will be assisting adolescents with the stigma they encounter in their daily lives. As individuals in the general public typically do not understand the experience of living with the challenges associated with ADHD, adolescents with ADHD may play a chief role in teaching others about the experience of living with ADHD, the unique challenges associated with it, supports they benefit from, and advocating for themselves in this context. Hinshaw (2005) and Gaertner and Dovidio (2000) suggest that when individuals with ADHD have the opportunity to interact with others on an egalitarian basis, towards common goals, the attitudes of ingroup members improve and there is an expanded sense of ingroup identity. At the secondary school level, adolescents with ADHD are in a position to educate others about their “insider” experiences of living with ADHD.
References


hierarchies of skills. *Psychological Review, 87*(6), 477-531.


Ohan, J.L., & Johnston, C. (2002). Are the performance overestimates given by boys with


Scholtens, S., Diamantopoulou, S., Tillman, C. M., & Rydell, A. (2012). Effects of symptoms of ADHD, ODD, and cognitive functioning on social acceptance and the positive illusory


Stuss, D.T., & Benson, D.F. (1987). The frontal lobes and control of cognition and


## Appendix A

### Non-Significant Locus of Causality Findings with PIB Discrepancy Scores (ADHD sample)

<table>
<thead>
<tr>
<th>Discrepancy Score</th>
<th>External (N = 14)</th>
<th>Internal (N = 26)</th>
<th>t</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td></td>
</tr>
<tr>
<td>DSM Inattentive</td>
<td>19.00</td>
<td>20.19</td>
<td>13.00</td>
<td>16.82</td>
<td>1.00</td>
</tr>
<tr>
<td>DSM Hyperactive-Impulsive</td>
<td>18.86</td>
<td>21.69</td>
<td>11.92</td>
<td>18.92</td>
<td>1.05</td>
</tr>
<tr>
<td>Learning Problems</td>
<td>16.21</td>
<td>15.77</td>
<td>12.11</td>
<td>13.01</td>
<td>.88</td>
</tr>
<tr>
<td>Social Problems</td>
<td>3.76</td>
<td>8.74</td>
<td>1.20</td>
<td>10.90</td>
<td>.73</td>
</tr>
</tbody>
</table>
Appendix B

Adapted Dominic-R, Alex, and AAQ Measures

1. Sample Adapted Dominic-R Picture
2. List of Adapted Dominic-R Problem Behaviors
3. Sample Alex Pictures
4. List of Alex Problem Behaviors
5.Attributions for ADHD Questionnaire
Appendix B.1: Sample Adapted Dominic-R Picture

DOMINIC/DOMINIQUE

IS IT HARD FOR YOU TO PAY ATTENTION WHEN PEOPLE ARE TALKING TO YOU, LIKE DOMINIC?
Appendix B.2: List of Adapted-R Dominic Problem Behaviors

**ADHD**

*Inattention*
- Keeping Mind on Work
- Easily Distracted
- Pay Attention When People are Talking to You
- Jump From One Thing to Another
- Follow Directions
- Lose Things

*Hyperactivity-Impulsivity*
- Call Out Answers Before Question Completed
- Wait for Your Turn
- Talk too Much
- Fidget With Your Hands or Feet/Squirm in Your Seat
- Playing Quietly
- Remain Seated
- Disturb Other Children When They Are Playing

**Learning Difficulty**
- Solve Math Problems
- Remember Number Facts
- Hard to Read
- Understand What You Read
- Come Up With Ideas when Writing
- Hard to Spell
- Copy Things off the Board Neatly and Quickly

**Conduct Problems**
- Argue With Adults
- Lose Temper
- Refuse to Do What Adults Tell You to Do
- Do Things on Purpose to Get On Nerves of Other People
- Hurt People on Purpose
- Start Fights
- Stolen More than Once

**Anxiety**
- Worry a Lot
- Can’t Stop from Worrying

**Depression**
- Feel Sad Most of the Time
- Are you Sad
Is it difficult for you to concentrate or keep your mind on your work, like Alex?
Is it difficult for you to concentrate or keep your mind on your work, like Alex?
Appendix B.4: List of Alex Problem Behaviors

ADHD

Inattention
● Concentrate or Keep Mind on Work
● Listen When People are Speaking to You
● Follow Directions
● Finish Things
● Lose Things
● Get Easily Distracted
● Make Careless Mistakes in Schoolwork
● Forgetful in Daily Activities
● Difficulty Getting Organized

Hyperactivity-Impulsivity
● Fidget With Hands/Feet or Squirm in Seat
● Being Restless
● Call Out Answers Before Question Has Been Completed
● Wait For Your Turn
● Talk Too Much
● Remain Seated
● Interrupt Others
● Always Being “On the Go”
● Doing Leisure Activities Quietly

Learning Difficulty
● Solve Math Problems
● Remember Number Facts
● Sound Out Words
● Recognize Words
● Understand What You Read
● Read Too Slowly
● Copy Things off Blackboard/Overhead Neatly & Quickly
● Come Up With Ideas When Writing
● Organize Ideas When Writing
● Spell Words
● Grammar or Punctuation Mistakes When Writing
● Poor Vocabulary
● Explain Exactly What You Mean (Precision)
● Come Up With the Word You Want to Say (Word Retrieval)
● Understand What Others Say to You (Receptive Language)
● Remember Information Just Presented to You (Short-Term Memory)
● Remember Information Presented to You When You Have to Work with it (Working Memory)
● Remember Things, Like, Names, Events Facts (Long-Term Memory)
● Difficulty Performing Tasks Quickly
• ODD
  • Refuse to Do What Adults Tell You to Do
  • Do Things on Purpose to Annoy Others
  • Argue With Adults
  • Lose Temper
  • Blame Others for Mistakes

• CD
  • Take Things That Don’t Belong to You
  • Start Physical Fights
  • Hurt People on Purpose
  • Lie to Get Things or to Get Out of Doing Things
  • Break Rules

• Internalizing
  • Worry a Lot
  • Being Irritable
  • Feeling Sad Most of the Time Even When Others Are Having Fun

• Social Difficulties
  • Worry About Talking In Front of Others (Social Anxiety)
  • Making friends
  • Keeping Close Friends
  • Giving into Peer Pressure
  • Conflict With Peers
  • Bullied by others
  • Poor Social Skills
  • Understand How Others Think and Feel
  • Take Over Conversations
  • Start Conversations
  • Talk Too Loud
  • Take Turns During Conversations
  • Stay on Topic During Conversations

• Risk-Taking
  • Smoke Cigarettes
  • Smoke Marijuana
  • Take Street Drugs
  • Drink Alcohol and Get Drunk
  • Do Dangerous Things
  • Spend Money Foolishly
Positive Behaviors
● Good Fashion Sense
● Good Musician
● Draw Well
● Good at Sports
● Kind and Generous Person
● Being a Leader
● Good Sense of Humor
● Fun to be with
● Good and Loyal Friend
● Good at Drama
Appendix B.5 : Attributions for ADHD Questionnaire (AAQ)

Keeping Mind on Work

Stigmatization

Parents

1. A) Do your parents get bothered by your difficulty to keep your mind on your work?
   □ never
   □ a little
   □ a lot

B) Do you think that you cause your parents to be embarrassed because of your difficulty to keep your mind on your work?
   □ never
   □ a little
   □ a lot

C) Do you think your parents treat you differently from your brothers or sisters because of your difficulty to keep your mind on your work?
   □ never
   □ a little
   □ a lot

D) Do you think your parents get disappointed because of your difficulty to keep your mind on your work?
   □ never
   □ a little
   □ a lot

E) Give an example of how your parents treat you differently, get disappointed, and get embarrassed by your difficulty to keep your mind on your work.
________________________________________________________________
________________________________________________________________
**Teachers**

2. A) Do your teachers get bothered by your difficulty to keep your mind on your work?

   - □ never
   - □ a little
   - □ a lot

B) Do you think that teachers don't like you because of your difficulty to keep your mind on your work?

   - □ never
   - □ a little
   - □ a lot

C) Do you think teachers treat you differently from other students because of your difficulty to keep your mind on your work?

   - □ never
   - □ a little
   - □ a lot

D) Give an example of how teachers treat you differently.

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

**Peers**

3. A) Do your friends or classmates get bothered by your difficulty to keep your mind on your work?

   - □ never
   - □ a little
   - □ a lot
B) Do you think that you cause your friends to be embarrassed by your difficulty to keep your mind on your work?

☐ never
☐ a little
☐ a lot

C) Do you think that some classmates don’t like you because of your difficulty to keep your mind on your work?

☐ never
☐ a little
☐ a lot

D) Do you think some classmates treat you differently from your other peers and classmates because of your difficulty to keep your mind on your work?

☐ never
☐ a little
☐ a lot

E) Give an example of how some of your classmates treat you differently and get embarrassed by your difficulty to keep your mind on your work.
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

4. A) Do you get in trouble when you can’t keep your mind on your work?

☐ I never get in trouble
☐ I get in a little trouble
☐ I get in a lot of trouble

B) Give an example of how you get in trouble.
__________________________________________________________________________
__________________________________________________________________________
5. **A)** Are you embarrassed when you can't keep your mind on your work?
   - □ never
   - □ a little
   - □ a lot

   **B)** Give an example of how you feel embarrassed.
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________

**Controllability**

6. If you try really hard, do you think you can keep your mind on your work?
   - □ not at all
   - □ a little
   - □ a lot

7. On a scale of 1 to 5, with 1 being easy and 5 being very hard, how easy or hard is it for you to keep your mind on your work?

   1  2  3  4  5

8. **A)** What helps you keep your mind on your work?
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________

   **B)** Which of the following helps you keep your mind on your work?
   (rank in order from 1 – 4 with 1 being the highest and 4 being the lowest)
   - □ Being in a quiet non-distracting environment
   - □ Having other people provide structure to help keep me organized
   - □ Trying really hard
   - □ The pills I take
9. Do you find it difficult to keep your mind on your work even when you want to?
   □ never
   □ a little
   □ a lot

10. Can you control yourself and keep your mind on your work?
    □ a lot
    □ a little
    □ never

**Locus of Causality**
11. A) Why do you think it is difficult for you to keep your mind on your work?
    ______________________________________________________________________
    ______________________________________________________________________

    B) Is it,
    □ Something around you (like people) that makes it difficult for you to keep your mind on your work?
    OR
    □ Something inside of you that makes it difficult for you to keep your mind on your work?

**Pervasiveness**
12. Have you had difficulty keeping your mind on your work:
    □ only a short time
    □ a few years
    □ as long as you can remember

13. Do you have difficulty keeping your mind on your work?
    □ almost never
    □ only some of the time
    □ all the time
14. A) Do you think your difficulty with keeping your mind on your work is going to:

- □ disappear soon
- □ last only a few years
- □ last forever (even when you are an adult)

B) If you think that your difficulty with keeping your mind on your work is going to last, do you think it is going to:

- □ get better with time
- □ stay the same with time
- □ get worse with time

15. Do you think you can change and learn to keep your mind on your work?

- □ a lot
- □ a little
- □ not at all
16. You said that you are like Alex because you find it difficult to concentrate or keep your mind on your work. Do you have difficulty keeping your mind on your work when you are: (Check as many as apply.)

- bored
- doing school work in class
- doing home work
- doing quiet leisure activities
- doing active activities (e.g., like when playing sports)
- spending time with friends
- spending time with family members
- eating a meal
- at work
- watching television
- doing stuff on the computer
- listening to music
- asked by adults to do something you don’t want to
- other: ________________________________________________
Appendix C

Frequency of Behaviors Endorsed as Most Problematic by Participants

<table>
<thead>
<tr>
<th>Behavior</th>
<th>9-12 years</th>
<th>14-18 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>Comparaison</td>
</tr>
<tr>
<td></td>
<td>(N = 65)</td>
<td>(N = 41)</td>
</tr>
<tr>
<td><strong>Inattentive Symptoms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keeping Mind on Work</td>
<td>10.76% (7)</td>
<td>6.45% (2)</td>
</tr>
<tr>
<td>Easily Distracted</td>
<td>6.15% (4)</td>
<td>2.43% (1)</td>
</tr>
<tr>
<td>Forgetful Daily Activities</td>
<td>0.00% (0)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td>Listening to Others Speak</td>
<td>6.15% (4)</td>
<td>7.31% (3)</td>
</tr>
<tr>
<td>Losing Things</td>
<td>9.23% (6)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td>Finishing Things</td>
<td>0.00% (0)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td>Following Directions</td>
<td>3.07% (2)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td>Getting Organized</td>
<td>0.00% (0)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td>Jumping From One Thing to Another</td>
<td>6.15% (4)</td>
<td>17.07% (7)</td>
</tr>
<tr>
<td>Careless Mistakes in School Work</td>
<td>0.00% (0)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td><strong>Hyperactive-Impulsive Symptoms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talking Too Much</td>
<td>29.23% (19)</td>
<td>19.51% (8)</td>
</tr>
<tr>
<td>Fidgeting and Squirming</td>
<td>15.38% (10)</td>
<td>12.19% (5)</td>
</tr>
<tr>
<td>Calling Out Answers</td>
<td>0.00% (0)</td>
<td>2.43% (1)</td>
</tr>
<tr>
<td>Waiting Turn</td>
<td>1.53% (1)</td>
<td>4.87% (2)</td>
</tr>
<tr>
<td>Completing Leisure Activities Quietly</td>
<td>4.61% (3)</td>
<td>2.43% (1)</td>
</tr>
<tr>
<td>Remaining Seated</td>
<td>4.61% (3)</td>
<td>4.87% (2)</td>
</tr>
<tr>
<td>Interrupting Others</td>
<td>1.53% (1)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td>“On the Go”</td>
<td>0.00% (0)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td><strong>Learning Problems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solving Math Problems</td>
<td>0.00% (0)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td>Remembering Number Facts</td>
<td>0.00% (0)</td>
<td>2.43% (1)</td>
</tr>
<tr>
<td>Spelling</td>
<td>0.00% (0)</td>
<td>2.43% (1)</td>
</tr>
<tr>
<td>Copying from Board</td>
<td>0.00% (0)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td>Coming Up with Ideas when Writing</td>
<td>1.53% (1)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>0.00% (0)</td>
<td>2.43% (1)</td>
</tr>
<tr>
<td>Processing Speed</td>
<td>0.00% (0)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td><strong>Internalizing Problems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worrying A Lot</td>
<td>0.00% (0)</td>
<td>7.31% (3)</td>
</tr>
<tr>
<td>Feeling Sad</td>
<td>0.00% (0)</td>
<td>0.00% (0)</td>
</tr>
<tr>
<td><strong>ODD Problems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purposely Annoying Others</td>
<td>0.00% (0)</td>
<td>2.43% (1)</td>
</tr>
<tr>
<td><strong>Social Problems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keeping Friends</td>
<td>0.00% (0)</td>
<td>0.00% (0)</td>
</tr>
</tbody>
</table>

Note: Values enclosed in parentheses represent number of participants endorsing the behavior.