THE POSITIVE ILLUSORY BIAS AMONG WOMEN WITH DIFFERING LEVELS OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMS

by

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Abstract

Children with Attention-Deficit/Hyperactivity Disorder (ADHD) have a Positive Illusory Bias (PIB) in that they overestimate their abilities in areas in which they are deficient. Little is known about the PIB in adults with symptoms of ADHD. This study examines the PIB in adult women with differing levels of ADHD symptoms in seven domains of functioning. Ninety-one women with varying levels of ADHD symptoms completed a self-perception questionnaire inquiring about their sociability, intimate relationships, work competence, household management, intelligence, nurturance, and parenting. Others who knew the women well completed the same questionnaire with regard to the women. Standardized discrepancy scores between the women and other raters were used to index the women’s over-estimations of their competence. A composite score of the women’s ADHD symptoms was created (based on the women’s and others’ reports), and was not significantly related to the PIB in any domain. However, when the women’s and other raters’ reports of the women’s ADHD symptoms were examined separately, other raters’ reports were significantly positively associated with the PIB while women’s self-reports of ADHD symptoms were significantly negatively correlated with the PIB. These findings suggest the existence of the PIB in estimating competence among women with high levels of ADHD symptoms, at least when ADHD symptoms are assessed by other adults.
Preface

The ideas presented in this thesis are the work of the author. They were developed through discussion and collaboration with her advisor, Dr. Charlotte Johnston. The author had primary responsibility for all aspects of all the research presented here.

The research presented in this thesis was approved by the UBC Behavioural Research Ethics Board, under certificate number H09-02129.
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Dedication

To my parents
Introduction

Self-illusions in the form of moderately unrealistic optimism have been posited to be normal and even associated with markers of psychological well-being (Taylor & Brown, 1988). A distinct type of more extreme unrealistic positive self-perception, however, is maladaptive and less typical (Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007). This self-illusion is called the Positive Illusory Bias (PIB), and has been documented to exist in samples of children with Attention-Deficit/Hyperactivity Disorder (ADHD) (Owens et al., 2007). Little is known about whether adults with symptoms of ADHD also have this PIB. This study aims to examine the PIB in adults with differing levels of ADHD symptoms with respect competence in seven major domains of functioning (sociability, intimate relationships, work, household management, intelligence, nurturance, and parenting).

The following introduction begins by describing child ADHD, and emphasizes support for the dimensional nature of this construct. It then outlines the relation between normal optimistic self-illusions and mental health. It continues with a discussion of the PIB found in children with ADHD, and how it is different from normal illusory biases. Past studies exploring the PIB in children with ADHD and their methodologies are then reviewed. Further, the literature surrounding ADHD symptoms in adults is described, including information on prevalence rates. The dimensional nature of adult ADHD, and the ways in which adult ADHD is similar to child ADHD are discussed. Studies that examine the PIB in adults with ADHD symptoms are then outlined. Moreover, the existence of ADHD symptoms in parents is considered, along with an overview of the PIB in parents. Subsequently, the treatment implications of PIBs in adults are briefly discussed. Finally, the research question and predictions are presented.
ADHD in Children

ADHD is a psychological disorder that involves frequent and severe inattentiveness and/or hyperactivity/impulsivity that is developmentally inappropriate (American Psychiatric Association, 2000). It is estimated that ADHD has a prevalence of about 3-5% in school-aged children (American Psychiatric Association, 2000). Children with ADHD have difficulty with such behaviours as sustaining attention in tasks, listening when spoken to, following instructions, staying still in their classroom seats, and waiting their turn. In order to meet current diagnostic criteria for ADHD, a child must have six or more symptoms of inattention and/or six or more symptoms of hyperactivity/impulsivity (American Psychiatric Association, 2000). In addition, these symptoms must have an onset before 7 years of age, and cause impairment in at least two settings, interfering with current social, occupational, or academic functioning (American Psychiatric Association, 2000). The presence of ADHD in children is associated with a variety of cognitive, linguistic, emotional, motoric, scholastic, and health-related impairments, relative to children without ADHD (Barkley, 2006).

The Dimensional Nature of Child ADHD.

The current Diagnostic and Statistical Manual of Mental Disorders (DSM-VI-TR; American Psychiatric Association, 2000) uses a categorical system for diagnosing ADHD, which endorses the views that individuals with and without ADHD differ qualitatively rather than quantitatively, and that the cut-off for ADHD symptoms is non-arbitrary. Research, on the other hand, supports a dimensional nature to ADHD symptoms. For instance, taxometric analyses in children and adolescents show that ADHD symptoms are distributed continuously (Haslam, Williams, Prior, Haslam, Graetz, & Sawyer, 2006). In addition, behavioural genetic research finds that heritability of ADHD symptoms does not differ based
on the severity of ADHD symptoms in the sample (Gjone, Stevenson, & Sundit, 1996). These findings and results of other behavioural genetic studies suggest that genetic factors for ADHD operate on a continuum, and that the symptoms are distributed continuously within the population (Levy, Hay, McStephen, Wood, & Waldman, 1997). Looking at the taxometric and behavioural genetic analyses, there appears to be a great deal of support for the idea that child ADHD symptoms are distributed in a continuous fashion. I return to this point later in considering ADHD symptoms in adults.

**Self-Illusions and Mental Health**

It has been commonly, and erroneously, assumed in the past that being in touch with reality is one of the central tenets of mental health. Jahoda (1958), in her synthesis of current views of mental health at the time, wrote about the viewpoint that one is mentally healthy when one’s perceptions are in line with reality. As well, Colvin, Block, and Funder (1995) argued that positive illusions are maladaptive, and that positive adjustment depends on accurate perceptions of the self. These researchers believed that having an accurate, non-illusory handle on reality is one of the main ingredients of psychological well-being. Other research, however, has argued that mental health may depend not on accurate perceptions but instead on positive views of reality (Taylor & Brown, 1988).

Studies have demonstrated associations between overly positive perceptions of the self and the future, and important markers of mental well-being, such as being happy, sociable, and productive (Taylor & Brown, 1988). Self-enhancing illusions such as seeing oneself as better off than others, possessing higher than justified self-confidence, believing that life is under personal control, and thinking that the future will be happy have been linked to having a positive mood (Taylor & Brown, 1988). Positive self-illusions also have been
associated with enhanced social functioning. For example, there appears to be a link between high self-esteem in children and popularity among peers (Bohrnstedt & Felson, 1983). What’s more, it seems that positive illusions lead to greater motivation, persistence, and performance. More specifically, those who see themselves positively are more likely to work harder and longer at a task, which are characteristics associated with a greater likelihood of goal attainment (Bandura, 1977; Felson, 1984). Indeed, Bandura’s (1977) work on self-efficacy demonstrates a strong link between beliefs in personal efficacy (whether realistic or not) and success in behavioural change.

It seems that most individuals hold generally positive views of themselves (Greenwald, 1980). In fact, research has shown that the majority of adults from normal, non-clinical populations judge themselves as above average on positive personality attributes and below average on negative personality attributes (Alicke, 1985). It is statistically impossible for such appraisals to be accurate given that it is illogical for the majority of people to be better than average. In addition, most individuals see themselves as better than others see them (Lewinsohn, Mischel, Chaplin, & Barton, 1980). Despite how common and adaptive positive illusions in normal populations have been shown to be, there exists a type of positive self-illusion that is distinctly different.

**Self-Illusions in Children with ADHD**

Children with ADHD seem to exhibit an illusory form of self-perception that is different from the self-optimism found in the majority of individuals. This type of optimism in ADHD children has been termed the Positive Illusory Bias (PIB), and is operationalized as a higher self-report of competence in relation to actual competence (Hoza, Pelham, Dobbs, Pillow, & Owens, 2002). Children with ADHD possess a PIB in that they overestimate their
abilities in areas in which they are actually deficient (Owens et al., 2007). In other words, there exists a mismatch between self-reports of skills and measures of actual skills in these children.

Research suggests that the PIB of children with ADHD is different from the positive self-illusions of typically-developing individuals in three major ways. First of all, the disparity between perceived and actual ability is greater in degree in those with ADHD as opposed to those without ADHD (Owens et al., 2007). This means that there is a larger gap between real and self-perceived competence for children with ADHD versus children without ADHD. The excessive inflatedness of self-perceptions is a major difference from the moderately positive self-illusions of individuals without ADHD. Secondly, the positive illusions of children with ADHD are counterintuitive because these children maintain unrealistically positive self-perceptions in the face of clear evidence of deficits (Owens et al., 2007). Most children with ADHD have experienced failure in a number of domains, and the more frequent negative feedback that children with ADHD receive in comparison to non-ADHD children renders their steadfast PIBs contrary to reality. Even though children with ADHD receive environmental signals of their impairments time and again, these children do not, or are unable to, incorporate these pieces of feedback into their self-concepts. Finally, in contrast to the adaptiveness of normal positive self-illusions, the positive illusions of children with ADHD are not advantageous in that they are not correlated with improved persistence, motivation, or performance at a task (Hoza, Pelham, Waschbusch, Kipp, & Owens, 2001). In fact, studies suggest that the positive self-perceptions of children with ADHD bear no relation to the performance behaviour of these children (Milich & Okazaki, 1991). What’s more, PIBs may actually make children with ADHD more likely to fail due to their inability
to recognize the need to improve by making use of negative feedback (Milich & Okazaki, 1991). In sum, there is considerable evidence to suggest that PIBs in children with ADHD are distinct from the adaptive positive self-illusions of normal individuals.

Research suggests that the PIB in children with ADHD is specific to the child’s self-perceived competence and not to the child’s views of the competencies of others. Evangelista, Owens, Golden, and Pelham (2008) found that boys and girls with ADHD in Grades 3 and 5 had accurate perceptions of other children’s competencies in academic and social situations, despite having overly positive estimations of their own competence in relation to teacher perceptions across scholastic, social, athletic, and behavioural domains. It seems that children with ADHD do not lack the capacity to accurately assess the competence of people in general. Instead, they do not judge their own competence with precision.

Overall, there is strong support for the notion that the PIB in children with ADHD is first of all, distinct from normal self-illusions, and second of all, not due to a general inability to accurately evaluate competence.

**Methodologies for Studying the PIB**

Research on children with ADHD has investigated the existence of the PIB using three different methodologies. At a very basic level, researchers have examined self-reports of competence by children with ADHD compared to controls by examining differences in absolute self-perception scores between these two groups. A second technique involves comparing anticipatory and retrospective self-ratings of competence before and after a specific performance task in ADHD and control groups in light of data on actual performance for those groups. Thirdly, researchers have compared discrepancies between child reports of competence and reports of competence made by others who know the child well (such as
teachers or parents), for ADHD and control groups. The following sections will describe in
detail studies that use these three techniques.

**Absolute Self-Perceptions.**

In investigating the PIB in children with ADHD, early studies compared the absolute
levels of self-perceptions of competence between samples of children with and without
ADHD, in the absence of a criterion (Hoza, Pelham, Milich, & Pillow, 1993). This is one of
the weaker methodologies for exploring the PIB because one is unable to know the real
competencies of children and instead must rely on the assumption that children with ADHD
have marked impairments in the life domains for which they provide self-ratings. Although
this is a reasonable assumption, without a basis for comparison, studies utilizing absolute
self-rating scores only indirectly measure the PIB due to the absence of data regarding actual
impairments.

While the use of absolute levels of self-perceptions is one of the weaker
methodologies for detecting the PIB, it does provide converging evidence for the PIB in
children with ADHD. For instance, as part of their study on the predictions and self-
attributions of performance by children with and without ADHD, Whalen, Henker, Hinshaw,
Heller, and Huber-Dressler (1991) asked boys between 7 and 13 years of age to predict their
performance on a word-search task. Among other results, they found that 80% of boys with
ADHD anticipated perfect performance in comparison to only 43% of controls. This
difference in expectations was statistically significant. Unfortunately, no data existed on the
actual performance of children on these tasks.

In addition, Hoza, Pelham, Milich, & Pillow (1993) recruited boys between 8 to 12
years of age to complete Harter’s (1985) Self-Perception Profile for Children (SPPC), and
found that the absolute level of self-reported competence was not significantly different between boys with and without ADHD. After controlling for comorbid internalizing symptomatology, no significant differences were found between self-ratings of boys with and without ADHD in the areas of scholastic competence, social acceptance, physical appearance, and behavioural conduct. Further, boys with ADHD rated themselves as significantly higher in athletic competence than boys without ADHD. One can infer from the fact that these boys were in treatment for ADHD that they had significant functional impairments due to their ADHD, which makes it reasonable to presume that rating themselves as just as competent as controls is indicative of a PIB at least with respect to social, academic, and behavioural competence. However, the interpretation of these results must be treated with caution, as no direct means of comparison for the ADHD and the control groups were available.

**Pre-Task Predictions, Post-Task Evaluations, and Actual Performance.**

Another method for studying the PIB involves the use of pre-task self-predictions and/or post-task self-evaluations in light of information on actual performance. Children perform a specific activity and are asked for ratings of their performance before and/or after the activity. This method represents an improvement over the more indirect comparisons of absolute ratings because it allows for the measurement of actual performance in the particular sample of interest. A drawback of this technique is that the domains of competence to be investigated are limited to specific tasks rather than generalized areas. For instance, individuals are asked to rate themselves with respect to a particular situation (e.g., how well one will be able to solve a puzzle), but the methodology is more difficult to use with respect to more general domains of functioning (e.g., one’s ability to maintain social relationships),
as it is more difficult to construct a task that would measure performance in such a broad area in a manner that maps onto the child’s self-ratings.

Despite their methodological challenges, pre- and/or post-task self-reports compared to actual performance information have been employed by a number of studies. For instance, Hoza, Waschbusch, Pelham, Molinda, and Milich (2000) had 7- to 13-year-old boys with and without ADHD rate their performance on a social interaction task. More specifically, participants were given the task of getting a similarly-aged confederate to both like them and to want to go to a camp. The behaviour of the confederate with respect to these goals was predetermined such that the participant either succeeded or failed. Although boys with ADHD were rated by objective observers as less socially competent than controls across both success and failure situations, their subsequent performance self-evaluations were significantly better than boys without ADHD. It seems that boys with ADHD possessed a PIB with respect to their social performance on this particular interaction task.

Hoza et al. (2001) utilized information on pre-task predictions, post-task evaluations, and actual performance in the academic domain by having 7- to 13-year-olds complete word-search puzzles. They found that boys with ADHD were less likely than boys without ADHD to persist, use effort, or come up with puzzle solutions; however, their subsequent self-evaluations of performance were not significantly different from the evaluations of boys without ADHD. In addition, both boys with and without ADHD had similar pre-task predictions of performance. That is, the boys with ADHD clearly possessed a PIB with respect to their performance on these word puzzles.

Similarly, Milich and Okazaki (1991) used pre-task predictions and actual performance to examine the PIB in 9- to 11-year-olds in the academic domain. They asked
boys with ADHD to report how well they thought they would perform when solving word-search puzzles. Boys with ADHD had significant difficulties with this task compared to boys without ADHD, despite reporting more optimistic expectations of their performance. Interestingly, in spite of their optimism regarding puzzle-solving, boys with ADHD reported greater frustration during the task and gave up on significantly more puzzles than controls. These boys with ADHD clearly possessed a PIB with respect to these puzzles, and the fact that the PIB did nothing to improve their performance supports the argument that it is not adaptive.

O’Neill and Douglas (1991) asked 11-year-old children to predict their performance on a story recall task. Two control groups were present: one composed of children with reading disabilities and one comprised of typically-developing children. The two control groups were equivalent in terms of the optimism of their predictions while boys with ADHD made significantly more positive predictions. Despite these more positive predictions, however, the boys with ADHD exerted less effort, used less elaborate strategies, and spent less time studying during the story recall task than typically-developing children. Two conclusions were drawn from this study. Firstly, despite clear deficiencies in performance, boys with ADHD had inflated positive expectations of how well they would do. Secondly, the presence of two control groups suggested that the PIB was specific to child ADHD populations.

Ohan and Johnston (2002) had 7- to 12-year-old boys with and without ADHD complete a maze task (academic task) and interact with a confederate teacher (social task). These boys answered questions regarding how well they expected to do on the mazes and how much they thought the teacher would like them before they did the tasks, and estimated
their performance on the mazes and how much the teacher liked them after they did the tasks. There were no significant differences between estimates of performance on the maze task or how well the teacher would like them between boys with ADHD and boys without ADHD, for either the pre-task predictions or the post-task estimates. However, the overall maze performance of boys with ADHD was significantly lower than the performance of those without ADHD in terms of number of out-of-boundary marks, dead-end entries, and mazes failed. As well, teachers’ estimates of liking the boy were significantly lower for boys with ADHD versus those without. In sum, pre- and post-task performance evaluations compared with data on actual performance on a task support the existence of a PIB in children with ADHD. However, more generalized domains of competence may not be fully captured by this methodology.

**Discrepancy and Criterion Analyses.**

The use of discrepancy scores between a self-rating and an objective criterion (e.g., a standardized achievement measure) is most useful in assessing the PIB, however, it is oftentimes difficult to find an appropriate criterion measure that captures the essence of the behaviour of interest. For instance, it can be difficult to find an absolutely objective task for the measurement of social competence. The use of others’ ratings of the child’s performance as the criterion to which a child’s own ratings are compared stands as a useful proxy of an objective criterion in determining whether a PIB exists with respect to perceptions of broader domains of functioning.

In this methodology, child self-ratings often are compared to ratings of the child by other people who know the child well, such as teachers or mothers. A number of studies have utilized this technique to assess the PIB in children with ADHD, with results that converge
with those found by the other two methodologies. For instance, Hoza et al. (2002) compared self- and other-reports to assess the PIB in boys between the ages of 7 and 13 with and without ADHD using Harter’s (1985) SPPC. Teachers as well as boys with and without ADHD filled out the questionnaire, and their reports were compared. A PIB was found for boys with ADHD in the academic, behavioural, and social domains, in that there was a significantly larger discrepancy between self-ratings and teacher ratings in those areas of competence, relative to the control group.

More recently, Hoza et al. (2004) examined the self-perceptions of 7- to 10-year-olds with ADHD with respect to the scholastic, social, athletic, appearance, and behavioural domains. Using Harter’s (1985) SPPC, they compared the self-ratings of children to ratings from the children’s mothers, fathers, and teachers. This study was the first to use ratings from different informants to assess the PIB. Results demonstrated that, regardless of the informant, a PIB existed in both boys and girls with ADHD relative to controls. This study supported the existence of the PIB for children with ADHD and demonstrated consistency in results by showing that this effect was robust across multiple raters serving as objective criterions.

In sum, using different types of measures such as social interactions, puzzles, or ratings on Harter’s (1985) SPPC, researchers have been able to provide converging evidence for the existence of the PIB in children with ADHD in a variety of domains. Comparisons of absolute self-ratings and discrepancy scores have generally found effects in the academic, social, physical appearance, athletic competence, and behavioural domains while comparisons of pre- and post-task predictions along with performance data have found PIBs for tasks within the academic and social domains. Amongst the three methodologies used for detecting the PIB, there is a great deal of support for the phenomenon in the academic and
social domains. Given the abundance of research on the pronounced deficits of children with ADHD in these two areas, it is surprising to see that these children hold PIBs with respect to their social and academic functioning.

Externalizing and Internalizing Symptoms and the PIB

ADHD can co-occur with internalizing disorders such as depression and anxiety, and with externalizing conditions such as conduct problems or aggression (Barkley, 2006). In a number of the above-mentioned studies, researchers have examined the PIB among children with ADHD in comparison to children without ADHD while also controlling for depressive symptoms or externalizing problems. Studies have shown that externalizing symptoms are associated with higher estimations of self-competence while internalizing symptoms are associated with lower self-perceptions of competence (see Hoza et al., 1993; Hoza et al., 2002; Hoza et al., 2004). It makes intuitive sense that children with internalizing symptoms such as a depressed mood have worse self-evaluations than children without depression, given that a major sign of depression is a lack of belief in one’s self-worth. Similarly, the literature on bullies and their high self-concepts underscores the link between behavioural aggression and excessively positive self-perceptions (Baumeister, Smart, & Boden, 1996). Both internalizing and externalizing comorbidities may influence the magnitude of the PIB.

Treatment Implications of the PIB in Children with ADHD

Common empirically-supported treatments for ADHD in children include the use of psychostimulants and behavioural interventions (Biederman, Spencer, & Wilens, 2004; Pelham & Fabiano, 2008). While it is usually the responsibility of parents or teachers to carry out treatments, the child plays no small role in deciding to comply with such interventions. Knowledge of one’s deficits seems vital for adherence to treatment. Research suggests that
high confidence can actually interfere with treatment progress in children with ADHD (Hoza & Pelham, 1995). Indeed, findings of Mikami, Calhoun, and Abikoff (2010) indicate that inflated self-perceptions of competence in children with ADHD predict poorer response to treatment, as measured by changes in observed conduct problems, peer-nominated social preference, and friendships. The existence of a PIB in children with ADHD appears to be maladaptive with respect to treatment, as it may prevent children with ADHD from acknowledging the full extent of their impairments and their need to engage in treatment.

In summary, children with ADHD suffer from a number of psychological, scholastic, social, and behavioural impairments (Barkley, 2006). However, they hold positive self-perceptions that are contradictory to their impairments. These illusions are not adaptive and involve a bias in self-judgment. A large number of studies utilizing a variety of methodologies of varying strength have found converging results in support of the PIB in children with ADHD, particularly in the social and academic domains. Studies also demonstrate that the PIB may interfere with response to treatment.

**ADHD in Adults**

ADHD is not just a psychopathology in children; it also is now recognized to be a type of psychiatric disorder in adults (Faraone & Biederman, 2005). The next section of this paper outlines the literature on ADHD symptoms in adults, and presents both arguments and evidence regarding the existence of the PIB in adults with high ADHD symptoms. The similarity between adult and child ADHD will be explicated, as well as the dimensional nature of ADHD symptoms in adults. Finally, the significance of studying the PIB in parents with high levels of ADHD symptoms will be considered.
Prevalence of ADHD Symptoms in Adults.

Only a small handful of studies of children assessed with ADHD have been able to retain 50% or more of their original samples, in order to examine the adult outcomes of these children. These follow-up studies are: (1) the Montreal study (Weiss, Hechtman, Milroy, & Perlman, 1985), (2) the New York City study (Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1998), (3) the Swedish study (Rasmussen & Gillberg, 2000), and (4) the Milwaukee study (Barkley, Fischer, Smallish, & Fletcher, 2002). Results from these studies have been mixed in terms of the adult continuation of the disorder. The Montreal study (Weiss et al., 1985) found that 67% of its sample of children with ADHD claimed to be troubled by ADHD symptoms in adulthood while the Swedish study showed that 49% of their original sample continued to report ADHD symptoms in adulthood (Rasmussen & Gillberg, 2000). In contrast, the New York study found that 31-43% of their initial sample met DSM criteria for ADHD at ages 16 to 23, but after 8 years, these numbers dropped to 4-8% (Mannuzza et al., 1998).

The stark difference in persistence of ADHD symptoms across these studies could be the result of differences in the sample selection criteria of the children with ADHD (Barkley, 2006). Systematic DSM diagnostic criteria were unavailable at the beginning of these studies; therefore, explicit thresholds for ADHD symptoms, pervasiveness, and age of onset were not used (Barkley, 2006). In addition, the two studies with higher persistence rates (the Montreal and Swedish studies) did not exclude children with aggression whereas the New York study did, thereby likely limiting the severity of ADHD in the New York sample (Barkley, 2006). Another factor that could account for the mixed findings is the use of self-reports for examining symptoms in adults in comparison to using other-reports (e.g., teacher
or parent reports) when diagnosing ADHD in children. Indeed, the New York and Montreal studies switched to self-reports once their sample progressed into young adulthood (Barkley, 2006). Given research that suggests only low to moderate correspondence ($r = .16-.32$) between child self-reports of externalizing symptoms and reports by parents and teachers, the change in reporting sources may have affected the results (Henry, Moffit, Caspi, Langley, & Silva, 1994).

Barkley et al.’s (2002) Milwaukee study used a DSM definition of ADHD as well as a developmentally-referenced cut-off score (greater than 2 standard deviations above the normative mean) for ADHD in adulthood. Based solely on self-report, only 3-5% of their sample met DSM criteria for ADHD at young adulthood. However, based on parent-report, the rate was 42-66%. Parent report of the young adult’s ADHD symptoms also was more strongly predictive of the young adults’ impairments in major life domains, which suggests greater validity for such reporting sources versus self-report.

For research on adults with high ADHD symptoms who have not been followed since childhood, the prevalence of ADHD in 18- to 44-year-olds in the United States has been estimated to be around 4.4% (Kessler et al., 2006). Another study of adults in the United States has found a prevalence of ADHD of 3-16% in those over the age of 18, depending on the thresholds used for symptom counts (Faraone & Biederman, 2005). Across nations, the prevalence of adult ADHD has been found to range from 1-7% in 18- to 44-year-olds, with lower rates in lower-income countries compared to higher income countries (Fayyad et al., 2007). Similarly, a study in the Netherlands found ADHD prevalence rates of 1-3% for 18- to 75-year-olds, depending on the cut-off of number of symptoms required for diagnosis (Kooij, Buitelaar, van den Oord, Furer, Rijnders, & Hodiamont, 2005).
In sum, there is tremendous variability in prevalence estimates of adult ADHD, owing to variations in the reporting source, the diagnostic criteria used, and the country in which the study was conducted. Some studies have shown that up to 66% of children with ADHD continue to be impaired from this disorder into adolescence and adulthood while other studies have demonstrated a rate as low as 4%. For those adults with ADHD followed from childhood, the prevalence rate is higher when reports by others who know the individual well are employed rather than self-reports. For adults not followed from adulthood, prevalence rates of ADHD range from 1-16%.

**Similarities between Adult and Child ADHD.**

ADHD symptoms, when found in adults, are in many ways highly similar to ADHD symptoms in childhood. On a biological level, adults with ADHD show patterns of genetic transmission and brain anomalies similar to children with ADHD (Faraone et al., 2000). Moreover, adults and children with ADHD display abnormalities in the same brain regions (Seidman et al., 2004). On a psychosocial level, adults with high levels of ADHD symptoms are at heightened risk for the same psychopathological comorbidities, neuropsychological deficits, and functional impairments as children. For example, adults with ADHD are more likely than adults without ADHD to also suffer from anxiety, antisocial problems, and depressive disorders (Downey, Stelson, Pomerleau, & Giordani, 1997), and regardless of age, those with ADHD exhibit deficits in verbal learning, memory, executive functions, motoric inhibition, and vigilance (Barkley, Grodzinsky, & DuPaul, 1992). In addition, adults with ADHD have clinically significant functional impairments analogous to those of children with ADHD. These deficits include problems in the school, work, and/or home environment, such as conduct problems, substance abuse, relationship difficulties, driving impairments,
employment obstacles, and academic deficits (Murphy & Barkley, 1996). All in all, the similarities in ADHD-related behavioural, physiological, and psychological characteristics between children and adults with ADHD support the importance of studying ADHD symptoms in adult samples.

Assessment of ADHD in Adults.

There has been considerable debate surrounding whether to use DSM criteria versus more developmentally appropriate criteria for assessing adult ADHD (Barkley et al., 2002). McGough and Barkley (2004) outlined issues related to applying existing DSM criteria for ADHD in children to adults with ADHD. Firstly, on a substantive level, several of the symptoms outlined in the DSM-IV do not seem developmentally appropriate for adults (e.g., often runs about or climbs excessively). Instead of using current DSM symptoms, a number of alternate questionnaire items that can be used with adults in diagnosing ADHD are proposed (e.g., Conners, Erhardt, & Sparrow, 1999). In addition, given the relatively low normative levels of ADHD symptoms in the adult population, there is little empirical basis for establishing the threshold for adult ADHD at six or more symptoms of inattention and/or hyperactivity or impulsivity, and evidence suggests that clinically significant impairment occurs at levels of symptoms below this threshold (Heiligenstein, Conyers, Berns, & Miller, 1998). As well, in adults, the functional impairment caused by ADHD may occur across a large number of social settings and functional activities (e.g., child rearing, marital activities, health maintenance, community activities) (McGough & Barkley, 2004). Finally, it is recommended in assessing adult ADHD symptoms that third party reports of the individual’s ADHD symptoms and patterns of impairment be obtained whenever possible, due to the
previously-noted differences between self- and other-reports of ADHD symptoms (Barkley et al., 2002).

When both self and other-reports of ADHD symptoms are gathered, it seems best to combine the ratings of the self and other-reports by creating an average, composite score of the two sources of information. Such an action is consistent with the way in which children are diagnosed with ADHD using combined parent and teacher reports, and with the recommendations for diagnosis of ADHD in adults (McGough & Barkley, 2004). Research on the validity of self versus other-reports of ADHD has yielded inconclusive results. While some studies suggest that adults with ADHD are the best informants with regard to their symptoms of ADHD (Kooij, Boonstra, Swinkels, Bekker, Noord, & Buitelaar, 2008), other studies appear to demonstrate that other-reports of an individual’s ADHD symptoms are more predictive of the individual’s functional impairment (Barkley et al., 2002). Still other studies seem to show that the association between ADHD symptoms and functional impairment is strong within raters but not across raters (Katz, Petscher, & Welles, 2009). Despite these inconsistent results, studies seem to agree that other-reports are still important in assessment in terms of providing additional information that could be useful beyond self-reports (Adler et al., 2008; Katz et al., 2009; Kooij et al., 2008). Given the uncertainty of the literature, creation of a composite score ensures that neither the perspective of the self nor that of the other rater is ignored, as disagreement between informants does not necessarily mean that either perspective is invalid. Thus, this is the approach I will use in this study.

The Dimensional Nature of Adult ADHD.

Past research has shown that the symptoms of many disorders are distributed dimensionally rather than categorically in the population, and that adults differ along a
continuum in the number of symptoms they demonstrate (Widiger & Clark, 2000; Widiger & Samuel, 2005). Consistent with the literature on children with ADHD, as previously discussed, conceptual and empirical arguments support the idea that inattention, hyperactivity, and impulsivity are dimensionally distributed among adults (Levy et al., 1997; Sonuga-Barke, 1998). As well, as noted above, research has found ADHD-related impairment in adults who are sub-threshold in terms of the number of ADHD symptoms required for a clinical diagnosis (Faraone et al., 2000). Therefore, a study comparing groups of adults with and without ADHD in a categorical fashion may confound ADHD-related impairment with diagnostic group (e.g., some individuals who do not meet diagnostic threshold may still show significant impairment). In sum, it appears that ADHD can be better characterized as a continuous dimension of symptoms in both children and adults. This is the approach that I will take in this study.

**The PIB in Adults with High Levels of ADHD Symptoms**

To date, few studies have investigated the existence of the PIB in adults with symptoms of ADHD. Those studies that do exist present equivocal results. For instance, Knouse, Bagwell, Barkley, and Murphy (2005) examined the accuracy of self-evaluations of driving behaviour in a clinic sample of adults with ADHD. Men were asked to report on their driving behaviour and then their driving performance was observed both in a naturalistic setting and in a driving simulator. Those with ADHD had a greater number of speeding tickets, collisions, and driving citations in their driving histories, compared to those without ADHD. They also demonstrated more unsafe driving behaviours in both simulated and natural settings than men without ADHD. Despite these impairments, those with ADHD gave
self-assessments of driving that were comparable to controls. Thus, this study provides evidence of the PIB in adults in the context of driving.

On the other hand, in a second study, Knouse, Paradise, and Dunlosky (2006) found no PIBs in adults with ADHD in the context of judgments about future memory. They examined the relative accuracy of adults with and without ADHD and found that the two groups were equivalent in terms of the magnitude and accuracy of their judgments of their future memory. These results suggest that adults with ADHD can make reasonably accurate judgments about their future memory and do not overestimate their performance in this area.

Given the sparseness of studies examining adult PIBs and the inconclusiveness of the data that does exist, little is known about the PIB in adults with symptoms of ADHD, and only the functional areas of driving and prospective memory have been examined. Given the convergence in studies and strong support demonstrating the existence of the PIB in the social and academic domains for children with ADHD, for the sake of comparison, it would be important to assess similar domains in adults with symptoms of ADHD.

**ADHD in Parents**

Obviously, many adults with high ADHD symptoms become parents, and spend a significant part of their lives engaged in child-rearing tasks. It is not implausible to believe that their ADHD-related symptoms have an adverse influence on their parenting behaviour (Weiss, Hechtman, & Weiss, 2000). Studies demonstrate associations between the presence of ADHD symptoms and a host of negative parenting behaviours. For instance, Chen and Johnston (2007) found that maternal inattention was associated with lower involvement with one’s child and the use of inconsistent discipline. As well, maternal impulsivity was negatively associated with use of positive reinforcement. Further, mothers with high levels of
ADHD symptoms have been found to use less effective disciplinary styles, such as having higher laxness and more overreactivity (Banks, Ninowski, Mash, & Semple, 2007). In addition, Murray and Johnston (2006) found that parental monitoring, consistency, and problem-solving were lower in mothers with ADHD compared to mothers without ADHD, even though both groups of mothers had children with ADHD. The fact that the ADHD of the child was held constant across groups indicated that the difference in negative parenting behaviours was uniquely associated with the ADHD of the mother rather than the ADHD of the child. In sum, ADHD symptoms seem to be associated with a number of disruptive parenting behaviours.

Further compounding the consequences of high levels of ADHD symptoms in parents is the fact that children of parents with high ADHD symptoms are much more likely to have ADHD symptoms themselves than the children of parents without ADHD symptoms (Biederman et al., 1995). Indeed, ADHD is a highly heritable psychological disorder, as demonstrated by family aggregation studies, adoption research, twin studies, and molecular genetic analyses (Biederman et al., 1995; Faraone, Doyle, Mick, & Biederman, 2001; Gilger, Pennington, & DeFries, 1992; Sprich, Biederman, Crawford, Mundy, & Faraone, 2000). Thus, many parents not only have to cope with the functional impairments associated with their own ADHD symptoms but also with managing the disruptive behaviours stemming from the ADHD of their child. Calm, consistent, clear, and structured parenting is particularly important for the care of a child with ADHD, and parents with elevated ADHD symptoms may not have the resources to provide such parenting (Barkley, 2006; Sonuga-Barke, Daley, Thompson, Laver-Bradbury, & Weeks, 2001). In sum, parents with high ADHD symptoms have a lot to cope with in the domain of parenting, and their ADHD
symptoms are associated with behaviours that can have deleterious effects on their children, who may also be suffering from ADHD.

**PIB in Parents**

Given the paucity of research examining the existence of the PIB in adults with elevated ADHD symptoms, it is unknown whether adults with high ADHD levels have a PIB in the domain of parenting. However, preliminary evidence from analyses of existing data in our lab reveals that, compared to mothers with fewer ADHD symptoms, those with six or more symptoms in either inattentiveness or hyperactivity/impulsivity had significantly higher scores on self-reported parenting efficacy after controlling for depression. Given that maternal ADHD has been linked in the literature to poor parenting behaviour, the finding that mothers with greater ADHD symptoms held more positive views of their parenting competence suggests the presence of a PIB with regard to parenting. Therefore, there is some support for the idea that the mothers with high levels of ADHD symptoms hold a PIB with respect to their parenting competence.

**Treatment Implications of the PIB in Adults with High ADHD Symptoms**

Studies suggest that adults with ADHD can benefit from treatments similar to those used for children with ADHD, such as medication or psychosocial approaches (Murphy, 2006; Prince, Wilens, Spencer, & Biederman, 2006). It is, however, quite clear that in order for either type of treatment to work, the individual must adhere to the intervention. If a PIB exists in adults with high levels of ADHD, it may play an important role in reducing their motivation to seek and/or maintain treatment for their ADHD symptoms. For example, a PIB in parents with high levels of ADHD could render them less likely to seek out or utilize parenting programs and services. As well, parents with elevated ADHD symptoms may be
less likely to benefit from treatment targeting the ADHD symptoms of their child. Indeed, research suggests that greater maternal ADHD symptoms are associated with less improvement by children with ADHD from a parent training program (Sonuga-Barke, Daley, & Thompson, 2002). Knowledge of the PIB in adults with symptoms of ADHD would propel research into the mechanisms of the phenomenon and the circumstances under which the PIB can be modified, which may aid in informing treatment programs. Not believing that a problem exists and therefore not engaging in treatment can leave adults with high ADHD symptoms with significant functional impairments in a number of major life domains, which can detrimentally impact the individual’s quality of life, the lives of those around them, and society at large.

**Research Question**

The proposed study will test the existence of the PIB in women with differing levels of symptoms of ADHD in a variety of important life domains. Research appears to characterize ADHD as lying on a continuum, and this is the approach that was adopted in this study. Women will rate their level of ADHD symptoms and complete a standard self-perception scale, with additional items added to examine self-perceptions of parenting competence. In addition, another informant who knows the women well (e.g., a family member or close friend) will also evaluate the women’s ADHD symptoms and complete a comparable self-perception scale. The discrepancy between self- and other-ratings in the various life domains will be predicted from the level of women’s ADHD symptoms, as measured by a composite score of self- and other-reports of women’s ADHD symptoms.

The domains of competence to be assessed are sociability, intimate relationships, work, household management, intelligence, nurturance, and parenting. In general, these adult
domains were chosen to reflect the social and academic areas, because of the prominence of the PIB found in the child literature in these two domains. The domains of sociability and intimate relationships were used as analogues for the social domain often assessed in children with ADHD. As well, the domains of work, household management, and intelligence represent the academic domain. Given the substantial evidence for the PIB in these areas of functioning for children with high ADHD symptoms, it is expected that the same effects may be found for adults with elevated levels of ADHD in these domains. The parenting domain was added due to the importance of this domain for many adults. As well, the nurturance domain was used along with the parenting domain in order to gain a more comprehensive assessment of perceptions of women’s general ability to care for others.

Predictions

Given similarities in the functional deficits, comorbidities, and biological characteristics associated with high levels of ADHD symptoms in children and adults (Faraone et al., 2000), it is reasonable to expect that the PIB is present in adults as well as children. Therefore, the primary research prediction was that the discrepancy between self- and other-ratings of competence (in the areas of sociability, intimate relationships, work competence, household management, intelligence, nurturance, and parenting) would be positively predicted by the level of women’s ADHD symptoms. In other words, higher levels of ADHD symptoms would be related to a higher discrepancy score in the domains of competence. Here, a higher discrepancy score is defined as a higher number when other-ratings are subtracted from self-ratings. A lower discrepancy score, on the other hand, is a lower number when other-reported ratings are subtracted from self-ratings.
The possible relations of women’s levels of depressive symptoms and hostility with the PIB were examined in light of findings that show that the level of PIB in children with ADHD is associated with both comorbid internalizing and externalizing symptoms. I also examined difficulties in the women’s children, given the possibility that these may increase or decrease ratings of the women’s parenting competence.
Methods

Participants

Two hundred and forty-six women contacted the UBC Parenting Lab to inquire about the study. They were recruited from Vancouver and surrounding areas to participate in the study. Of those women, 189 agreed to participate. Of the participating women, 97 women did not complete the study. Ninety-two pairs of women and other raters completed the study, however, one woman and other rater pair was deleted due to missing data on all of the items of the self-report ASPP questionnaire. Of the 97 women who did not complete the study, 7% of the women completed their questionnaires while their other raters did not complete their questionnaires, 3% of the women did not complete the questionnaires while their other raters did complete their questionnaires, 16% actively discontinued their participation due to lack of time, being unable to find another rater, or having family or work-related issues, and 74% either did not give an explanation or were unable to be contacted by research assistants before the study end date. Ninety-one pairs of women and other raters were used in the final analyses.

To ensure a sufficient range of ADHD symptoms in the sample, particularly at the high end, a recruitment procedure that involved over-sampling from adults likely to be at the high end of the continuum on ADHD symptoms was implemented. I recruited not only via community advertisements, but also from referrals to the Provincial ADHD Program at the British Columbia Children’s Hospital, notices in ADHD support groups, advertisements in a newsletter produced by the Parenting Lab, and the Parenting Lab’s registry of volunteers who had participated in research at the lab in the past. Each woman had to be able to speak and understand English, have access to the Internet, have at least one child between 3 to 16 years
of age currently residing with her, and have another person close to her who was willing to serve as the other rater in the study.

The majority (78%) of women were married with an average age of 40.76 ($SD = 6.58$). These women had an average of two children ($SD = .97$), and family socioeconomic status (SES) was predominantly middle-class based on the Hollingshead (1975) Four-Factor Index of Social Status ($M = 2.57$, $SD = 1.00$). The average age of the children for whom these women rated child problems was 9.20 ($SD = 4.11$). The other raters had an average age of 42.98 ($SD = 12.53$), an average of two children ($SD = .94$), and their SES was predominantly middle-class ($M = 2.62$, $SD = 1.19$). Comparisons between groups yielded no significant differences in age, SES, and number of children.

Confirming my success in over-sampling at the high end of the continuum of ADHD symptoms, seven women had been diagnosed with ADHD, three of these seven had been treated in the past for their ADHD, and two of the seven were currently taking medication for their ADHD. Sixty-nine percent of the women were born in Canada. The majority (74%) of women identified themselves as Canadian, Caucasian, European, or European-Canadian, 19% identified themselves as Asian, Asian-Canadian, or Indo-Canadian, 1% identified herself as of First Nations ethnicity, 1% identified herself as East Indian, and 5% were either of mixed or unknown ethnicity. Sixty-seven percent of other raters were born in Canada. The majority (73%) of other raters identified themselves as Canadian, Caucasian, European, or European-Canadian, 19% categorized themselves as Asian, 1% was Hispanic, 1% was of First Nations ethnicity, and 6% were either of mixed or unknown ethnicity.

With respect to the relationships between women and their other raters, 51% of the other raters were partners, 25% were relatives, and 24% were friends. Women and other
raters also rated the closeness and positiveness of their relationship on seven-point scales (1 = not at all close or not at all positive, 7 = extremely close or extremely positive). They also were asked to rate their frequency of contact with each other on a scale of 1 to 4 (1 = 1-2 days per week, 2 = 3-4 days per week, 3 = 5-6 days per week, 4 = 7 days per week). On average, women rated their relationship with the other rater as highly positive ($M = 6.29, SD = .82$), and other raters also rated their relationship with the women as highly positive ($M = 6.15, SD = .93$). Between women and other raters, ratings of the positiveness of the relationship did not significantly differ and were not significantly correlated. As well, women and other raters reported seeing each other about 5 to 6 days per week ($SD = 1.22, 1.25$ for women and other raters, respectively), and these ratings did not significantly differ and were significantly correlated, $r(76) = .93, p < .001$. Women and other raters did, however, differ on their ratings of the closeness of their relationships with each other, with women rating their relationship as significantly closer than other raters, $t(90) = 2.27, p < .05$. Despite this difference, both women and other raters rated the relationship as close, ($M = 6.47, SD = .78,$ $M = 6.20, SD = 1.15$ for women and other raters, respectively), and these ratings between women and other raters were significantly correlated, $r(90) = .33, p < .01$. Only one other rater rated the relationship as not at all close.\(^1\) Descriptive statistics are presented in Table 1.

\(^1\)Main and exploratory analyses were repeated with and without this case, with results that did not differ.
Table 1

*Descriptive Statistics for Women and Other Raters*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Women</th>
<th>Other Raters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( M (SD) )</td>
<td>( M (SD) )</td>
</tr>
<tr>
<td>Age in years</td>
<td>40.76 (6.58)</td>
<td>42.98 (12.53)</td>
</tr>
<tr>
<td>SES</td>
<td>2.57 (1.00)</td>
<td>2.62 (1.19)</td>
</tr>
<tr>
<td>Number of children</td>
<td>2.25 (.97)</td>
<td>2.35 (.94)</td>
</tr>
<tr>
<td>Closeness of relationship&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.47 (.78)</td>
<td>6.20 (1.15)</td>
</tr>
<tr>
<td>Positiveness of relationship&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.29 (.82)</td>
<td>6.15 (.93)</td>
</tr>
<tr>
<td>Frequency of contact&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.06 (1.22)</td>
<td>3.09 (1.21)</td>
</tr>
<tr>
<td></td>
<td>26-54</td>
<td>18-80</td>
</tr>
<tr>
<td></td>
<td>1-5</td>
<td>1-5</td>
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<td></td>
<td>1-5</td>
<td>1-5</td>
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<tr>
<td></td>
<td>4-7</td>
<td>1-7</td>
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<tr>
<td></td>
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<td>3-7</td>
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<tr>
<td></td>
<td>1-4</td>
<td>1-4</td>
</tr>
<tr>
<td>Note. SES = socioeconomic status.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;sup&gt;a&lt;/sup&gt;1 = not at all close; 7 = extremely close.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;sup&gt;b&lt;/sup&gt;1 = not at all positive; 7 = extremely positive.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;sup&gt;c&lt;/sup&gt;1 = 1-2 days per week; 2 = 3-4 days per week; 3 = 5-6 days per week; 4 = 7 days per week.</td>
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</tr>
</tbody>
</table>

**Procedure**

Upon calling the lab, women were informed of the details of the study by a trained research assistant and asked if they would like to participate. If they agreed, women were asked to designate a close relative or friend to rate them, and to provide the phone number and address of the other rater. Women were then given a password and a link to access the study questionnaires online. They were mailed a consent form which they were asked to sign and mail back to the lab, detailing that they consented for researchers to contact their designated other rater, that they consented to the confidentiality of the other rater’s questionnaire responses, and that they had informed the other rater of this arrangement.

Upon receiving the completed written consent form from the women, designated other raters were contacted by phone. The relationship of the other rater to the women was confirmed, and the other rater was provided with a password and link to access questionnaires online. Both the woman and the other rater were instructed to complete the questionnaires online in one sitting if possible. Women and other raters were told that their responses were confidential from each other.
Upon accessing the online website, women and other raters encountered an electronic consent form that they were able to acknowledge by clicking the “yes” button. They then completed all measures, with the order counterbalanced across participants. After completing the questionnaires, women were mailed a honourarium of $15 for participation in the study. The study took about 45 minutes for each woman, and about 20 minutes for each other rater.

**Measures Assessing ADHD Symptoms**

**Adult ADHD Rating Scale.**

The level of ADHD symptoms in the women was assessed based on completion of the Conners’ Adult ADHD Rating Scale – Self-Report: Screening Version (CAARS-S:SV) by the woman and the Conners’ Adult ADHD Rating Scale – Observer: Screening Version (CAARS-O:SV) by the other rater (Conners et al., 1999). The CAARS-S:SV is composed of 30 items designed to assess ADHD-related symptoms in adults, with a 4-point Likert scale of 0 (not at all, never) to 3 (very much, very frequently). These items are scored on four subscales. The first subscale contains nine items that assess inattentive symptoms as designated by the DSM-IV. The second contains nine items corresponding to the hyperactive/impulsive symptoms listed in DSM-IV. The two subscales can be added for a total ADHD symptoms score. The total ADHD symptoms score was used for this study. The CAARS-O:SV has parallel items to the CAARS-S:SV, which have been modified so as to refer to the individual being rated.

The CAARS-S:SV and the CAARS-O:SV are psychometrically reliable measures (Conners et al., 1999). Using data reported by Conners et al. (1999) for 18– to 49-year-old females, the Inattentive Symptoms and Hyperactive/Impulsive Symptoms subscales for the

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2 For women currently on ADHD medication, women and other raters were asked to complete questionnaires according to behaviour when not medicated.
self-report and observer versions had internal reliability coefficients of .70 and above. The internal consistencies of this study’s sample are presented in the Results section of this paper. No test-retest reliability data have been reported for the CAARS-S:SV, however, 2-week test-retest correlations for the CAARS-O:SV were .90 and higher for the Inattention Symptoms, Hyperactivity/Impulsivity Symptoms, and Total ADHD subscales. These test-retest correlations were based a community sample of 50 non-clinical men and women who rated their spouses (Conners et al., 1999).

The CAARS-S:SV and CAARS-O:SV also are psychometrically valid measures (Conners et al., 1999). The self-report and observer forms have been standardized on almost 2,000 non-clinical North Americans above the age of 17. In terms of discriminant validity, the CAARS subscales produced an overall correct classification rate of 85% in terms of categorizing adults into ADHD versus control groups (Conners et al., 1999). As for construct validity, moderate to high correlations were found between the CAARS-S:SV and the CAARS-O:SV. The correlations between self- and other-reports for the ADHD index for females were .41 and higher (Conners et al., 1999).

Measures Assessing Perceptions of Competence

Adult Self-Perception Profile.

Modified versions of Messer and Harter’s (1986) Adult Self-Perception Profile (ASPP) were completed by the woman and the other rater to gather information about the woman’s perceptions of competence and the other rater’s perceptions of the woman’s competence. The other-report version of the ASPP was created for use with other informants, based on an adaptation of the teacher version of Harter’s (1985) SPPC, which has been used to assess child competence in many previous studies of the PIB. The ASPP is composed of
50 items with a 4-point scale designed to capture aspects of the adult self-concept in 11 domains. The entire measure was not used in this study.

The domains that were used are (1) sociability, or one’s comfort and behaviour around other people, (2) intimate relationships, or one’s meaningful interactions with significant others, (3) job competence, or competence in one’s major occupation, (4) household management, or the ability to keep the household running smoothly, (5) intelligence, or the ability to learn and accumulate knowledge, and (6) nurturance, or one’s ability to foster the growth of others. An additional parenting subscale was added to the ASPP, with six items related to competence as a parent as found in the Parenting Sense of Competence Scale (PSOC; Johnston & Mash, 1989), similar in format to the items in the rest of the ASPP. Pilot testing of the parenting items with a separate group of parents determined the appropriateness and comprehensiveness of these items.

For each item on the ASPP, two statements reflecting two extremes of the aspect of competence (e.g., some adults are not very productive in their work BUT other adults are very productive in their work) are made and women pick which of the two statements is like them, and to what degree (Messer & Harter, 1986). Half of the items start with a positive statement, while the other half start with a negative statement. No two items from the same subscale are consecutively presented. Each item is scored on a scale of 1 to 4, with higher numbers reflecting higher perceived competency.

The ASPP has been standardized on two non-clinical samples (Messer & Harter, 1986). The first sample included 141 parents between the ages of 30 to 50, who were from upper middle class families in Colorado. The majority of individuals in this sample were Caucasians who had completed college. The second sample included 215 mothers with
children under 3 years of age, with an average mother age of 24. Over 90% of the mothers were married, and half were middle class and half were lower class. Ninety percent of mothers had completed high school, and the majority were Caucasian.

The ASPP is a psychometrically reliable measure (Messer & Harter, 1986). The internal consistencies were .65 and above for the domain of job competence for the first sample’s women, including women working at home, working part-time, or working full-time. The second sample’s alpha was .71 for that same domain. The internal consistencies for the domain of household management was .82 and above for the first sample’s women, and .87 for the second sample. In addition, the internal consistencies for the domain of intelligence for the first sample’s women were .75 and above. The second sample’s alpha was .82 for that same domain. As well, in the domain of sociability, the internal consistencies for the first sample’s women were .73 and above, and .81 in the second sample. For the domain of intimate relationships, the reliability was .72 and above for the first sample’s women, and .82 for the second sample. Finally, for the domain of nurturance, the reliability was .67 and above for the women in the first sample, and .65 for the second sample. The internal consistencies of this measure for this study are presented in the Results section of this paper.

There is some data to support the idea that the ASPP is psychometrically valid (Messer & Harter, 1986). For example, data suggestive of convergent validity comes from differential means found on the subscales for different groups of women. In the first sample, for example, the full-time homemakers (women working inside the home) had scores on job competence which were significantly lower than the scores for full-time working women and full-time working men. In the second sample, mothers who had attained a college education
reported significantly higher scores on the intelligence subscale than those who had only attained a high school education. As well, similar to the first sample, mothers who were employed rated themselves significantly higher on job competence than those not working outside the home. It is interesting to note that among all groups of women, physical appearance was endorsed as the lowest competence, which is consistent with prior studies showing that girls have lower self-concepts related to appearance than boys (Hoza et al., 2004).

**Measures of Possible Covariates**

**Center for Epidemiologic Studies Depression Scale.**

Radloff’s (1977) Center for Epidemiologic Studies Depression Scale (CES-D) was administered to all women to detect depressive symptoms. This self-report questionnaire consists of 20 items on a 4-point Likert scale designed to assess depressed mood, feelings of worthlessness, helplessness, guilt, hopelessness, lose of appetite, sleep disturbances, and psychomotor retardation. This measure has both clinical and non-clinical norms. Internal consistencies of .84 and greater have been reported and test-retest correlations for 2- to 4-week intervals ranged from .51 to .67 (Radloff, 1977). The internal consistency of this measure for this study is presented in the Results section. In terms of validity, the CES-D discriminates between psychiatric inpatients and the general population, and correlated .44 and .54 with the Hamilton Clinician’s Rating Scale and the Raskin Rating Scale, respectively (Radloff, 1977).

**Brief Symptom Inventory.**

Derogatis’ (1993) Brief Symptom Inventory (BSI) is a 53-item self-report symptom inventory used to measure psychological symptoms. There is a 5-point Likert scale of
distress, ranging from 0 (not at all) to 4 (extremely). The Hostility index of the BSI was administered to women, so as to detect externalizing symptoms. This index includes behaviours, thoughts, and emotions characteristic of the negative state of anger. The BSI has been normed on both clinical and nonclinical groups. The Hostility index of the BSI is reliable and valid (Derogatis, 1993). The internal consistency of the Hostility index in a sample of psychiatric outpatients was .78 and the 2-week test-retest reliability was .81. The internal consistency of this measure for this study is presented in the Results section. There is also impressive convergent validity between the BSI and MMPI. Of particular interest, the Hostility items correlated significantly at .31 or above with the Resentment and Aggression, Manifest Hostility, Suspicion and Mistrust, Family Problems, and Anxiety scales of the MMPI (Derogatis, 1993). The BSI Hostility index also had a correlation of .99 with the Hostility symptom dimension of the SCL-90-R, based on a sample of psychiatric outpatients (Derogatis, 1993).

**Strengths and Difficulties Questionnaire.**

The Strength and Difficulties Questionnaire (SDQ; Goodman, 1997) was completed by women as a measure of their child’s behaviour problems. I anticipated that it would be important to control for child problems as mothers with higher levels of ADHD symptoms may be more likely, as a result of both the parenting environment and heredity, to have children with more behaviour problems. These differences in child characteristics need to be controlled so as to preclude the explanation that the mothers’ PIB, particularly with respect to parenting, is due to child problems rather than the elevated ADHD symptoms of the mother. This scale is composed of 25 items rated on a 3-point Likert rating scale, ranging from not true to somewhat true to certainly true. This measure is designed to assess emotional
symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behaviour in 3- to 16-year-olds. The Conduct Problems and Hyperactivity/Inattention subscales will be combined to index child problems in this study.

Reliability was adequate as demonstrated by measures of internal consistency (average Cronbach’s $\alpha = .73$), cross-informant correlations ($M = .34$), and test-retest stability ($M = .62$; Goodman, 2001). The internal consistency of this measure for this study is presented in the Results section. In terms of concurrent validity, Goodman and Scott (1999) showed that the SDQ was significantly more accurate at evaluating inattention and hyperactivity as measured by a parent interview than the Child Behaviour Checklist (CBCL), and just as good at detecting internalizing and externalizing problems. In addition, high scores on this measure were associated with a substantial increase in psychiatric risk (Goodman, 2001).

**Demographics Questionnaires.**

Demographics questionnaires were created by the Parenting lab to collect information regarding the general demographic characteristics of the women and the other raters, which could be potential covariates. The demographic questionnaires assessed education, occupation, ethnicity, marital status, age, number of children, among other characteristics of the women and the other rater.
Results

Data Screening

All univariate descriptive statistics were firstly inspected for data inaccuracies, making sure that all values were within range and that means and standard deviations were plausible. No data inaccuracies were found.

Missing Data.

A Missing Values Analysis from version 18.0 of the Statistical Package for the Social Sciences (SPSS), was employed to find the percentages of missing data per measure. Missing values were inspected for the 16 main variables of interest (self-and other-reported ADHD Symptoms, self- and other-reported Sociability, self- and other-reported Intimate Relationships, self- and other-reported Job Competence, self- and other-reported Household Management, self- and other-reported Intelligence, self- and other-reported Nurturance, and self- and other-reported Parenting). Data missing for self- and other-reported ADHD Symptoms were 6% and 13% of cases respectively. Data missing for the self- and other-reported ASPP domains ranged from 2% to 9% of cases for self-reports and 4% to 9% of cases for other-reports.

A Missing Values Analysis on SPSS also was used to perform $t$-tests to detect whether, for those aforementioned variables with at least 5% of cases with data missing, the missingness was correlated with differences in the values of the main variables, the covariate variables (Depression, Hostility, and Child Problems), or the demographic variables (self-reported Age and SES, and other-reported Age and SES). Thus, for each measure with missing cases, a dummy variable was constructed indicating whether a case was missing data or not and all other variables were compared using groups formed with this dummy variable.
Out of the 220 independent sample t-tests conducted, 10 (5%) were significant (see Table 2).

No Bonferroni corrections were applied so as to be conservative in checking for randomness of missing data.

Table 2

<table>
<thead>
<tr>
<th>Variable with Missing Data Dummy Coded</th>
<th>Variable compared Between Groups</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other-reported ADHD</td>
<td>Other raters’ SES</td>
<td>-2.44*</td>
<td>15</td>
</tr>
<tr>
<td>Self-reported Intimate Relationships</td>
<td>Women’s Depression</td>
<td>-2.31*</td>
<td>10</td>
</tr>
<tr>
<td>Self-reported Intimate Relationships</td>
<td>Self-reported Sociability</td>
<td>6.75***</td>
<td>12</td>
</tr>
<tr>
<td>Self-reported Intimate Relationships</td>
<td>Self-reported Parenting</td>
<td>-3.57*</td>
<td>4</td>
</tr>
<tr>
<td>Self-reported Intimate Relationships</td>
<td>Other-reported Parenting</td>
<td>-2.32*</td>
<td>9</td>
</tr>
<tr>
<td>Self-reported Parenting</td>
<td>Self-reported Job Competence</td>
<td>2.77*</td>
<td>6</td>
</tr>
<tr>
<td>Other-reported Nurturance</td>
<td>Self-reported Intelligence</td>
<td>6.16***</td>
<td>8</td>
</tr>
<tr>
<td>Other-reported Intimate Relationships</td>
<td>Self-reported Nurturance</td>
<td>2.86*</td>
<td>16</td>
</tr>
<tr>
<td>Other-reported Intimate Relationships</td>
<td>Other-reported Household Management</td>
<td>-3.44*</td>
<td>7</td>
</tr>
<tr>
<td>Other-reported Parenting</td>
<td>Self-reported Job Competence</td>
<td>2.72*</td>
<td>6</td>
</tr>
</tbody>
</table>

Note. ADHD = Attention-Deficit/Hyperactivity Disorder.
* p < .05. ** p < .01. *** p < .001.

Despite these significant differences, none of the significant t-tests involved the self- or other-reported ADHD Symptoms, and one of the seven domains of competence. In other words, the missingness of the data on the self and other-reported ADHD Symptoms was unrelated to the scores in the ASPP domains. Likewise, the missingness of the data on the ASPP was unrelated to the self- and other-reports of ADHD Symptoms. It is thus less likely that the missingness of the data will bias the results for the primary analyses involving the ADHD Symptoms and the ASPP domains variables. As well, it is entirely possible that some of the significant differences related to missingness may have occurred by chance. The data
were deemed missing at random, and measure-specific as well as variable-specific mean substitution were employed.\(^3\)

When items on a measure were missing, items were pro-rated based on recommendations from the manual of each measure. In the event that a recommendation for the amount of allowable missing items was non-existent, a rule of thumb of allowable missing items being less than \(1/3\)\(^\text{rd}\) of the total number of scale items was employed. For the self- and other-reported ADHD Symptoms measure, a total of 16 or more of the items answered was used as a cut-off to use mean item substitution. If fewer items were answered, the scale was left as missing. For the Hostility measure, a total of four or more of the Hostility items answered was used as a cut-off for using mean item substitution. For the Depression measure, the cut-off of 16 or more items answered was employed. Finally, for the Child Problems scale, a cut-off of six or more items answered was used. If more items than these cut-offs were missing, the scale was not scored and left as missing.

For variable-specific mean substitution, if a case was missing a score on a measure, the corresponding sample mean for that variable was used to replace the missing score. After item-specific mean substitution, 10 variables still had missing data (self-reported Intimate Relationships, other-reported ADHD Symptoms, other-reported Sociability, other-reported Intimate Relationships, other-reported Job Competence, other-reported Household Management, other-reported Intelligence, other-reported Nurturance, other-reported Parenting, and Depression). These variables underwent variable-specific mean substitution.

\(^3\) Analyses were repeated without replacement of missing data, with results for the main analyses that did not differ. For exploratory analyses, results did not differ aside from the following exceptions: (1) for the PIB in Intelligence, the \(\Delta R^2\) was no longer significant and other-reports of ADHD Symptoms were no longer significantly predictive, (2) for the PIB in Nurturance, the \(\Delta R^2\) was no longer significant and self-reports of ADHD Symptoms were no longer significantly predictive.
In addition, one other rater was missing a SES score, and mean substitution was employed for this score.

**Univariate Outliers.**

The main variables of interest were examined for univariate outliers using frequency histograms. A visual inspection revealed that no data points appeared substantially disconnected from the rest of the data for any of the variables. There were four participants with scores higher than 3.3 standard deviations above the mean: one on self-reported Hostility, one on other-reported Job Competence, one on other-reported Nurturance, and one on other-reported Parenting. These outliers were dealt with through transformations.

**Normality and Transformations.**

The skewness and kurtosis values as well as corresponding standard errors were computed for the main variables of interest. Overall, 13 variables were high on skewness (z-score >3.3) while 3 of those variables were high on kurtosis (z-score >3.3). In response to these instances of non-normality, variable transformation was employed. The moderately positively skewed self- and other-reported ADHD Symptoms as well as the Hostility measure were dealt with by square root transformation. To ensure consistency and ease of interpretation among the ASPP domains of competencies, all of the 14 domain scores were transformed via logarithmic transformations with a constant subtracted from each score to deal with substantial negative skew. Because such transformations created a reverse score, all scores were then multiplied by -1 to allow for later ease of interpretation. Although transformations were applied to the 19 measures, 4 measures continued to exhibit skewness above a standardized score of 3.3 (other-reported Job Competence, other-reported Intelligence, other-reported Nurturance, other-reported Parenting). After transformations,
outliers more than 3.3 standard deviations from the mean were no longer present for any of the measures.

**Calculation of Composite and Discrepancy Scores**

**Composite ADHD Score.**

As discussed in the introduction, a composite score of ADHD symptoms rated by self- and other-reports allows for the retention of unique information regarding the women’s behaviour from the perspectives of both the women themselves and the other rater. Use of a composite score is in line with the diagnosis of ADHD in children, as well as the recommendations for the diagnosis of ADHD in adults. Research on the validity of self-versus other-reports of ADHD has yielded inconclusive results. In general, studies seem to agree that the report of another informant is important in the assessment of ADHD symptoms, as it provides information useful beyond self-reports (Adler et al., 2008; Katz et al., 2009; Kooij et al., 2008). Therefore, an average of the women’s and other raters’ reports of ADHD Symptoms was computed. The correlation between the self- and other-reports of ADHD Symptoms was .40 ($p<.001$), which is highly similar to the inter-rater correlations between adults and other raters on externalizing disorders reported in a recent meta-analysis (Achenbach, Krukowski, Dumenci, & Ivanova, 2005). The composite ADHD Symptoms score had a mean of 12.78, with a standard deviation of 7.66 and a range of 1.50 to 39.38.

**PIB Measured Using Discrepancy Scores.**

Standardized discrepancy scores were calculated for each of the seven ASPP domains of Sociability, Intimate Relationships, Job Competence, Household Management, Intelligence, Nurturance, and Parenting. These discrepancy scores were computed by first standardizing the self- and other-reported scores on these variables, and then subtracting
other-reported scores from self-reported scores within each variable. This discrepancy score represents the PIB, and has been widely used in prior investigations of the PIB in the child literature (Owens et al., 2007). This study will use the term PIB to represent the extent to which the woman’s score is greater than that of the other rater when calculated using standardized discrepancy scores.

Researchers have documented challenges to using discrepancy scores as the dependent variables in analyses of the PIB (Owens et al., 2007). On one hand, there is a greater chance of combined measurement error in that the reliability of a difference score is usually much lower than the reliability of the two variables used to attain the discrepancy (Edwards, 2001). Therefore, there is a higher chance of failing to detect a meaningful difference between groups due to low reliability of the scores of the dependent variables. However, given that the internal consistencies of all but one of the measures in this study are within the acceptable range (see Table 2), it is unlikely that low reliability of the discrepancy score would be a major concern.

Another issue is that discrepancy scores tend to be correlated with the two variables used to construct the discrepancy, which may lead to a relationship between difference scores and dependent variables that misleadingly depicts the predictive value of the discrepancy score itself. This also is not a primary issue for this study, as relations between discrepancy scores and their constituent dependent variables are not of interest for investigation. Furthermore, experts propose that the best possible approach is to use standardized discrepancy scores. De Los Reyes and Kazdin (2004) evaluated three informant discrepancy methods: (1) unstandardized difference scores between two informants, (2) standardized difference scores between two informants, and (3) residual difference scores (calculated
based on regression analyses of one informant as a predictor of the other informant) between two informants. The standardized discrepancy method was the only technique that showed the same level of correlations with each of its constituent ratings. It was concluded that standardizing component scores, by equating the variances of the two scores, allows for the equal association of the discrepancy score with both component ratings, which minimizes issues of construct validity.

A further concern, relevant specifically to measuring the PIB, is that due to the impairments of those with high levels of ADHD symptoms, it might be expected that criterion scores (in this case other raters’ scores of the women’s competence) will be much lower for these individuals. It would thus be much easier for an individual with high levels of ADHD symptoms to overestimate their own competence compared to this criterion. In other words, a ceiling effect may exist for individuals with lower levels of ADHD symptoms in that it is less possible for them to overestimate their competence compared to those with high levels of ADHD simply because their actual competence is already quite high. However, this is less of an issue in this study given that the women, on average, reported lower ASPP competence scores than the scores given to them by other raters. In addition, inspection of data using a median split of the ADHD Symptoms composite score showed that both women with higher and lower levels of ADHD symptoms had lower ASPP competence ratings than other raters.

Despite the limitations, there are also strengths to using discrepancy scores. Researchers have argued for the greater importance of conceptual validity over statistical validity. Difference scores represent constructs, such as the PIB, that are uniquely different from those represented by the variables that make up the difference score (Tisak & Smith,
1994) and are most optimally and parsimoniously assessed by the use of difference scores. As well, some have argued that even difference scores with low reliability might still be useful (Rogosa, Brandt, & Zimowski, 1982). In sum, the use of standardized discrepancy scores seems appropriate for this study.

**Descriptive Analyses**

**Internal Consistencies.**

The internal consistencies of the scales of all of the questionnaires were generally satisfactory. Cronbach’s alphas ranged from .59 to .92 for the measures for self- and other-reports of ADHD Symptoms, the seven ASPP domains, and self-ratings of the covariates of Depression, Hostility, and Child Problems (see Table 2). Cronbach’s alpha for other-reported ASPP Intelligence was .59, which is low. However, to allow consistency in testing for a PIB across all domains of functioning, this score was retained for use. The low level of internal consistency must be considered in interpreting the results.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Women</th>
<th>Other Raters</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD Symptoms</td>
<td>.92</td>
<td>.87</td>
</tr>
<tr>
<td>ASPP Sociability</td>
<td>.83</td>
<td>.68</td>
</tr>
<tr>
<td>ASPP Intimate Relationships</td>
<td>.84</td>
<td>.75</td>
</tr>
<tr>
<td>ASPP Job Competence</td>
<td>.76</td>
<td>.67</td>
</tr>
<tr>
<td>ASPP Household Management</td>
<td>.88</td>
<td>.84</td>
</tr>
<tr>
<td>ASPP Intelligence</td>
<td>.80</td>
<td>.59</td>
</tr>
<tr>
<td>ASPP Nurturance</td>
<td>.68</td>
<td>.80</td>
</tr>
<tr>
<td>ASPP Parenting</td>
<td>.82</td>
<td>.84</td>
</tr>
<tr>
<td>Depression</td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td>Hostility</td>
<td>.71</td>
<td></td>
</tr>
<tr>
<td>Child Problems</td>
<td>.84</td>
<td></td>
</tr>
</tbody>
</table>

*Note. ADHD = Attention-Deficit/Hyperactivity Disorder. ASPP = Adult Self-Perception Profile.*
Means, Standard Deviations, and Ranges.

The means, standard deviations, and ranges of the ADHD symptoms, the seven ASPP domains, and the possible covariates are presented in Table 3. To allow for ease of interpretation, these statistics are based on data that have not undergone mean substitution or transformation. On the CAARS, both women and other raters endorsed a level of ADHD symptoms for the women that was within the average range (Conners et al., 1999). In terms of the seven ASPP domains of competence, women and other raters reported scores comparable to the ratings of most homemakers and working women (Messer & Harter, 1986). For ratings of Depression on the CES-D, women scored within one standard deviation of the mean for a community sample (Radloff, 1977). For scores of Hostility on the BSI, women’s average scores corresponded to the $84^{th}$ percentile amongst adult non-patient females (Derogatis, 1993). Finally, for ratings of Child Problems on the SDQ, women rated their children as having hyperactivity/inattention and conduct problems falling in the high end of the normal range to the low end of the difficult range (Bourdon, Goodman, Rae., Simpson, & Koretz, 2005).
Table 4

Descriptive Statistics for ADHD Symptoms, ASPP Domains, and Covariates

<table>
<thead>
<tr>
<th>Variable</th>
<th>Women</th>
<th>Other Raters</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD Symptoms</td>
<td>14.07 (9.27)</td>
<td>10.56 (7.60)</td>
<td>0-42</td>
<td>0-34</td>
</tr>
<tr>
<td>ASPP Sociability</td>
<td>2.94 (.80)</td>
<td>3.37 (.62)</td>
<td>1.25-4</td>
<td>1.50-4</td>
</tr>
<tr>
<td>ASPP Intimate Relationships</td>
<td>3.04 (.80)</td>
<td>3.22 (.68)</td>
<td>1-4</td>
<td>1.25-4</td>
</tr>
<tr>
<td>ASPP Job Competence</td>
<td>3.27 (.70)</td>
<td>3.63 (.50)</td>
<td>1-4</td>
<td>2-4</td>
</tr>
<tr>
<td>ASPP Household Management</td>
<td>2.94 (.92)</td>
<td>3.25 (.79)</td>
<td>1-4</td>
<td>1-4</td>
</tr>
<tr>
<td>ASPP Intelligence</td>
<td>3.22 (.72)</td>
<td>3.75 (.36)</td>
<td>1-4</td>
<td>2.75-4</td>
</tr>
<tr>
<td>ASPP Nurturance</td>
<td>3.50 (.57)</td>
<td>3.65 (.46)</td>
<td>1-4</td>
<td>2-4</td>
</tr>
<tr>
<td>ASPP Parenting</td>
<td>3.09 (.66)</td>
<td>3.57 (.54)</td>
<td>1-4</td>
<td>1.5-4</td>
</tr>
<tr>
<td>Depression</td>
<td>11.44 (10.23)</td>
<td>3.57 (.54)</td>
<td>0-41</td>
<td></td>
</tr>
<tr>
<td>Hostility</td>
<td>0.68 (.58)</td>
<td>0-2.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child Problems</td>
<td>6.70 (4.54)</td>
<td>0-18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. ADHD = Attention-Deficit/Hyperactivity Disorder; ASPP = Adult Self-Perception Profile. Sample sizes varied between 79-89 across participant types and variables.

Mean Differences.

On ADHD Symptoms, scores of women and other raters were significantly correlated, $r(89) = .40$, $p < .001$, and women endorsed greater severity of ADHD symptoms than other raters, $t(90) = 3.52$, $p < .01$. For the Sociability scale, scores of women and other raters were also significantly correlated, $r(89) = .55$, $p < .001$, and women rated themselves as lower in competence compared to other raters, $t(90) = -5.60$, $p < .001$. Scores of women and other raters on Intimate Relationships were neither significantly correlated nor significantly different. In addition, women and other raters’ Job Competence scores were significantly correlated, $r(89) = .30$, $p < .01$, and women rated themselves as lower than other raters, $t(90) = -4.78$, $p < .001$. Similarly, scores on Household Management between women and other raters were significantly correlated, $r(89) = .34$, $p < .01$, and women rated themselves as lower than other raters, $t(90) = -2.71$, $p < .01$. Scores of women and other raters on Intelligence were not significantly correlated, but women rated themselves as lower in Intelligence than other raters, $t(90) = -6.53$, $p < .001$. With respect to Nurturance, women
and other raters’ scores were not significantly correlated, but women rated themselves as lower than other raters $t(90) = -2.32, p < .05$. Finally, with regard to Parenting, women and other raters’ scores were significantly correlated, $r(89) = .34, p < .01$, and women rated themselves as lower than other raters, $t(90) = -7.42, p < .001$. Overall, self- and other-reports were significantly correlated, although women tended to self-report more ADHD Symptoms and lower competence than the other raters perceived in them.

**Bivariate Correlations**

Prior to the main analyses, bivariate correlations amongst self-reported ADHD Symptoms, other-reported ADHD Symptoms, composite scores of ADHD Symptoms, self- and other-reported ASPP domains of competence, and self- and other-reported ASPP discrepancies (or PIBs) were examined (see Table 5). On the whole, higher scores on the ADHD Symptoms composite variable were significantly related to lower scores in only two domains of competence (Job Competence and Household Management) as reported by both women and other raters. Composite scores of ADHD Symptoms were not related to a PIB in any of the ASPP domains. Higher scores on the self-reported ADHD Symptoms variable were significantly correlated with lower scores in four self-reported ASPP domains, and a lower PIB in Household Management. Higher other-reported ADHD Symptoms, on the other hand, were significantly correlated with lower scores in six other-reported ASPP domains, and a higher PIB in five ASPP domains.
Table 5  
**Correlations between ADHD Symptoms, Individual ASPP Domains, and PIBs**

<table>
<thead>
<tr>
<th>Domains of Competence</th>
<th>ADHD Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Composite</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
</tr>
<tr>
<td>ASPS Sociability</td>
<td>-.05</td>
</tr>
<tr>
<td>ASPS Intimate Relations</td>
<td>-.16</td>
</tr>
<tr>
<td>ASPS Job Competence</td>
<td>-.23*</td>
</tr>
<tr>
<td>ASPS Household Management</td>
<td>-.38**</td>
</tr>
<tr>
<td>ASPS Intelligence</td>
<td>-.12</td>
</tr>
<tr>
<td>ASPS Nurturance</td>
<td>-.08</td>
</tr>
<tr>
<td>ASPS Parenting</td>
<td>-.22</td>
</tr>
<tr>
<td><strong>Other Raters</strong></td>
<td></td>
</tr>
<tr>
<td>ASPS Sociability</td>
<td>-.10</td>
</tr>
<tr>
<td>ASPS Intimate Relations</td>
<td>-.18</td>
</tr>
<tr>
<td>ASPS Job Competence</td>
<td>-.40***</td>
</tr>
<tr>
<td>ASPS Household Management</td>
<td>-.37***</td>
</tr>
<tr>
<td>ASPS Intelligence</td>
<td>-.16</td>
</tr>
<tr>
<td>ASPS Nurturance</td>
<td>-.13</td>
</tr>
<tr>
<td>ASPS Parenting</td>
<td>-.19</td>
</tr>
<tr>
<td><strong>PIB</strong></td>
<td></td>
</tr>
<tr>
<td>ASPS Sociability</td>
<td>.06</td>
</tr>
<tr>
<td>ASPS Intimate Relations</td>
<td>.02</td>
</tr>
<tr>
<td>ASPS Job Competence</td>
<td>.14</td>
</tr>
<tr>
<td>ASPS Household Management</td>
<td>-.01</td>
</tr>
<tr>
<td>ASPS Intelligence</td>
<td>.03</td>
</tr>
<tr>
<td>ASPS Nurturance</td>
<td>.04</td>
</tr>
<tr>
<td>ASPS Parenting</td>
<td>-.03</td>
</tr>
</tbody>
</table>

*Note. ADHD = Attention-Deficit/Hyperactivity Disorder; ASPP = Adult Self-Perception Profile; PIB = Positive Illusory Bias.  
*p < .05. **p < .01. ***p < .001.

Correlations between self-reported ADHD Symptoms, other-reported ADHD Symptoms, composite scores of ADHD Symptoms, ASPP PIBs, and possible covariates are presented on Table 6. As expected, the women’s SES, Depression, Hostility, and Child Problems were all related to higher self-reported and composite scores of ADHD Symptoms in the women. The other-reports of ADHD Symptoms correlated only with SES and Child Problems. The age and SES of other raters were not significantly related to the any of the measures of ADHD Symptoms. Potential covariates were also correlated with the ASPP PIBs
to determine which ones needed to be controlled in subsequent regression analyses. To be more conservative in regressions, I identified covariates that were at least marginally significantly related \((p < .10)\) to the PIB scores. Using this rule, the age and SES of the other raters as well as the age and Depression scores of the women were used as covariates in the relevant regressions.
### Table 6
**Correlations between Potential Covariates, ADHD Symptoms, and the PIB in the ASPP Domains**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Women</th>
<th>Other Raters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age</td>
<td>SES</td>
</tr>
<tr>
<td><strong>Total ADHD</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Composite</td>
<td>.19</td>
<td>.35**</td>
</tr>
<tr>
<td>Self-report</td>
<td>.07</td>
<td>.31**</td>
</tr>
<tr>
<td>Other-report</td>
<td>.27*</td>
<td>.28**</td>
</tr>
<tr>
<td><strong>PIB</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASPP Sociability</td>
<td>.14</td>
<td>.08</td>
</tr>
<tr>
<td>ASPP Intimate</td>
<td>.09</td>
<td>.11</td>
</tr>
<tr>
<td>Relationships</td>
<td></td>
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</tr>
<tr>
<td>ASPP Job Competence</td>
<td>.14</td>
<td>.12</td>
</tr>
<tr>
<td>ASPP Household</td>
<td>.10</td>
<td>-.01</td>
</tr>
<tr>
<td>Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASPP Intelligence</td>
<td>.04</td>
<td>.12</td>
</tr>
<tr>
<td>ASPP Nurturance</td>
<td>.08</td>
<td>-.07</td>
</tr>
<tr>
<td>ASPP Parenting</td>
<td>.24*</td>
<td>.02</td>
</tr>
</tbody>
</table>

*Note.* ADHD = Attention-Deficit/Hyperactivity Disorder; ASPP = Adult Self-Perception Profile; PIB = Positive Illusory Bias. Marginal significances are presented only for relations between potential covariates and PIBs.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$. 
Main Analyses

Seven hierarchical models were constructed to determine the relations of ADHD Symptoms with the PIB in each of the seven ASPP domains of competence. In each model, the relevant covariates were entered at Step 1, followed by the ADHD Symptoms composite score at Step 2. The significance of the full model and any significant $\Delta R^2$ were examined for each model. The data were screened and assumptions checked for these regression models. No multivariate outliers were found. As well, no dramatic deviations from linearity or homoscedasticity were detected. In addition, normality of the distribution of errors was confirmed, and no significant multicollinearity or singularity was detected. Given the lack of previous research in the area of adult PIBs and the exploratory nature of these analyses, no Bonferroni corrections were applied to compensate for possible inflated Type I error rates.

Regression Models involving the ADHD Symptoms Composite Score.

Results of the regression models involving the ADHD Symptoms composite score are presented in Table 7. The $\Delta R^2$ for the addition of the ADHD Symptoms composite score at Step 2 was not significant in any of the ASPP domains beyond the relevant covariates, $p > .09$. Contrary to my hypothesis, these results suggest that when self- and other-reports of the women’s ADHD symptoms are aggregated, the women’s level of ADHD symptoms is not significantly predictive of a PIB in any of the seven ASPP domains.

---

4 Analyses were repeated with all covariates (women’s age, SES, Depression, Hostility, Child Problems, and other raters’ age, SES) controlled in each regression, rather than controlling only for variables associated with the PIB in each specific domain of competence. These analyses yielded the same results. Analyses also were repeated with all relevant covariates as well as all relevant relationship variables (women’s and other raters’ positiveness, closeness, frequency of contact) controlled, yielding the same results. In addition, analyses were repeated with multiple imputation with all relevant covariates controlled in each regression. These analyses yielded the same results.
Table 7

Results for Full Model Regression Analyses examining the Relations of the ADHD Symptoms Composite Score with the PIB in ASPP Domains

<table>
<thead>
<tr>
<th>Domain/Source</th>
<th>Domain/Source</th>
<th>( \beta )</th>
<th>( T )</th>
<th>( p )</th>
<th>( R )</th>
<th>( R^2 )</th>
<th>( F )</th>
<th>dfs</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASPP Sociability PIB</td>
<td>Other rater’s Age</td>
<td>-.19</td>
<td>-1.79</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Other rater’s SES</td>
<td>-.19</td>
<td>-1.79</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADHD Symptoms composite score</td>
<td>.07</td>
<td>0.65</td>
<td>.52</td>
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<tr>
<td>ASPP Intimate Relationships PIB</td>
<td>Other rater’s Age</td>
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<td>-2.01</td>
<td>.05</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>ADHD Symptoms composite score</td>
<td>.002</td>
<td>0.02</td>
<td>.99</td>
<td></td>
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<tr>
<td>ASPP Job Competence PIB</td>
<td>ADHD Symptoms composite score</td>
<td>.14</td>
<td>1.36</td>
<td>.18</td>
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<tr>
<td>ASPP Household Management PIB</td>
<td>Woman’s Depression</td>
<td>-.43</td>
<td>-3.86</td>
<td>.00</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>ADHD Symptoms composite score</td>
<td>.18</td>
<td>1.66</td>
<td>.10</td>
<td></td>
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<td></td>
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<tr>
<td>ASPP Intelligence PIB</td>
<td>Woman’s Depression</td>
<td>-.30</td>
<td>-2.64</td>
<td>.01</td>
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</tr>
<tr>
<td></td>
<td>ADHD Symptoms composite score</td>
<td>.17</td>
<td>1.47</td>
<td>.15</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>ASPP Nurturance PIB</td>
<td>ADHD Symptoms composite score</td>
<td>.04</td>
<td>0.33</td>
<td>.74</td>
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<tr>
<td>ASPP Parenting PIB</td>
<td>Woman’s Age</td>
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<td>2.32</td>
<td>.02</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>Woman’s Depression</td>
<td>-.37</td>
<td>-3.42</td>
<td>.001</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADHD Symptoms composite score</td>
<td>.10</td>
<td>0.86</td>
<td>.39</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Note. ADHD = Attention-Deficit/Hyperactivity Disorder; ASPP = Adult Self-Perception Profile; PIB = Positive Illusory Bias.
Exploratory Analyses

Due to the significant difference between reports of women and other raters on the women’s ADHD Symptoms and the fact that at the bivariate level, the women’s and other raters’ reports were correlated in opposite directions with the PIB on the ASPP, self- and other-reports of ADHD Symptoms were examined as separate predictors of the PIB in the ASPP domains, while controlling for relevant covariates.5

Seven hierarchical regression models were constructed to determine the independent relations of self- and other-reported ADHD Symptoms with each of the ASPP domains. In each model, the relevant covariates were entered at Step 1, followed by the self- and other-reported ADHD Symptoms scores at Step 2. The significance of the full model and any significant $\Delta R^2$ were examined in each model. The data were screened and assumptions checked for the seven regression models. No multivariate outliers were found. As well, no dramatic deviations from linearity or homoscedasticity were detected. In addition, normality of the distribution of errors was confirmed, and no significant multicollinearity or singularity was detected across any of the models. Given the lack of previous research in the area of adult PIBs and the exploratory nature of these analyses, no Bonferroni corrections were applied to compensate for possible inflated Type I error rates.

5Analyses were repeated with all covariates (women’s age, SES, Depression, Hostility, Child Problems, and other raters’ age, SES) controlled in each regression, rather than controlling only for variables associated with the PIB in each specific domain of competence. These analyses yielded the same results with the following exceptions: (1) self-reported ADHD Symptoms was no longer significantly related to the Intimate Relationships PIB, (2) the $\Delta R^2$ for the Job Competence PIB became only marginally significant, and (3) the $\Delta R^2$ for the Intelligence PIB became non-significant, and other-reported ADHD Symptoms was only marginally predictive of the PIB in this domain. Analyses were repeated with all relevant covariates and all relevant relationship variables (women’s and other raters’ positiveness, closeness, frequency of contact) controlled, yielding the same results, except the $\Delta R^2$ for the Intelligence PIB was no longer significant. In addition, analyses were repeated with multiple imputation with all relevant covariates controlled in each regression. These analyses yielded the same results, except the $\Delta R^2$ for the Intelligence PIB was no longer significant.
Regression Models involving Self- and Other-reported ADHD Symptoms.

The results of regression models involving self- and other-reported ADHD Symptoms as predictors of the PIB are presented in Table 8. The $\Delta R^2$ for the PIB in Sociability was non-significant. In contrast, the PIB in Intimate Relationships was significantly predicted by both self- and other-reports, $\Delta R^2 = .11$, $\Delta F(2, 87) = 5.84, p < .01$. More specifically, higher self-reported ADHD Symptoms were related to lower PIBs for Intimate Relationships. In contrast, higher other-reported ADHD Symptoms were related to higher PIBs for this domain. The PIB in Job Competence was significantly predicted only by other-reports of ADHD Symptoms, in that higher other-reported ADHD Symptoms translated to higher PIBs, $\Delta R^2 = .12$, $\Delta F(2, 88) = 6.21, p < .01$. Both self- and other-reports of ADHD Symptoms were significant predictors of the PIB in Household Management, but again in opposite directions, $\Delta R^2 = .20$, $\Delta F(2, 87) = 12.65, p < .001$. For the PIB in Intelligence, only other-reports of ADHD Symptoms were significant predictors, $\Delta R^2 = .07$, $\Delta F(2, 87) = 3.66, p < .05$. Both self- and other-reports significantly predicted the PIB in Nurturance in opposite directions, $\Delta R^2 = .13$, $\Delta F(2, 88) = 6.47, p < .01$. The $\Delta R^2$ for the PIB in Parenting was non-significant.

In sum, higher other-reports of the ADHD Symptoms of the women were predictive of these women reporting higher competence in relation to reports of the other raters in five domains (Intimate Relationships, Job Competence, Household Management, Intelligence, and Nurturance). In contrast, higher self-reports of ADHD Symptoms were significantly predictive of these women reporting lower competence in relation to the reports of the other raters in three domains (Intimate Relationships, Household Management, and Nurturance). The PIB in the domains of Sociability and Parenting were not significantly predicted by either self- or other-reports of ADHD Symptoms. These results indicate that self- and other-reports of the women’s ADHD Symptoms function as opposite predictors of the women’s PIB.
Table 8
Results for Full Model Regression Analyses examining the Relations of Self- and Other-reported ADHD Symptoms with the PIB in ASPP Domains

<table>
<thead>
<tr>
<th>Domain/Source</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>R</th>
<th>R²</th>
<th>F</th>
<th>dfs</th>
<th>p</th>
</tr>
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<tr>
<td>ASPP Sociability PIB</td>
<td>.33</td>
<td>.11</td>
<td>2.68</td>
<td>4, 86</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Other rater’s Age</td>
<td>-.16</td>
<td>-1.58</td>
<td>.12</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Other rater’s SES</td>
<td>-.18</td>
<td>-1.80</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-reported ADHD Symptoms</td>
<td>-.12</td>
<td>-1.11</td>
<td>.27</td>
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<tr>
<td>Other-reported ADHD Symptoms</td>
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<td>1.97</td>
<td>.05</td>
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<td>ASPP Intimate Relationships PIB</td>
<td>.40</td>
<td>.16</td>
<td>5.41</td>
<td>3, 87</td>
<td>.002</td>
<td></td>
<td></td>
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<tr>
<td>Other rater’s Age</td>
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<td>-1.71</td>
<td>.09</td>
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<tr>
<td>Self-reported ADHD Symptoms</td>
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<td>-2.73</td>
<td>.01</td>
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<tr>
<td>Other-reported ADHD Symptoms</td>
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<td>2.99</td>
<td>.004</td>
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<tr>
<td>ASPP Job Competence PIB</td>
<td>.35</td>
<td>.12</td>
<td>6.21</td>
<td>2, 88</td>
<td>.003</td>
<td></td>
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<tr>
<td>Self-reported ADHD Symptoms</td>
<td>-.19</td>
<td>-1.72</td>
<td>.09</td>
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<tr>
<td>Other-reported ADHD Symptoms</td>
<td>.38</td>
<td>3.51</td>
<td>.001</td>
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<tr>
<td>ASPP Household Management PIB</td>
<td>.56</td>
<td>.32</td>
<td>13.45</td>
<td>3, 87</td>
<td>.000</td>
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<tr>
<td>Woman’s Depression</td>
<td>-.20</td>
<td>-1.80</td>
<td>.08</td>
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<tr>
<td>Self-reported ADHD Symptoms</td>
<td>-.35</td>
<td>-2.93</td>
<td>.004</td>
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<tr>
<td>Other-reported ADHD Symptoms</td>
<td>.48</td>
<td>4.93</td>
<td>.000</td>
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<tr>
<td>ASPP Intelligence PIB</td>
<td>.35</td>
<td>.13</td>
<td>4.15</td>
<td>3, 87</td>
<td>.01</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Woman’s Depression</td>
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<td>-1.44</td>
<td>.15</td>
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<tr>
<td>Self-reported ADHD Symptoms</td>
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<td>.29</td>
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<tr>
<td>Other-reported ADHD Symptoms</td>
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<td>2.70</td>
<td>.01</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>ASPP Nurturance PIB</td>
<td>.36</td>
<td>.13</td>
<td>6.47</td>
<td>2, 88</td>
<td>.002</td>
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<tr>
<td>Self-reported ADHD Symptoms</td>
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<td>-2.66</td>
<td>.01</td>
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</tr>
<tr>
<td>Other-reported ADHD Symptoms</td>
<td>.36</td>
<td>3.29</td>
<td>.001</td>
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</tr>
<tr>
<td>ASPP Parenting PIB</td>
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<td>5.03</td>
<td>4, 86</td>
<td>.001</td>
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<td>-2.54</td>
<td>.01</td>
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<td>Other-reported ADHD Symptoms</td>
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<td>1.52</td>
<td>.13</td>
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</tr>
</tbody>
</table>

Note. ADHD = Attention-Deficit/Hyperactivity Disorder; ASPP = Adult Self-Perception Profile; PIB = Positive Illusory Bias.
Discussion

Summary

This study investigated the existence of the PIB in adult women with differing levels of ADHD symptoms. The PIB was defined as higher self- versus other-reports of competence in a variety of life domains. A methodology comparable to the procedure used in studies of the PIB in children with high levels of ADHD was utilized to shed light on the association between the PIB and level of ADHD symptoms. It was predicted that, given the similarities between children and adults with high ADHD symptoms, a larger PIB (in the areas of sociability, intimate relationships, work, household management, intelligence, nurturance, and parenting) would be associated with higher levels of ADHD symptoms in adult women. In addition, the women’s depressive and hostility symptoms, their children’s problems, and sociodemographic characteristics were controlled as needed in assessing the relation between ADHD symptoms and the PIB.

Contrary to my prediction, the PIB was not associated with women’s ADHD symptoms when a composite ADHD symptoms score that took into account self- and other-reports was used. When the separate relations of self- and other-reports of ADHD symptoms with the PIB were examined, however, higher ADHD symptoms were associated with a higher PIB for five of the seven ASPP domains when other-reports of ADHD symptoms were used. On the other hand, when self-reports of ADHD symptoms were used, higher ADHD symptoms were related to a lower PIB for three of the seven
ASPP domains. On the whole, the existence of a relationship between levels of the PIB and ADHD symptoms seems to depend, at least in part, on the person rating the ADHD symptoms of the women.

**Main Findings**

Contrary to my hypothesis, the PIB was not significantly associated with the ADHD symptoms of the women in this study in any of the seven ASPP domains when a composite score of ADHD symptoms was used. This result suggests the possibility that a PIB does not exist in adult women with high levels of ADHD symptoms compared to those with lower levels of ADHD symptoms. One explanation for this finding may be that the PIB only exists for children and not for adults with high ADHD symptoms. Indeed, although there exists a great deal of research on the PIB in children with high ADHD symptoms, few studies examine the PIB in adults with ADHD symptoms, and the studies that do exist present inconclusive results with regards to the existence of a PIB (e.g., Knouse et al., 2005; Knouse et al., 2006). It may be that although children with high ADHD symptoms are more likely to overestimate their competence, the tendency to overestimate in those with high ADHD symptoms disappears by adulthood. Indeed, studies of typically developing children demonstrate a negative relationship between age and the overestimation of abilities (Schneider, 1998). As well, research on the development of meta-cognition shows major growths in self-awareness and other cognitive abilities across childhood to adulthood (Siegler, Deloache, & Eisenberg, 2006). The decreased tendency in adults to overestimate their abilities may be due to their increased cognitive maturity and/or the accumulation of consistent negative
feedback encountered regarding their competencies throughout their lives. The view that adults with high levels of ADHD may have “outgrown” their proclivity to overestimate their abilities is a definite possibility.

Another possibility to explain the lack of association between the PIB and the level of ADHD symptoms of the women in this study could be that the PIB strictly exists only in clinical samples of adults with high ADHD symptoms. In other words, the PIB may be a unique phenomenon limited to individuals with clinically significant ADHD. This study generally used a community sample of women, almost all of whom have not been diagnosed with ADHD, whereas the plenitude of research on the presence of the PIB in children involved clinical samples recruited from ADHD treatment programs, and diagnosed using not only evidence of symptoms but also impairment as assessed through structured interviews and parent- and teacher-reports (e.g., Evangelista et al., 2008; Hoza et al., 2002; Hoza et al., 1993; Hoza et al., 2001; Hoza et al., 2000). However, proposing that the non-clinical nature of the sample of this study may explain the null results would be suggesting a qualitative rather than dimensional model of ADHD, which is generally not supported by the literature (Haslam et al., 2006).

Results of the main analyses were based on a composite average of self- and other-reports of women’s ADHD symptoms. Use of such a composite has both strengths and weaknesses. In terms of strengths, a composite score allows for the retention of important information from both the perspective of the women and the other raters, and consideration of both reports allows for a full picture of ADHD symptoms (Barkley, 2006; Barkley et al., 2002; Magnusson et al., 2006; Zucker,
Morris, Ingram, Morris, & Bakeman, 2002). This method of using both sources of information would be consistent with recommended methods for the comprehensive assessment of ADHD symptoms in both children and adults (Barkley, 2006). With respect to weaknesses, a composite score may not be entirely representative when its constituent scores are not highly correlated.

**Exploratory Findings**

Although self- and other-ratings of women’s ADHD symptoms were significantly correlated at a level consistent with correlations of self- and other-reports typically found for externalizing disorders in adults (Achenbach et al., 2005), the level of the relationship was modest. In addition, bivariate correlations between the PIB and self- and other-reports of women’s ADHD symptoms were in opposite directions. Indeed, it appears that the combination of self- and other-reports in the composite score of ADHD symptoms worked to cancel out any significant relations and yield non-significant associations between the composite score and the PIB in the ASPP domains. Therefore, in an exploratory manner, the composite score of ADHD symptoms was separated into self- and other-reports, and analyses were conducted using the two reports independently.

These analyses demonstrated that higher self-reports of ADHD symptoms were associated with lower PIBs in three of the seven ASPP domains. More specifically, women who rated themselves as having more severe ADHD symptoms rated themselves as lower in competence in the ASPP domains compared to the reports of other raters. This result suggests that the women who rated themselves as having higher
ADHD symptoms tended to see themselves in an overly negative light with regard to
their life competencies. In other words, a generalized negative viewpoint with regard to
both their competencies and ADHD symptoms seems to describe these women. If the
self-reports of ADHD symptoms are taken to be valid indicators of ADHD symptoms, it
may be the case that these women with higher ADHD symptoms have lower self-esteem
(possibly due to continual negative feedback related to their ADHD deficits) relative to
women with lower ADHD symptoms, and that this lower sense of self-esteem
permeates their view of themselves and their competencies such that they actually rate
themselves as lower in competence than others rate them. These women may be
showing a global view of themselves that is negatively biased, comparable to the views
of clinically depressed individuals (Wright & Beck, 1983). However, this study did in
fact control for depression, which suggests that this global negative tendency of women
with high ADHD symptoms to view themselves negatively may stem from constructs
related to, but unique from, depression, such as general self-esteem (Campbell & Fehr,
1990). If it is true that these women with high ADHD symptoms hold such low views of
themselves, then treatment for ADHD symptoms may involve raising the self-esteem of
these women so that their deficiencies in life competencies are not exaggerated.

On the other hand, higher other-reports of ADHD symptoms were related to
higher PIBs in five of the seven ASPP domains. That is, the women who the other raters
saw as having more severe ADHD symptoms rated themselves as higher in competence
in the ASPP domains of life compared to the reports of other raters for these same
domains. This result suggests that women with higher ADHD symptoms, as reported by
other raters, possessed a PIB in that they saw themselves more positively in life
competencies than others saw them. If other-reports are taken to be the more valid
indicators of ADHD symptoms, then adults have not “out-grown” their PIBs. They
continue to over-estimate their competencies whether due to cognitive immaturity, lack
of assimilation of negative feedback into their self-concepts, a self-protective
motivation, or all or any combination of these possibilities. The argument that adults
with high ADHD symptoms still possess a PIB similar to children with elevated ADHD
symptoms is substantiated by past studies that show comparable functional deficits,
comorbidities, neuropsychological activations, and biological characteristics between
adults and children with high levels of ADHD symptoms. In addition, if the finding that
women with higher ADHD symptoms have a higher PIB is true, then this would lend
support for finding the PIB even among those with high ADHD symptoms in a
community sample, suggesting that the PIB is not limited to only clinical samples.

The findings suggest evidence of over-reporting of competence (or the PIB)
when other-reports of ADHD symptoms are utilized but under-reporting of competence
when self-reports of ADHD symptoms are employed. To answer the question of
whether the PIB is associated with ADHD symptoms in adults, one must decide on the
relative validity of self- versus other-reports of ADHD symptoms. Studies have
attempted to answer this question using a variety of approaches. Some studies have
compared self-reports of ADHD symptoms to “gold standard” assessments involving
diagnostic interviews. For example, in a direct comparison of self- versus other-ratings,
Magnusson et al. (2006) found that self-reports of ADHD symptoms were correlated
more highly with diagnostic interviews than other-reports in men and women who were relatives of children and adolescents diagnosed with ADHD. Similarly, Kooij et al. (2008) found that other-reports of ADHD symptoms were less strongly related to diagnostic interviews than self-reports for individuals referred for ADHD assessment in an outpatient clinic. In contrast, comparing self- and other reports of ADHD symptoms for college students who presented with academic problems at a clinic, Zucker et al. (2002) found no differential relationships between diagnostic interviews and self-versus other-reports.

In general, most of the studies using the approach of comparing self-reports of ADHD symptoms with “gold standard” interviews indicate greater validity of self-reports relative to other-reports of ADHD symptoms. However, in these comparisons, there is significant confounding due to shared rater variance between the interviews and self-reports (e.g., the source of information is more similar between interviews and self-reports than interviews and other-reports). As another example, Belendiuk, Clarke, Chronis, and Raggi (2007) found in a sample of mothers of children with ADHD that self-reported ADHD symptoms were significantly associated with diagnostic interviews conducted with the mothers regarding ADHD symptoms, while self-reported ADHD symptoms were less strongly associated with interviews gathered from other reporters. This finding also suggests that shared rater variance may underlie the stronger association between self-reports and interviews with the target individual versus other-reports and interviews with the target individual.
One might use as evidence for self-reports of ADHD symptoms being more valid than other-reports the fact that, in this study, women’s self-reports of ADHD symptoms were correlated with variables known to be associated with high ADHD symptoms, such as SES, depression, hostility, and child problems. In contrast, other-reports of the women’s ADHD symptoms were correlated with only two of these variables, SES and child problems. However, the fact that self-reports of ADHD symptoms correlated with a greater number of relevant ADHD-related variables than other-reports may again be due to shared rater variance.

Another, more practical, approach to this problem of the relative validity of self-versus other-reports of ADHD symptoms would be to elucidate the independent relations of self- and other-reports of ADHD symptoms to impairment in major life domains. Unfortunately, there is a paucity of studies that take this approach. Katz et al. (2009) examined the correlations of self- and other-reported ADHD symptoms with self- and other-reported impairment scores in a sample of university students self-referred to a clinic for ADHD assessment. Inter-rater agreement was generally low, but they found that other-reported ADHD symptoms were correlated with impairment scores when these impairment scores were reported by the other rater. Similarly, self-reported ADHD symptoms were correlated with impairment scores when these scores were self-reported. Again, confounding by shared rater variance precludes a conclusion regarding the validity of the different raters.

To my knowledge, there is only one study that investigates the validity of self-versus other-reports of ADHD symptoms and also controls for shared rater variance.
Barkley et al. (2002) followed adults who had been diagnosed as having ADHD in childhood and found that the level of ADHD symptoms in adulthood varied drastically depending on whether the adults themselves or their parents provided the rating. Comparing self-reports to parent-reports of ADHD symptoms, they found that self-reports were significantly correlated with only two of eight outcome measures, while parent-reports were significantly correlated with all eight outcome measures. The outcome measures were years of education, high school grades, high school class ranking, employer-rated ADHD symptoms, employer-rated work performance, number of jobs fired from, number of friends, and number of arrests. The likelihood of shared rater or method variance accounting for the stronger correlations for parent reports of symptoms was low because these outcome measures were attained through different methods (e.g., high school transcripts, criminal records) and various raters (e.g., self-reports, employer-reports). Thus, the study provides support for the validity of other-reports in assessing the ADHD symptoms of adults.

Furthermore, studies of person perception in general suggest that other-reports may be just as valid as (if not more valid than) self-reports in characterizing individuals who do not necessarily have symptoms of ADHD. Wilson and Dunn (2004) indicate that there exists a great deal of biases in self-perception which may render accurate self-knowledge quite difficult. As well, Vazire and Mehl (2008) found that other-reports can be at least as accurate as self-reports, when compared to a behavioural criterion, for predictions of daily behaviour. Further, John and Robins (1994) found that when compared to rankings made by 11 trained assessment staff members, individuals were
more accurate in evaluating their peers than themselves when ranking their performance in a managerial group-discussion task. Similarly, Kolar, Funder, and Colvin (1996) found that other-reports of personality judgments were more strongly correlated with a behavioural criterion than self-reports. Moreover, studies that test the associations of self- and other-reports to objective life outcomes also suggest that other-reports of personal characteristics may have greater predictive validity. For instance, Fiedler, Oltmanns, and Turkheimer (2004) found that other-reports of personality disorder traits have greater predictive validity in terms of military job outcome. As well, other-reports, in contrast to self-reports, of hostility and antagonism have been found to be more highly associated with the severity of coronary artery calcification, an indicator of coronary artery disease (Smith et al., 2007).

Additional support for the greater validity of other-reports of ADHD symptoms stems from the speculation that if the women in this study had a PIB, there is little reason to suggest that this PIB would not affect their self-ratings of ADHD symptoms. In fact, it seems less likely that a deficit in meta-cognitive self-awareness in those with higher ADHD symptoms would be discriminatory in terms of the area in which the deficiency in self-awareness manifests itself (Barkley, 1997). Given this, women with low self-reported ADHD symptoms may actually have high ADHD symptoms if a PIB exists with respect to their ADHD symptoms in addition to their ASPP life domains.

If other-reports are indeed more valid than self-reports of symptoms of ADHD, then the results of this study that the PIB does exist for most life domains among women with higher levels of ADHD symptoms would be consistent with prior research
conducted with children with high levels of ADHD symptoms. It is interesting to note that these past studies typically categorized their child participants as having high levels of ADHD symptoms based on assessments involving other-reports (e.g., parent- and teacher-reports) and not self-reports. Overall, given the limited research on specifically on the validity between raters on symptoms of ADHD, there appears to be no conclusive answer as to whether self- or other-reports are more valid, although the evidence seems to be more convincing for the greater validity of other-reports of ADHD symptoms, relative to self-reports.

If women with high symptoms of ADHD truly possess a PIB that results in them seeing themselves in an overly positive light, then these women may be less apt to initiate or engage in programs or treatments for their difficulties in major life domains as well as for their ADHD symptoms. If these women falsely believe that their current functioning is unproblematic, then they may have little reason to participate in any kind of intervention. Indeed, past studies of children with high levels of ADHD symptoms suggest that the PIB is associated with poorer treatment response. For instance, a study of children with high ADHD symptoms suggests that children with high confidence at the beginning of treatment for ADHD were more likely to show less improvement as measured by counsellor ratings of teasing/peer aggression, problem-solving skills, social skills, rule following, and attention (Hoza & Pelham, 1995). In addition, as previously mentioned, a recent study by Mikami et al. (2010) demonstrates that a PIB at the beginning of treatment in children with high levels of ADHD symptoms predicted
poorer response to treatment in terms of friendships, observed conduct problems, and peer-nominated social-preferences.

To my knowledge, no studies have examined the associations of the PIB and treatment response in adults with high levels of ADHD symptoms. However, if adults with high ADHD symptoms are similar to children with high ADHD symptoms, it is likely the case that a PIB in adults participating in treatment also may be associated with poorer treatment outcomes. Not engaging in treatment can leave adults with high levels of ADHD symptoms with significant functional impairments in a number of major life areas, which can adversely impact the individual as well as society.

**The PIB in Specific Life Domains**

The majority of the ASPP domains of competence for this study were chosen to represent the domains for which the PIB has been well-demonstrated in studies of children with high levels of ADHD symptoms. The sociability and intimate relationships domains in adults were selected to represent the social domain, and the job competence, household management, and intelligence domains were chosen to represent the academic domain. The nurturance and parenting domains were selected as new areas to explore. Taking into account the lower internal consistency of other-reports for the intelligence domain, the finding that self- and other-reports of ADHD symptoms were independently significantly related to at least one of the ASPP domains chosen to represent the social domain as well as at least one of the domains selected as analogues of the academic domain suggests that the domains were adequately chosen as life areas relevant to domains where the PIB may exist. The fact that the PIB was found to be
associated with higher levels of ADHD symptoms, based on other-reports, across these life domains suggests that this PIB is prevalent in domains similar to those used in past studies of children with high levels of ADHD symptoms.

Interestingly, neither self- nor other-reports of ADHD symptoms were related to a PIB in the parenting domain. At first glance, one might think that this result may stem from the fact that the parenting domain was newly constructed within the context of this study and not part of the original ASPP. However, the items in the parenting domain were drawn from the well-established PSOC questionnaire (Johnston & Mash, 1989), and the internal consistency of this sample for the parenting scale was quite high for women (Cronbach’s $\alpha = .82$) and other raters (Cronbach’s $\alpha = .84$). As well, the fact that both self- and other-reports of ADHD symptoms were independently correlated within raters with the individual levels of parenting ratings argues against the parenting items being problematic. Given that the measure of parenting appears not to be contributing to the null findings, one possibility is that the PIB only appears with respect to intimate relationships, job competence, household management, intelligence, and nurturance. However, such a conclusion remains speculative. As previously argued, it seems less likely that a PIB in these women would be limited to specific domains.

**Conclusion**

This study set out to examine whether a PIB in a variety of life domains is related to the level of ADHD symptoms in women. The findings of this study differ depending on the measurement of ADHD symptoms. The prediction that the PIB increases as the ADHD symptoms of women increase was not supported when ADHD
symptoms were assessed by combined self- and other-reports of ADHD symptoms. However, when ADHD symptoms were measured by self-reports, the results suggest that the PIB decreased as ADHD symptoms increased. In contrast, the PIB increased as ADHD symptoms as measured by other-reports increased. These results suggest that determination of the existence of a PIB depends, at least in part, on how one assesses ADHD symptoms. Research comparing the validity of self- versus other-reports of ADHD symptoms is limited and further study of this issue is required. The evidence that exists seems to support the validity of other-reports of ADHD symptoms, relative to self-reports. Therefore, one can tentatively conclude that adults with high ADHD symptoms appear to exhibit a PIB with regard to their competence in various life domains.

**Limitations**

This study is not without its limitations. First of all, the main analyses of this study yielded a null result, which may be due to a low sample size. Although the sample size was chosen to provide adequate statistical power, this calculation was based on expected effects of a medium size. The magnitude of the effect size was surmised from studies of the PIB in children with high ADHD symptoms (e.g., Diener & Milich, 1997; Hoza et al., 2002; Hoza et al., 2004). The possibility exists that the effect size for a PIB in adults with high ADHD symptoms may be smaller than the effect size found for children with high ADHD symptoms. In this case, this study may not have had enough participants to detect such effects. However, Knouse et al. (2005) showed a medium to large effect size for the PIB in adults with ADHD symptoms. As well, the fact that
significant correlations were found between individual self- or other-reported ADHD symptoms and the ASPP domains provides evidence that the sample size was at least sufficient to detect small to medium effects (e.g., correlations of approximately .20 to .30). In addition, if the effect size for PIB is quite small, then detection of small effects may not be clinically meaningful in the real world.

An additional limitation concerns the fact that although the exploratory analyses of this study demonstrated significant relationships between self- and other-reports of ADHD with the PIB in the ASPP domains, one obviously cannot infer causation from these correlations. Although care was taken to control for the possibility of a third factor influencing both ADHD symptoms and the PIB by covarying relevant variables such as hostility, depression, child problems, and demographic factors, conclusions of causality cannot be addressed with this cross-sectional research design.

A further concern involves the internal consistencies of the measures for the ADHD symptoms and ASPP domains. There appears to be a pattern of somewhat lower internal consistencies for other raters in comparison to self-reports in five of the seven life domains (sociability, intimate relationships, job competence, household management, and intelligence). This lower reliability has the potential to limit the validity of other-reports compared to self-reports. However, the pattern of results from main and exploratory analyses was examined with this possibility in mind and no trends corresponding to the pattern of internal consistencies was detected. For main analyses, the ADHD symptoms composite score was not significantly related to any of the ASPP domains, regardless of whether alphas were higher for self- versus other-reports in the
ASPP domains. For exploratory analyses, both self- and other-reports of ADHD symptoms were significantly related to an ASPP domain (that is, household management) that had lower other- versus self-report internal consistencies, as well as an ASPP domain (that is, nurturance) that had higher other-report internal consistency relative to self-report.

Another major limitation of this study involves the fact that a community sample was generally used, and a completely clinical sample of adults diagnosed with ADHD was not recruited. Indeed, all but three of the women in my sample did not have ADHD diagnoses. A more equivalent comparison with the past research that has found a PIB in children with diagnosed ADHD would involve primarily studying adults with diagnosed ADHD. There may be differences between adults diagnosed with ADHD versus adults with high ADHD symptoms, such as differences in impairment levels and/or onset of symptoms. In addition, use of a clinical sample would allow for greater external validity in terms of drawing conclusions about individuals who actually have above-threshold levels of ADHD and who also are more likely to have ADHD-related impairments.

Future Directions

Future studies of the relation between the PIB and ADHD symptoms in adults may involve developmental studies to test the PIB at several different ages to show the presence of the PIB in childhood, adolescence, adulthood, and late adulthood. These cross-sectional or longitudinal studies could more precisely detect the point at which the PIB ceases to exist in individuals with high ADHD symptoms. In addition, studies in the future could use more objective measures of ADHD symptoms by administering
“gold standard” diagnostic interviews, using reports from multiple informants, and inspecting school and work records. Similarly, future studies could employ more objective measures of the PIB by utilizing actual records of competencies (e.g., work progress reports and university transcripts), using actual in-lab observations of competencies in certain life areas (e.g., a social interaction task), having the individual estimate his/her performance in an actual test of competency (e.g., an intelligence test), employing more than one informant to rate the competencies of the individual, and/or using more measures per life domain to enhance validity and reliability. Overall, a multi-rater, multi-method study assessing the PIB in adults with high ADHD symptoms would control for shared rater and method variance, which allows for conclusions of whether the PIB exists in adults with high ADHD symptoms to be drawn with more certainty. Such a study could also examine adults with diagnosed ADHD and/or trace the PIB throughout the lifespan.
References


http://ajp.psychiatryonline.org


report and informant report concerning symptoms of ADHD in adult patients.


Rasmussen, P., & Gillberg, C. (2000). Natural outcome of ADHD with developmental coordination disorder at age 22 years: A controlled, longitudinal, community-


Appendix A: UBC Research Ethics Board's Certificate of Approval

The University of British Columbia
Office of Research Services
Behavioural Research Ethics Board
Suite 102, 6190 Agronomy Road,
Vancouver, B.C. V6T 1Z3

CERTIFICATE OF APPROVAL - FULL BOARD

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<td>UBC/Arts/Psychology, Department of</td>
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INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT:

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Other locations where the research will be conducted:

- Internet

CO-INVESTIGATOR(S):

Yuanyuan Jiang

SPONSORING AGENCIES:

Canadian Institutes of Health Research (CIHR)

PROJECT TITLE:

The Positive Illusory Bias in Mothers with and without Attention-Deficit/Hyperactivity Disorder (H09-02129)

REB MEETING DATE: September 10, 2009

CERTIFICATE EXPIRY DATE: September 10, 2010

DOCUMENTS INCLUDED IN THIS APPROVAL:

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The application for ethical review and the document(s) listed above have been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.

*Approval is issued on behalf of the Behavioural Research Ethics Board and signed electronically by one of the following:*

- Dr. M. Judith Lynam, Chair
- Dr. Ken Craig, Chair
- Dr. Jim Rupert, Associate Chair
- Dr. Laurie Ford, Associate Chair
- Dr. Anita Ho, Associate Chair