TYPES OF AGGRESSION USED BY GIRLS WITH AND WITHOUT ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

by

JENEVA LEE OHAN

B. Sc., McMaster University, 1995
M. A., The University of British Columbia, 1997

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

in

THE FACULTY OF GRADUATE STUDIES

(Department of Psychology; Clinical Psychology Programme)

We accept this thesis as conforming to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

June 2002

© Jeneva Lee Ohan, 2002
In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of Psychology

The University of British Columbia
Vancouver, Canada

Date July 19, 2002
Abstract

This thesis was designed to investigate differences in aggression between girls with and without attention-deficit/hyperactivity disorder (ADHD). Forty girls with ADHD and 43 girls without ADHD aged 9- to 12- years and their mothers and teachers participated. A multi-assessment methodology was used to investigate these differences, employing mothers’ reports, teachers’ reports, and a laboratory aggression analogue task (a computer game involving simulated girls in other rooms). The results indicated that mothers and teachers saw girls with ADHD as having much higher levels of all types of aggression assessed, including overt, relational, proactive, and reactive aggression, than girls in the control group. On the lab task, girls with ADHD used a strategy that involved more threatening and bragging comments, and social exclusions of their co-players. Expected differences on some of the lab task measures did not emerge. Also, according to mothers, teachers, and the results from the lab task, girls with ADHD were significantly less prosocial than girls in the control group. Where significant group differences had been found, follow-up tests generally indicated that girls with ADHD and comorbid oppositional-defiant disorder (ODD) were more aggressive than girls in the control group, with girls with ADHD but not ODD falling in between. In sum, these results indicate substantial cause for concern for the concurrent and future psychosocial well-being of girls with ADHD.
## TABLE OF CONTENTS

Abstract ................................................................. ii

Table of Contents ...................................................... iii

List of Tables .......................................................... iv

Acknowledgements ...................................................... vi

CHAPTER I Introduction ............................................... 1

1.1 Attention-deficit/hyperactivity disorder ......................... 1

1.2 Aggression .......................................................... 10

CHAPTER II Methods .................................................. 40

CHAPTER III Results .................................................. 58

CHAPTER IV Discussion ............................................... 73

References .............................................................. 95

Appendix A DSM-IV symptoms of ADHD (APA, 1994) ............... 110

Appendix B DSM-IV Symptoms of ODD ............................ 112

Appendix C Proactive and Reactive Aggression Rating Scale (Dodge & Coie, 1987) .... 113

Appendix D Amended Children’s Social Behavior Scale (Crick, 1996) ............ 115

Appendix E Coding Manual: Girls’ Chat Centre Responses ............. 117

Appendix F Questions asked after the “Girls’ Club” game ............ 129

Appendix G Coding Manual: Post-game questions assessing girls’ intent ....... 131
**LIST OF TABLES**

Table 1  Demographic information for girls with and without ADHD .......................... 133

Table 2  Girls’ reasons for deducting 2 points and blacking-out a player’s screen during the “Girls’ Club!” game ................................................................. 134

Table 3  Descriptive information for overt and relational aggression measures .............. 135

Table 4  Descriptive information for proactive and reactive aggression measures .......... 136

Table 5  Descriptive information for instrumental and hostile aggression measures .......... 137

Table 6  Descriptive information for overt and relational aggression measures for girls with and without comorbid ODD ......................................................... 138

Table 7  Descriptive information for proactive and reactive aggression measures for girls with and without comorbid ODD ......................................................... 140

Table 8  Descriptive information for lab task measures of instrumental and hostile aggression for girls with and without comorbid ODD ........................................... 142

Table 9  Descriptive information for prosocial and awkward social behaviour ............... 143

Table 10 Descriptive information for measures of prosocial and awkward behaviour for girls with and without comorbid ODD ......................................................... 144

Table 11 Correlations between lab and corresponding adult-report overt and relational aggression measures ................................................................. 145

Table 12 Correlations between lab and corresponding adult report proactive and reactive aggression measures ................................................................. 146

Table 13 Correlations between lab relational and overt aggression measures and mother-reported psychopathology and social competence ........................................... 147

Table 14 Correlations between proactive and reactive lab measures and mother-reported psychopathology and social competence ........................................... 148

Table 15 Correlations between instrumental and hostile lab measures and
Table 16 Mother and teacher agreement on overt and relational aggression ratings ........ 150
Table 17 Mother and teacher agreement on proactive and reactive aggression ratings .... 151
Table 18 Correlations between adult reports of relational and overt aggression and
mother-reported psychopathology and social competence ......................... 152
Table 19 Correlations between adult-reported proactive and reactive aggression and
mother-reported psychopathology and social competence ......................... 153
I would like to thank my supervisor, Dr. Charlotte Johnston, for her guidance throughout my graduate studies and of this research. I would like to thank all of the participants, without whom this research was not possible. My research assistants, Salome Mui, Leanne Mak, Teresa Howell, Josie Hua, Sarah Connor, Julianna Machell, and in particular, Katherine McKenney, deserve special thanks for all of their hard work in this project. I would also like to thank the agencies that funded this research, included Medical Research Council of Canada, the Society for a Science of Clinical Psychology, and the Canadian Federation of University Women. Finally, I would like to thank Troy Visser and Michelle Haring for their support and help during the dissertation process.
Introduction

It is well accepted that childhood aggression plays an important role in influencing concurrent and later life adjustment (e.g., Parker & Asher, 1987). However, despite the importance of aggression on psychosocial adjustment, aggression in girls has been a neglected area of research. In particular, aggression in females with attention-deficit/hyperactivity disorder (ADHD), who we believe are at an increased risk for using aggressive interpersonal strategies, has been lacking. To address this need, this dissertation was designed to explore aggressive behaviours used by girls with and without ADHD.

The introduction begins with a description of ADHD in elementary-school aged girls and a review of our limited knowledge of problems that are associated with ADHD in girls, including aggression. I then move to a review of theoretical perspectives on aggression, and useful typologies that have been applied to research on childhood aggression. The introduction ends with a discussion of how aggression can be assessed with a clinical sample of children. Next, an overview of the methods is outlined, which includes a description of the participants and the specific procedures of the investigation. Finally, the results of the investigation are described, followed by a discussion of their implications for understanding aggression in girls with ADHD.

Attention-deficit/hyperactivity disorder

Attention-deficit/hyperactivity disorder (ADHD) is defined by developmentally-inappropriate levels of inattention and/or hyperactivity-impulsivity that are relatively persistent and pervasive. Diagnostic guidelines for ADHD are provided in the most recent edition of the Diagnostic and Statistical Manual of Mental Disorders, *(DSM-IV; American Psychiatric Association, 1994)*, a manual which provides basic information and sets of symptom criteria for psychiatric disorders. In the DSM-IV, ADHD symptoms are divided into two core clusters: inattention (e.g., distractible, can't concentrate), and hyperactivity-impulsivity (e.g., runs or
climbs about, fidgets). A subtype of ADHD is specified depending on which cluster of symptom
criteria is met: inattentive type, hyperactive-impulsive type, or combined type (if criteria for both
clusters are met). In addition, there must be evidence that these symptoms began before age 7,
have been present for at least 6 months, and cause impairment. A full list of symptom criteria is
available in Appendix A.

Gender and the prevalence of ADHD

Based on these criteria, ADHD is one of the most common mental health disorders of
childhood, affecting an estimated 3 to 5 percent of elementary-school children (APA, 1994).
More boys are affected than girls, with gender ratios varying from 4:1 to 9:1 in samples of
children who are referred to clinics for their ADHD symptoms and from 2:1 to 3:1 in
epidemiological or community-based samples (APA, 1994; Arnold, 1996). The discrepancy
between gender ratios in clinic-referred and community samples indicates that girls with ADHD
may be less likely to be referred for treatment than boys with ADHD (e.g., Berry, Shaywitz &
Shaywitz, 1985; McGee & Feehan, 1991). Some authors have hypothesized that girls with
ADHD might be overlooked because boys with ADHD are more disruptive (e.g., Biederman et
al., 1999; Biederman et al., 2002), but the available evidence suggests that disruptive behaviour
accounts for only part of this bias (e.g., Bussing, Zima, Perwein, Belin, & Widowski, 1998).
Unfortunately, girls with ADHD have also been overlooked by researchers, with a
disproportionate number of studies including only male samples (Arnold, 1996). This neglect of
girls with ADHD is significant because even though a smaller proportion of children with ADHD
are female, the high prevalence rate of ADHD means that literally thousands of girls are affected
nationally. For example, if we assume a prevalence of 5% and a conservative 5:1 male to female
ratio, then 150,000 (1% of the 15 million) females in Canada are affected by ADHD. This
significant prevalence makes it crucial for us to understand the phenomenon of ADHD in girls.
A basic but unresolved issue in ADHD is the appropriateness of applying our current diagnostic criteria to females (Ohan & Johnston, 1999). As my colleague and I (Ohan & Johnston, 1999) and others (e.g., Barkley, 1998) have noted, the DSM-IV criteria for ADHD may be more appropriate for males because the criteria were determined by predominantly male researchers investigating predominantly male samples. In other words, it is possible that there are differences in the ways that girls and boys express the core symptoms of ADHD (i.e., qualitative gender differences) and that the symptoms listed in the DSM-IV are more representative of masculine symptom expressions. For example, boys who are inattentive to their schoolwork may play with their work materials in a way that disrupts other children, whereas girls who are inattentive may doodle quietly. Unfortunately, there have not been any thorough investigations of qualitative gender differences in ADHD symptoms. On the other hand, quantitative differences (i.e., differences in the frequency or intensity of the core symptoms) have been examined in numerous studies. There is generally good agreement that overactivity is more common amongst boys with ADHD than girls with ADHD (Gaub & Carlson, 1997; McBurnett et al., 1999). In contrast, rates of inattentive symptoms may vary with the location from which the sample is recruited. Based on a meta analysis of gender differences in children with ADHD, referred girls tended to be more inattentive than referred boys (effect size, .25), but among non-referred children with ADHD, boys were more inattentive than girls (effect size, .24) (Gaub & Carlson, 1997).

These gender differences in the core ADHD symptoms imply that boys may be more likely to meet hyperactive-impulsive subtype and referred girls may be more likely to meet the inattentive subtype of ADHD; however, findings have been inconsistent. For example, in the two DSM-IV field trial studies of clinic-referred samples, gender ratios in one study did not differ across any of the subtypes (approximately 3:1 for all subtypes; McBurnett et al., 1999),
whereas in the other study the gender ratio was less pronounced in the inattentive subtype (about 3:1) than the combined subtype (about 4:1), with the hyperactive-impulsive subtype ratio in between (Lahey et al., 1994). One consistent finding in this research is that the combined subtype was the most common and the hyperactive-impulsive subtype was the least common diagnosis for both genders. In summary, although the current evidence precludes conclusions about differences in gender ratios within the subtypes of ADHD, it appears reasonable to conclude that in referred samples, combined subtype diagnoses are the most common in both genders.

Related impairments in girls with ADHD.

ADHD in girls is associated with many family and educational problems and shares high comorbidity rates with other childhood disorders. At home, girls with ADHD experience more family conflict and less cohesion (Biederman et al., 1999) and are more likely to have divorced parents (Bhatia et al., 1991) than girls without ADHD. Girls with ADHD also have more difficulties at school than their non-ADHD classmates; for example, they are more than six times as likely to fail a grade in school or to be placed in a special education class than are girls without ADHD (Biederman et al., 1999) and have low academic achievement (Rucklidge & Tannock, 2001). Learning disabilities, which are defined as academic achievement scores that are significantly below one’s ability, affect twice as many girls with than without ADHD (12% versus 6%; Biederman et al., 1999). Another example of the associated impairments of girls with ADHD is the relatively high rates of internalizing disorders (i.e., problems that are inner-directed such as withdrawal and depression) (e.g., Arcia & Conners, 1998; Breen & Barkley, 1988; Rucklidge & Tannock, 2001).

Another area of concern for children with ADHD is social relationships. It is well-documented that boys with ADHD are frequently disliked and rejected by their peers (e.g.,
Erhardt & Hinshaw, 1994; Madan-Swain & Zentall, 1990). The impulsive and aggressive style of social interactions of boys with ADHD has earned them the name “negative social catalysts” because they seem to engender more negative behaviour in children around them (Whalen & Henker, 1985). Fewer studies on social relationships have been conducted with girls with ADHD, but the evidence that is available suggests that girls with ADHD have at least as many social problems as boys with ADHD, regardless of the recruitment method or subtype of ADHD (e.g., Berry, Shaywitz, & Shaywitz, 1985; Biederman et al., 2002; Carlson, Tamm, & Gaub, 1997; deHaas, 1986; Greene et al., 2001; Horn et al., 1989). For example, in a school sample of teacher-identified ADHD-combined type children, Carlson et al. (1997) reported that teachers rated girls and boys with ADHD-combined type as equally ignored and poorly liked, but the girls as more disliked (ratings of like and dislike were both gathered). The magnitude of impairment for girls with ADHD is most apparent when they are considered relative to girls without ADHD: large effect sizes have been found on ratings of social skills (1.33), peer likeability ratings (.80), and peer dislike ratings (.92) (Gaub & Carlson, 1997). This research, combined with findings that social relationships are more important to girls than boys (e.g., Bukowski, Hoza, & Boivin, 1994), strongly point to the need for serious concern about the social interactions of girls with ADHD. Unfortunately, research has not yet addressed why girls with ADHD have these problems, although it is possible that it is due to a similar aggressive and emotionally dysregulated interactional style that has been identified in boys with ADHD.

**Disruptive behaviour and ADHD**

Oppositional-defiant disorder (ODD) and conduct disorder (CD) are common comorbid disruptive behaviour diagnoses for children with ADHD. ODD is defined by a pattern of disobedient and rebellious behaviours that are directed towards people in authority. Symptoms include losing one’s temper and arguing with adults (APA, 1994; see Appendix B for criteria).
Although aggressive behaviour is not part of the ODD diagnosis, the presence of an ODD behaviour pattern may increase the likelihood that the child is aggressive. ODD is often thought to be a developmental precursor of CD, which is defined by serious contempt or disrespect for social regulations and the rights of others (APA, 1994). Most CD symptoms reflect aggressive and delinquent behaviours (e.g., assault with a weapon, forcing someone into sexual activity), but CD is not exclusively a disorder of aggression or delinquency, as only certain physically aggressive and delinquent behaviours are included, and other legal and non-aggressive behaviours are also included (e.g., staying out at night despite parental prohibitions). Still, as with ODD, the presence of CD is almost certain to increase the likelihood that the child is aggressive. Depending on when the CD symptoms start, a childhood- or adolescent-onset is specified (APA, 1994). Boys outnumber girls in both ODD and CD diagnoses (Loeber & Keenan, 1994), but the gender ratio in the CD-adolescent onset group is much less discrepant (APA, 1994). The comorbidity with ADHD is significant; for example, 35% to 70% of children with ADHD also have ODD, and 30% to 50% also have CD (Biederman, Newcorn, & Sprich, 1991; Taylor, Sandberg, Thorley, & Giles, 1991). These estimates are based on predominantly male samples, however, which justifies an exploration of comorbidity in girls.

There are only a couple of studies that have considered the comorbidity of ODD and CD in girls with ADHD. In one study of a large clinic-referred sample of 140 girls with ADHD and 122 girls without ADHD aged 6 to 18 years, the rates of ODD and CD were 35% and 8%, respectively, in the ADHD group, and 4% and 0%, respectively, in the control group (Biederman et al., 1999). Interestingly, the rates of ODD and CD within the ADHD group did not differ based on the subtype of ADHD, which is contrary to the findings of many other studies that have generally found greater rates of ODD and CD in children with ADHD-combined or ADHD-hyperactive/impulsive than ADHD-inattentive subtype (Lalonde, Turgay, & Hudson, 1998;
Teegarden & Burns, 1999). In another study that compared the rates of ODD and CD in a community-based sample of 42 girls and 56 boys with ADHD-combined subtype, the rates of ODD and CD in girls with ADHD were 50% and 2% respectively, whereas the rates of ODD and CD in boys were 33% and 7%, respectively (Sharp et al., 1999). It is important to note that in the latter study, the rates of CD comorbidity may be underestimated because the young age of the participants (approximately 9 years) implies that some children had yet to develop CD. This is especially relevant to girls because females are much more likely to have an onset of CD in their adolescence than their childhood (APA, 1994). In sum, considering the available evidence, comorbid CD and especially ODD are a serious concern for girls with ADHD.

There have been very few studies that have examined the impact of ADHD with and without comorbid ODD in girls. In one recent study, girls and boys with ADHD plus ODD were seen by mothers as more socially impaired (e.g., problems with peers, siblings, and parents) than girls and boys with ADHD in the absence of ODD, who were in turn seen as more socially impaired than girls and boys with neither disorder (Greene et al., 2001). There were no gender differences seen on any of the measures used. Unfortunately, the authors did not present information about the impact of ADHD subtype on social impairment. In addition, the social impairment measure used did not consider aggressive behaviour, which is the most important social behaviour when considering concurrent and future adjustment (Parker & Asher, 1987). Still, this does indicate that ADHD in the presence of ODD is a significant concern for social relationships, at least according to mothers’ perceptions.

As discussed above, ODD and CD are not disorders of aggression, but either disorder may increase the likelihood that the child is aggressive. Although the DSM-IV does not contain an aggressive behaviour disorder, aggression in children is an important area of study. This importance is underscored by the following findings: 1) aggression has a high cost to society
(e.g., Berkowitz, 1993; Vitiello & Stoff, 1997); 2) aggression is relatively stable over time (e.g., Feshbach, Feshbach, & Jaffe, 1997; Huesmann, Eron, Lefkowitz, & Walder, 1984); 3) aggression has many negative concurrent ramifications, such as peer rejection (e.g., Coie, Dodge, & Coppotelli, 1982); and 4) aggression is the single best known predictor of poor long-term outcome, such as criminality (Parker & Asher, 1987).

One of the largest gaps in our knowledge of ADHD in girls is an understanding of how they express aggression. Most research on aggression in children with ADHD has been conducted on mainly (and often exclusively) male samples, with only a handful of studies including girls. In one of the few studies in this area, Brown et al. (1991) reported no significant gender differences in parent-reported aggression, but a trend for more severe aggression in teacher reports of boys in a clinic-referred ADHD sample of 51 boys and 20 girls aged 5 to 13 years. These results are consistent with other investigations of clinic samples of similarly-aged children with ADHD that have failed to find gender differences in parent-rated aggression (Breen, 1989; Breen & Barkley, 1988; Silverthorn, Frick, Kuper, & Ott, 1996). The lack of significant gender differences may be due in part to the recruitment method, however. For instance, in their meta-analysis, Gaub and Carlson (1997) found similar levels of aggression in clinic-referred boys and girls with ADHD, but lower levels among non-referred girls with ADHD than their male counterparts. In addition, the effect size for the differences in aggression between ADHD and non-ADHD peers was moderate for girls (.76) but significantly larger for boys (1.22). In sum, there is little research in this area, but the results indicate that aggression is a problem for girls with ADHD.

Unfortunately, studies that have examined aggression in girls with ADHD share numerous limitations. As with most research on this population, samples have been very small and have included only referrals to one health centre. In addition, although research into
aggression in boys with ADHD has used many different measurement techniques, such as computer analogue tasks (e.g., Atkins & Stoff, 1993), naturalistic observations (e.g., Murphy, Pelham, & Lang, 1992), and peer ratings of aggression (Johnston & Pelham, 1986), research on the aggression of girls with ADHD has consisted primarily of parent reports. Furthermore, comparisons to a non-clinical sample of girls rather than to boys with ADHD may be a more appropriate way to understand the extent of impairment related to aggression in girls with ADHD, but this is rarely done. Finally, the existing literature has concentrated on ratings of overall aggression. This last limitation is crucial: literature is accumulating that suggests that childhood aggression is not a homogeneous construct, and there may be different outcomes and optimal treatment strategies associated with the different types of aggression (Dodge, Lochman, Harnish, Bates, & Petit, 1997). The measures of aggression used in prior research (e.g., the parent-report and teacher-report forms of the Child Behavior Checklist [CBCL]; Achenbach, 1991) treat aggression as a unitary construct and are primarily designed to assess physical aggression. In summary, a study that improves upon these limitations is essential in order to adequately describe aggression in girls with ADHD.

Another major limitation of past research on aggression in children with ADHD is that the influence of ODD or CD symptoms is rarely considered. This is important because it is possible that the group differences in aggression between girls with and without ADHD are affected by the comorbid presence of ODD and/or CD in addition to ADHD itself. Carlson et al. (1997) examined the possible impact of comorbid ODD on aggression as rated by teachers of children in kindergarten through grade 5. Based on teacher ratings of DSM-IV symptoms, children were placed into diagnostic groups of ADHD-combined subtype (46 boys, 11 girls), ODD (59 boys, 35 girls), or ADHD-combined subtype and comorbid ODD (26 boys, 27 girls), and a control child who did not meet ADHD or ODD criteria was matched for grade, gender, and
ethnicity. Control children were rated by teachers as significantly less aggressive than all diagnostic groups. Among diagnostic groups, the comorbid ADHD/ODD group was rated as significantly more aggressive than the ADHD group, with the ODD group falling in between. Within diagnostic groups, girls with ODD or ADHD were rated as less aggressive than boys with ODD or ADHD, but there were no gender differences in the comorbid ADHD/ODD group. This finding indicates that girls with ADHD are more aggressive than girls without ADHD, but that the combined presence of ODD and ADHD intensifies aggression. In the present study, the focus will be on differences between girls with and without ADHD, but the impact of ODD symptoms on aggression will be examined.

To summarize, aggression appears to be a problem in girls with ADHD, but we know very little about it. Without knowing how girls with ADHD aggress, we are limited in providing effective treatment options. Given the stability of aggression over time as well as the concurrent and future impairments of children who are aggressive, research that can address the shortcomings of past studies is crucial in order to appropriately address the needs of this significant population. Before discussing how I attempt to address these problems in this study, however, I begin with a general review of aggression. First, I will attempt to define aggression, and review prominent theoretical explanations. I then turn to a discussion of how childhood aggression is manifested finish by addressing measurement issues.

**Aggression.**

*What is aggression?*

Like many concepts in psychology, there is no universally agreed upon definition of aggression. Buss (1961, p.1), one of the first behavioural researchers in this area, defined aggression as a “response that delivers noxious stimuli to another organism.” Although framing aggression in purely behavioural terms helped to promote it as an area worthy of scientific
investigation, this definition falls short of capturing the full essence of an aggressive act. For instance, if we adhered to this meaning, accidental harm or harm caused by helpful behaviour (such as a physician injecting a medicine) would be classified as aggressive. Thus, the intent of the actor is crucial in differentiating aggression from other types of behaviours that also result in harm. A generally accepted definition of aggression, then, and the one that will be used in this work, is a behaviour that is intended to harm or hurt another living being (e.g., Bandura, 1973; Baron & Richardson, 1994; Berkowitz, 1993; Feshbach, 1964).

Still, there are problems with this refined definition that deserve discussion. Because intent is an internal, unobservable event, researchers must either infer intent or attempt to measure it post-hoc. Furthermore, definitions of intent are controversial. Although intent may generally be taken to mean that the actor behaved of his/her own will, the existence of free will is a centuries-old subject of philosophical and psychological debate (Baron & Richardson, 1994; Berkowitz, 1993). Another problem with this definition is that it excludes acts that are expressions of anger without the intent to harm another person, but which would be interpreted as aggressive by others (e.g., a person hitting a wall during an argument). Still, the merit of including intent in the definition of aggression appears to override its flaws: it excludes accidental and hurtful but helpful acts, and includes acts that are intended to hurt but do not have their intended effect (e.g., a child pushing an adult) or are obstructed in the process (e.g., attempted murder) (Baron & Richardson, 1994).

**Brief overview of relevant theories of aggression**

Here I provide a brief overview of two of the most influential aggression theories in child clinical psychology: the frustration-aggression hypothesis, and the social-learning hypothesis. These theories have often been used to form the basis of theoretical work on aggression in children, and therefore a brief discussion is useful in providing the reader with a context in which
much of the past research on aggression in children was conducted. It is noteworthy that there are numerous other successful theories that have contributed to this field; for example, ethological (e.g., Lorenz, 1958) and biological (e.g., Brain, 1979) explanations of aggression. Although not reviewed here, the reader interested is encouraged to consult these writings.

*The frustration-aggression hypothesis.* In 1939, Dollard, Doob, Miller, Mowrer, and Sears proposed what is now perhaps the most renowned theory of aggression. Briefly, the core of their tenet is that frustration induces a propensity toward aggression (i.e., an aggressive drive) that then promotes aggressive behaviour. Frustration was defined as the thwarting of an attempt to reach an expected goal. The three factors that these authors saw as influential in determining the strength of the aggressive drive were: 1) the person's expectation of satisfaction upon reaching his/her goal, 2) the amount of interference with his/her goal-directed attempts, and 3) the number of frustrated responses. Note that this hypothesis assumes that every aggressive behaviour stems from frustration, but the authors pointed out that the reverse is not necessarily true (i.e., frustration does not lead to aggression in all circumstances). The authors emphasized that a threat of punishment is key in inhibiting aggressive behaviour, but because punishment was not thought to affect the aggressive drive, the motivation to aggress would remain and be expressed in situations of lesser or no threat of punishment.

Many empirical tests of this hypothesis have been conducted, and the general prediction that frustration leads to a tendency for people and other animals to aggress has been established (for a review, see Berkowitz, 1993). However, many problems with this hypothesis remain. One of the original authors (Miller, 1941) later added that people can develop other reactions to frustration besides negative ones. Although this may seem like a small revision to the theory, its implication is immense: frustration may lead to many reactions, including non-aggressive (e.g., despair) and positive (e.g., responding assertively) ones. Still, this amendment is vague
regarding when or for whom aggression would result from frustration. More recently, Berkowitz (1993) proposed that attributional processes mediate this link; namely, those who attempt to obtain a goal will not become frustrated or likely to aggress unless they attribute their failure to frustration brought on purposefully by someone. Finally, the assumption that every aggressive act is the result of frustration is a source of even greater debate. Evidence that aggression can be learned and that aggression results from situations in which there is a lack of frustrating events is simply overwhelming (for a review, see Baron & Richardson, 1994). These problems with the frustration-aggression theory do not mean that it is not useful in explaining some acts of aggression, but rather that it is limited in explaining all acts of aggression.

The Social-Learning Hypothesis. Another comprehensive and widely influential theory of aggression came in 1973 when Bandura proposed that aggression is a form of social behaviour, and, as such, is amenable to the same laws of acquisition and maintenance as are other forms of social behaviour. In brief, according to his theory, aggression is acquired through instrumental learning (i.e., through positive rewards, such as social approval or access to desired objects) and/or through social modeling (the success of the model in receiving reinforcement or escaping punishment was thought to be of key importance). Maintaining factors include continued rewards, such as tangible rewards, social esteem and status, and self-reward.

This theory provided researchers with clearly testable predictions, and within just a few years there was a substantial amount of supportive research with human and other animal species (see Baron & Richardson, 1994, for a synopsis). This theory still has a stronghold today and its basic tenets are rarely disputed. There are some notable shortcomings, however. Björkqvist (1997) has pointed out that although Bandura outlined the influence of modeling in detail (attending particularly to the success of the aggressor), he did not discuss the possible importance of the degree of similarity between the aggressor and viewer, a factor which has since been found
influential. In addition, Huesmann and Eron (1984) have pointed out that this theory largely ignores the importance of cognitions. They have proposed that through observation of and reward for aggression, children learn cognitive scripts that are encoded and stored in memory. In future situations that require social problem solving, these scripts may be retrieved and guide a child’s actions (e.g., Huesmann, 1988; Huesmann & Eron, 1984).

Summary. The frustration-aggression and social learning theories explain aggression in very different ways, with the former placing an emphasis on a frustrated internal state and resultant aggressive drive, and the latter on a learned, practiced and reinforced social behaviour. Perhaps part of the continued success of both theories has been due to these very different approaches; in fact, even the authors of the theories have acknowledged that their explanations are best treated as complementary. Bandura (1973) noted that the frustration-aggression theory most appropriately applies to instances in which a negative internal state instigates the aggressive behaviour, whereas his social learning theory applies most appropriately to instances in which aggression stems from an incentive. This recognition indicates that aggression may serve different functions. For example, a child may hit another child because he or she is angry (i.e., a negative internal state) or because he or she expects to get the other child’s toy (i.e., a reward). It should again be noted that these theories continue to be refined, most prominently with respect to the important role that cognitions play in influencing aggressive behaviour.

Are there different kinds of aggression?

The recognition that the frustration-aggression and the social learning theories explain different kinds of aggression implies that aggression is not a unitary construct and may be usefully subdivided. Many divisions have been proposed, but only a few have been successfully applied to childhood aggression research. In the following sections, I outline methods of classifying aggressive behaviour based on the motivation of the aggressor, on whether or not the
aggressor is identifiable, and on the preferred form of aggression used by the different genders. After each explanation, I briefly review how these concepts are measured and research that has been carried out with elementary-school aged children.

Using motivation to classify aggression.

Instrumental versus hostile motivations. Feshbach (1964) was one of the first to propose a comprehensive explanation of how aggression can be categorized based on the aggressor's motivation. Aggression that is premeditated and motivated by some non-injurious goal was aptly labelled instrumental, as the aggression is simply employed as a means to achieve a non-aggressive desired end. This type of aggression requires us to distinguish between a person's proximal and distal intents, with harm being the proximal objective (such as hitting someone) and the nonaggressive goal being the distal objective (such as proceeding to steal the person's wallet). In contrast, aggression motivated by a desire to harm or injure a person was labelled hostile. Feshbach linked this kind of aggression to the frustration-aggression theory. Finally, Feshbach acknowledged that these types of aggression may overlap; for example, a child who strikes his/her sibling may be wanting to gain attention from his/her parents (instrumental), but may also derive satisfaction from the sibling's painful expression (hostile).

Bandura (1973) has criticized this distinction because both hostile and instrumental aggression have a goal, whether it is to inflict pain or gain a reward, and are therefore instrumental. In addition, Dodge (1991) has pointed out that there is much less evidence for this distinction as applied to humans compared to other animal species. Recently, Bushman and Anderson (2001) offered their perspective that the hostile-instrumental aggression distinction has outlived its usefulness, and presented arguments, including those outlined above, for abandoning this distinction. In addition, they argued that human aggression has evolved to such a high level of complexity in motive, opportunity, and social milieu (e.g., internet aggression, school
shootings) that this distinction can no longer be useful in capturing the essence of harmful behaviours.

There is little empirical work with children in this area. One problem for applying this distinction to childhood is evidence that children do not meaningfully discriminate between instrumental and hostile aggression; for example, they evaluate both types as equally negative (Rule, 1974; Willis & Foster, 1990). However, there is other evidence that this distinction adds meaningfully to our understanding of aggression in children. Atkins and Stoff (1993) provide a good example of how this distinction may be useful in understanding aggression in children with disruptive behaviour disorders. They asked boys to play a computerized pinball game that was supposedly in competition with a boy in another room. Each participant wore headphones and sat in front of a personal computer. On the participant’s computer screen was his pinball game, his own score, and the score of his supposed competitor. Two buttons were available to boys throughout the game; a “tilt” button, which supposedly interrupted his competitor’s screen for a brief period (instrumental aggression, as it interfered with the opponent’s game), and a “noise” button, which supposedly briefly emitted a loud noise in the competitor’s earphones (hostile aggression, as it did not serve to interfere with the game). After a practice run, boys were given 5 pinballs that were uninterrupted, followed by 10 pinballs with provocation that the experimenter had pre-determined (2 noise and 5 tilt) but that the boy believed came from his competitor, and ending with another 5 unprovoked pinballs.

Atkins and Stoff (1993) hypothesized that boys with CD or ODD would use more instrumental aggression than normally developing control boys because both CD and ODD diagnoses are based in part on aggressive behaviours that are planned and have some other motive (e.g., assaulting for money, being spiteful and vindictive). They also hypothesized that children with comorbid ADHD would be more hostile in their aggression than boys without
ADHD because of the impulsive quality of hostile aggression. Thirteen boys with CD or ODD (CD/ODD group) and 15 boys with ADHD and CD or ODD (ADHD+CD/ODD group) were recruited from a child psychiatry unit, and 52 controls were recruited from the community, all between the ages of 8 and 12 years. As expected, both patient groups were significantly more instrumentally aggressive compared to controls. Also, the ADHD+CD/ODD group used significantly more hostile responses than controls, with the CD/ODD group falling in between. This provides some evidence that the instrumental/hostile distinction is useful in understanding the motivations in the aggression in these groups of boys.

Despite their promising results, evidence for the external validity of the Atkins and Stoff (1993) task was mixed. They had expected that the boys’ use of instrumental aggression during the task would correlate with parents’ reports of delinquency and aggression because of the aggressing-for-gain nature of many delinquent acts. This was partly supported by moderate correlations between the lab and parental measures. A less easily explained finding was that hostile aggression during the task was uncorrelated with parent-reported aggression. One possibility is that the parent-report measure of aggression obscured results, as it was confounded with other items (e.g., demands attention, mood changes). In a revision of this task also used with boys with ADHD and/or ODD or CD, Atkins, Stoff, Osborne, and Brown (1993) also reported mixed evidence for its validity. For example, most of the boys gave hostile reasons for using the hostile aggression response; however, just over half of them gave an instrumental reason for using the instrumentally aggressive response.

In summary, the limited available research with children has provided some support for the validity of the instrumental/hostile distinction in childhood aggression. Unfortunately, there is even less information about how this distinction applies to girls. With respect to our knowledge of the links between types of aggression and ADHD, ODD, or CD, there is some,
albeit limited, support for the relationship between ADHD and hostile aggression (if ODD or CD is present) and between ODD/CD and instrumental aggression in elementary-school aged boys. Given that the current investigation is interested in aggression in girls with ADHD, assessing this distinction may help us to understand the nature of aggressive motivations used by these girls compared to their peers. Unfortunately, there is no standard measure of instrumental and hostile aggression in this area, although the investigations by Atkins and colleagues (Atkins et al., 1993; Atkins & Stoff, 1993) provide some evidence for the utility of a laboratory analogue procedure. Because of the lack of parent-, teacher-, or child-report checklists assessing instrumental and hostile aggression, these types of aggression will be measured solely by a laboratory aggression paradigm in the present investigation.

Proactive versus reactive aggression. Dodge and Coie (1987) have outlined another theoretical distinction based on the aggressor's motivation, specifically applying it to childhood aggression. They defined proactive aggression as unprovoked aggressive behaviour that has the ultimate goal of dominating or coercing another person, or of achieving some external reward. Proactive aggression may be understood through the social-learning model, as it is thought to originate from modeling and teaching within the home or community, with operant reinforcers maintaining the behaviour. On the other hand, they defined reactive aggression as provoked aggression that is angry and volatile in nature. Reactive aggression is rooted in the frustration-aggression theory, as it is thought to stem from some provoked negative internal state.

Dodge and Coie (1987) and Dodge (1991) recognized the similarity between the proactive-reactive and instrumental-hostile distinctions, and have sometimes used the terms interchangeably. However, both authors have operationally defined proactive aggression as being composed of both instrumental (non-interpersonal) and hostile (interpersonal) components, which they respectively refer to as instrumental and bullying (e.g., Coie, Dodge, Terry, & Wright,
1991; Dodge, Coie, Pettit, & Price, 1990). Consistent with the definition of instrumental aggression reviewed above, the instrumental dimension of proactive aggression is the use of aggression in order to reach some non-aggressive end, such as a child hitting another child to obtain a toy. Bullying is defined by unprovoked taunting or intimidation that, like hostile aggression, has no immediately apparent non-aggressive goal (e.g., Brown, Atkins, Osborne, & Milnamow, 1996; Coie et al., 1991; Dodge et al., 1990). With respect to reactive aggression, most of these behaviours by definition are hostile in nature because they are operationally defined as personal attacks that have the intent of hurting others (e.g., Dodge, 1991). However, there may be an instrumental aspect to reactive aggression, as it is possible that some reactively aggressive behaviours are appropriately self-defensive (recall that self-defence is instrumental because the ultimate goal is self-preservation, not injury to another person).

Measuring these constructs is a difficult task, as provocation is in the mind of the aggressor, and what appears to be provoked aggression to one observer may appear unprovoked to another. Dodge and Coie (1987) have developed a teacher-report instrument for boys and girls in grades three through six with some success. One problem with the measure is that there are only three items on each scale, and the proactive items are all hostile/bullying (e.g., “uses physical force to dominate”), rather than both bullying and instrumental. Factor analysis generally supported a two-factor solution, but one of the eigenvalues was low (.74), and many items loaded on both scales. The internal consistencies of the scales were high (at or above .90), but there was also a substantial correlation between the scales (.76). However, more recent confirmatory factor analyses have supported the two factor model as a best fit solution for teacher and parent ratings of upper elementary school aged boys (Poulin & Boivin, 2000a) and for staff’s ratings of male adolescent inmates (Smithmeyer, Hubbard, & Simons, 2000). Consistent with findings by the scale’s authors, considerable overlap between the scales was found for parent and
teacher raters of elementary school aged boys (e.g., .90 for teachers, .82 for parents; Poulin & Boivin, 2000a), although this was lower for male adolescent inmates (.63; Smithmeyer et al., 2000). High internal consistencies were also found in both studies, further attesting to the measure's psychometric properties.

To add to factor analytic evidence for the concurrent validity of the proactive-reactive distinction, there is evidence that children classified as reactively or proactively aggressive have distinct cognitive, behavioural, and social profiles. Most researchers in this area have used scores of at least one standard deviation above the sample mean on the Dodge and Coie (1987) teacher report measure to classify children into proactively, reactively, or pervasively (proactively and reactively) aggressive groups. Given that reactive aggression stems from some perceived provocation, it would be expected that reactively aggressive children would be hypervigilent to threat, and therefore react to ambiguous situations aggressively (Dodge, 1991). On the other hand, given that proactive aggression is planned, it would be expected that proactively aggressive children would report having more reward-centred goals (Dodge, 1991). Findings have been relatively consistent with these explanations, indicating that reactively aggressive children generate more aggressive options when asked to social problem-solve than do proactively aggressive children (Dodge et al., 1997), and reactively and pervasively aggressive boys exhibit a cognitive bias towards attributing malintent to peers in ambiguous situations (Dodge & Coie, 1987), although this result is less clear when girls are included (e.g., Crick & Dodge, 1996; Dodge et al., 1997). Compared to reactively or pervasively aggressive children, proactively aggressive children report more reward-oriented than friendship-oriented social goals (Crick & Dodge, 1996), and feeling more capable of aggressing (Dodge et al., 1997).

Research into the backgrounds and concurrent functioning of children classified as reactively or proactively aggressive also suggests that these children have somewhat distinct
profiles. According to Dodge’s (1991) views on aggression, reactive aggression stems in part from inattention and hyperactivity and/or early maltreatment and other stressors (Dodge, 1991). Consistent with this suggestion, reactively or pervasively aggressive children have more physical abuse histories in their first 5 years of life, and are rated by teachers as more inattentive than are proactively aggressive children (Dodge et al., 1997). Consistent with the hypothesis that proactive aggression is rooted in the social learning theory, children identified by teachers as proactively aggressive are more likely to see positive outcomes for using aggression (Crick & Dodge, 1996; Dodge et al., 1997). It should also be noted that pervasively aggressive children appear to be the most impaired, with significantly higher rates of impulsivity, lower socio-economic background, and more social problems and severe behaviour problems at school (Dodge et al., 1997). In sum, the consistency between theoretical predictions and empirical findings of the profiles of children identified as reactively and proactively aggressive is impressive and supports the validity of this distinction.

The association between reactive aggression and impulsivity and inattention (Dodge et al., 1997) and the definition of reactive aggression as being an angry, impulsive reaction to a perceived threat (Dodge & Coie, 1987) leads us to question if the impairments that have been found to be associated with reactive aggression are really just impairments associated with the expression of aggression by children with ADHD (Dodge et al., 1997). There are a couple of findings that address this concern. Dodge et al. (1997) found that when attention and impulsivity problems were used as covariates to control for the possibility that differences between reactively and proactively aggressive children were due to ADHD symptoms, differences between reactive and proactive groups of children remained at least marginally significant. In another study, Waschbusch, Willoughby, and Pelham (1998) tested the utility of teacher-rated reactive and proactive aggression compared to ADHD, ODD, and CD symptoms in predicting reports of
negative peer adjustment, rule violations, and overall impairment in children in grades kindergarten through five. The utility of reactive aggression was partially supported by its significant correlation with overall impairment after variance due to proactive aggression, ADHD, ODD, and CD symptoms was controlled. However, the corresponding partial correlations for proactive aggression were not significant. Thus, it appears that teacher-rated reactive aggression provides information about the child's overall level of impairment above and beyond ADHD symptoms.

Finally, studies that support the predictive validity of this distinction are accumulating. For example, Vitaro, Gendreau, Tremblay, and Olligny (1998) gathered teacher-reports of reactive and proactive aggression in low socio-economic status boys at age 12, and at age 15 they conducted parent and youth interviews to determine ODD and CD diagnoses and asked boys to self-report delinquent behaviours. Only proactive aggression predicted ODD and CD in mid-adolescence. Furthermore, proactive aggression predicted delinquency but only if reactive aggression was low. The authors proposed that proactively aggressive boys who are not reactively aggressive are less likely to be rejected by peers and may therefore develop more deviant friendship groups and become delinquent through association. In support of this explanation, this interaction was not found for the ODD and CD symptoms that are more often manifested between adults and youths (e.g., actively defies adults' requests), but was found for the delinquency items (e.g., vandalism, substance use) that are more likely to occur in the presence of same-aged deviant peers. To substantiate this hypothesis, Poulin and Boivin (2000b) found evidence that boys with proactive (but not reactive) aggression selected similar friends. This is also consistent with the theoretical view that reactive aggression is interpersonally hostile and threatening to relationships, whereas proactive aggression is maintained in part by social reinforcement. To explain the lack of association between earlier reactive aggression and later
conduc problems, Vitaro and colleagues proposed that the relatively higher levels of teacher-reported anxiety and withdrawal at age 12 in children in the reactively aggressive group may have protected them through experiencing more unpleasant emotions such as guilt about delinquency.

A recent study has also found evidence that boys with reactive aggression suffer long-term effects of their behaviours. Brengden, Vitaro, Tremblay, and Lavoie (2001) hypothesized that the aggressing-for-gain nature of proactive aggression should lead to delinquent outcomes, whereas the interpersonally hostile nature of reactive aggression should lead to aggression in important relationships. Consistently, they found that proactive aggression in 13-year old boys predicted delinquency at 16 and 17 years of age, whereas reactive aggression predicted dating violence. The impact of proactive aggression on later delinquency involvement was moderated by parental supervision, whereas the impact of reactive aggression on later dating violence was moderated by maternal warmth. Again, these findings are consistent with the theoretical distinctions between proactive and reactive aggression.

In summary, it appears that the proactive/reactive aggression distinction is a valid and useful one for boys, both theoretically and practically. Unfortunately, gender differences have not been specifically addressed, and much of this research has been conducted on exclusively male samples. Nevertheless, there are implications of this research for understanding aggression in girls with ADHD. For example, teacher-rated inattention and impulsivity are correlated with reactive aggression in a sample of male and female children (Dodge et al., 1997). For this reason, the Dodge and Coie (1987) teacher and parent report scale will be used in this study.

Using the identifiability of the aggressor to classify aggression.

According to Buss (1961), direct aggression involves a confrontation between the aggressor and the target. Hitting, kicking, and calling names are all examples of direct
aggression. Indirect aggression, on the other hand, avoids direct confrontation. Examples of indirect aggression include spreading lies behind someone’s back, or damaging someone’s car when the owner is out of sight. The biggest advantage to an indirect aggressor is that danger of retaliation may be avoided because the aggressor is anonymous, the aggressor can blame someone else for the act, or the aggressor’s intent is unclear (e.g., slander may be masked as concerned discussion). Unfortunately, operational definitions of indirect aggression since the time of Buss have failed to be comprehensive, instead examining primarily or only indirect aggression that has the intent to cause harm to social status or social relationships. Lagerspetz, Björkqvist and colleagues (e.g., Lagerspetz & Björkqvist, 1994; Lagerspetz, Björkqvist, & Peltonen, 1988) have proposed that around adolescence females become more indirectly (socially) aggressive than males because they have better verbal and social skills at this age that allow for this type of aggression. Also, they proposed that males become more directly physically aggressive than females because they are more likely to be able to cause effective physical damage than females.

Björkqvist, Lagerspetz, and Kaukiainen (1992) developed a peer-report measure of indirect, direct physical, and direct verbal aggression to test their hypotheses about gender differences. Their measurement of indirect aggression involves behaviours that covertly exploit social relationships, (e.g., “tells untruth behind back”). Unfortunately, the indirect scale is limited by the inclusion of one item (“sulks”) that does not clearly have the intent to harm others and therefore does not meet the currently accepted definition of aggression. Also, physically indirect aggression items such as taking or destroying another person’s property are not included. Thus, although the authors purport that this scale measures indirect aggression, it actually assesses indirect aggression that is intended to cause harm socially and nondirected expressions of anger.
Its limitations notwithstanding, the gender differences found on the measure by Björkqvist, Lagerspetz, and colleagues (1992) have been consistent with the authors' theoretical explanations of how aggression should emerge. In large samples of 8-, 11-, 15-, and 18-year old Finnish school children, Björkqvist, Österman, and Kaukiainen (1992) found that peers reported more direct physical aggression in males than females in all but the 18-year old group. Also in support, indirect aggression (i.e., indirect social aggression and nondirected anger expressions) was used equally by both genders in the 8-year old group, but significantly more by females in every other age group, with higher frequencies in both genders in the older groups. In addition, the only significant gender difference in direct verbal aggression was in the 8-year old children, with higher rates in boys than girls but low rates in both genders compared to the older groups. Although the theory that these gender differences should begin to emerge around adolescence would be better tested with a longitudinal design, cross-sectional results obtained by other authors have been remarkably similar (e.g., Österman et al., 1994).

Research on the ramifications of indirect aggression is accumulating. There is evidence that both directly and indirectly aggressive children are rejected by their peers (Lancelotta & Vaughn, 1989). Spetter, La Greca, Hogan, and Vaughn (1992) found that indirect aggression, but not total levels of aggression, was useful in distinguishing between aggressive boys who were accepted versus rejected by their peers, with the more indirectly aggressive boys being more rejected. In a Canadian follow-up study of 77 girls and 63 boys, Verlaan and Schwartzmann (1998) reported that both self- and peer- reports of direct physical and indirect aggression at age 11 were equally good predictors of self-reported delinquency at age 14. Thus, although there is little research on the associated problems of indirectly aggressive children, it appears that they have problems that are similar to those of directly aggressive children.
In summary, Björkqvist, Lagerspetz, and colleagues (1992; Lagerspetz et al., 1988) have provided some evidence that females are not necessarily less aggressive than males, but that females may be more indirectly socially aggressive whereas males may be more directly physically aggressive. However, the importance of this gender difference is unknown given the relative lack of research into the concurrent and future consequences of indirect and direct aggression. In addition, the implications of this research are seriously limited by the failure of most studies to adequately measure indirect aggression, instead choosing to concentrate specifically on indirect social aggression (e.g., spreading rumours). Finally, non-directed expressions of anger (e.g., "sulks"), which are included in the most commonly used measure in this area, do not meet the definition of aggression that has been adopted in the present investigation because nondirected expressions (e.g., "sulks") lack malintent. Unfortunately, the impact of including such behaviours on research findings cannot be determined. Despite the limitations of this line of research, the idea that females' aggression becomes more indirect and social around adolescence compared to that of males is a significant contribution to aggression research. However, because of the serious limitations of research in this area, and, importantly, because other distinctions of aggression more comprehensively examine social aggression (see the next section), this distinction will not be used in the present research.

Classifications based on gender manifestations.

That males are more aggressive than females seems to be considered common knowledge. Recently, however, Crick and Grotpeter (1995) have challenged this notion, asserting that female aggression has been neglected because it is less salient than male aggression. They proposed that when children search for an effective way to cause harm, they choose to inflict damage on goals that are most valuable to their peer groups. For boys, aggression will involve overt attempts to disrupt ownership and attempts to exercise physical
dominance because power and possessions are important to their male peers. Examples of overtly aggressive behaviours that boys may use to achieve these goals include hitting, kicking, and intimidation. For girls, however, aggression will involve manipulating social relationships, because girls place greater value than boys on group belongingness and friendships. Examples of relationally aggressive behaviours include social exclusion, threatening to end the relationship unless the peer complies, and spreading lies about the peer. Although these relationally aggressive behaviours may seem similar to Björkqvist and colleague’s (1992; Lagerspetz et al., 1988) conceptualization of indirect social aggression, note that many relationally aggressive behaviours involve direct confrontation between the aggressor and the target (e.g., ignoring a peer, directly threatening to end the relationship).

Relational aggression is more difficult to measure than overt aggression because it is less visible and because most relationally aggressive acts occur within the confines of the peer group and are therefore not necessarily accessible to people outside that group. Thus, peer reports of other children’s aggressive behaviours are most commonly used to assess relational aggression. Crick and Grotpeter (1995) developed a psychometrically sound peer nomination measure of overt aggression, relational aggression, and prosocial behaviour. A parallel form for teachers has also been developed with good psychometric evidence (Crick, 1996; Rys & Bear, 1997). Moderate correlations have been obtained between these teacher and peer reports; however, peer reports seem to be superior predictors of future problems with peers (Crick, 1996).

Evidence for the validity of Crick and Grotpeter’s (1995) theory of gender-specific manifestations of aggression is growing. Elementary-school aged girls identify relationally aggressive acts as behaviours that are done in anger with the intent of hurting a peer, just as boys identify overtly aggressive acts in the same manner (Crick, Bigbee & Howes, 1996). However, girls appear to make exception depending on their intimacy with the aggressive peer; for
example, gossip about another peer is seen more positively if it is told by a best friend than an enemy (Sumrall, Ray, & Tidwell, 2000). As expected, children in grades three through six who were asked to rate their peers on aggression items identified boys as more overtly aggressive than girls, and girls as more relationally aggressive than boys (Crick, 1996; Crick & Grotpeter, 1995). Also, when children are classified into relationally or overtly aggressive groups based on scores that exceed one standard deviation from the class mean, similar percentages of girls are classified as relationally aggressive as boys are classified as overtly aggressive (Crick & Grotpeter, 1995; Rys & Bear, 1997).

Like overtly aggressive children, children who are classified as relationally aggressive have many comorbid problems. Relationally aggressive girls in grades three through six are rated as more disliked by their peers, and self-report significantly more depression, loneliness, poor peer acceptance, and peer isolation compared to their non-aggressive classmates when levels of overt aggression are controlled (Crick & Grotpeter, 1995; Rys & Bear, 1997). In addition, whereas peer ratings of overt aggression correlate with teacher-reported externalizing but not internalizing behaviour, relational aggression ratings correlate with both (Crick, 1997). Finally, relational and overt aggression are moderately stable in boys and girls over a 6-month period, and both predict peer rejection for boys and low peer acceptance for girls (Crick, 1996).

In summary, this line of research indicates that girls and boys express aggression differently. These findings are important for our understanding of aggression in females, and may have broader implications. For example, previous researchers have reported that aggression in girls is less stable than in boys (e.g., Huesmann, Eron, Lefkowitz, & Walder, 1984), and that early aggressive behaviour is a superior predictor of later delinquency and criminal behaviour in males compared to females (e.g., Roff & Wirt, 1984; Tremblay et al., 1992). These previous investigations have assessed mainly overt aggression, and therefore it is possible that including
relational aggression may lead to different findings. Future aggression research will need to pay greater attention to the role of relational aggression in predicting outcomes. There are also implications of these findings for the present research. For example, the relatively larger aggression differences between boys with versus without ADHD than girls with and without ADHD (effect sizes of 1.22 vs. 0.76; Gaub & Carlson, 1997) may in part be due to a lack of female-appropriate measures of aggression. For the purposes of this study, then, measurement of relational aggression is important. Crick’s (1996) teacher-report measure, which has demonstrated good psychometric properties, will be used to assess relational and overt aggression (see Appendix D).

Summary.

There is evidence for the validity and usefulness of the hostile-instrumental, proactive-reactive, and overt-relational aggression distinctions reviewed above. Unfortunately, the available evidence for the indirect-direct aggression distinction is based mainly on measures that do not adequately assess indirect aggression; rather, indirect social aggression and nondirected anger expressions have been the focus of these investigations. Given this limitation, the indirect-direct aggression distinction will not be included in the present investigation, but the hostile-instrumental, proactive-reactive, and overt-relational distinctions will be investigated.

Considering informants and methods in aggression research.

A possible limitation that needs to be considered, especially with respect to measuring relational and indirect aggression is the person who is providing the information, as not all informants will have equal access or be equally sensitive to all types of aggression. Peers may be in the best position to inform us about children’s aggression because they are most likely to be involved as conspirators, victims, and/or witnesses to aggressive acts. This may be particularly relevant to relationally aggressive acts because there is often no concrete proof that the
aggression occurred, and because individuals outside of the peer group in which the aggression took place may have only hearsay evidence of the aggressive act (Crick & Grotpeter, 1995). On the other hand, peers may not always be the best source of information because the aggressor may try to convince peers that their act was done with good intentions (e.g., hiding gossip as concerned discussion) or try to deflect blame from themselves to another child who may then be wrongfully blamed. In addition, collecting peer reports is extremely difficult when dealing with clinical populations, as ethical and practical constraints prohibit researchers from entering the classroom of every child in the clinical sample.

Beyond peers, teachers may be the next-most knowledgeable source of information on aggression because of their frequent exposure to peer interactions and the fact that they see and hear about many harmful acts that occur between children and often are called upon to intervene. However, teachers may use different standards to judge children's behaviour than children themselves do, and they may miss some of the more minor aggressive acts that peers are more likely to notice. Despite these problems, there is ample evidence in both research and clinical contexts that teacher reports of aggression are reliable and valid (e.g., Achenbach, 1991; Crick, 1996). Also, significant moderate correlations between teachers and peers have been obtained for a variety of aggression scales for both girls and boys (e.g., Caprara & Pastorelli, 1993; Epkins & Meyers, 1994).

Parents are also commonly used as informants on their child's aggression. Although parents do not have the immediate knowledge of their child's aggression at school as do teachers and peers, they have information about their child's aggression in the family context and in extracurricular activities. Despite these differences in opportunities to and situations in which they observe the child's behaviour, correlations between mother- and teacher-reports and between mother- and peer-reports of aggression are generally significant (e.g., Epkins & Meyers, 1994).
For example, in a school sample of children aged 7- to 10-years, Caprara and Pastorelli (1993) found a correlation of .40 between mother- and teacher- aggression ratings, and .34 between mother- and peer- ratings on a general measure of aggression (the correlation between teachers and peers was .62). Thus, there is concurrent validity for mothers’ aggression reports.

Finally, children’s reports of their own aggression have also been used, but there is little evidence to support the concurrent validity of their reports. For example, the self-reports of girls aged 8- to 11-years on a general measure of aggression correlated .19 with their parents, .24 with their teachers, and .04 with their peers (all correlations were non-significant; Epkins & Meyers, 1994). This may be because children are motivated by social desirability to deny their aggressive behaviour. Whatever the reason for the low concurrent validity of elementary-school aged children’s self-reports of aggression, there is no empirical evidence to suggest that they are useful in research contexts.

In all, there is good evidence to justify including parent and teacher reports of aggression in the present research. While peer reports would also be useful, they are not feasible in this study. However, sole reliance on others’ ratings is limiting. Although it is likely that others’ reports of a child’s aggression are more objective than the child’s self-reports, social desirability, the child’s reputation (Baron & Richardson, 1994), the informant’s own value judgments, and/or the informant’s beliefs about aggression (e.g., a belief that girls are not aggressive) may influence any or all of the reports. Reports are also limited by the ability of the informants to observe what we are asking them to report, especially for specific categories of aggressive behaviours that they may not have the opportunity to observe, such as indirect aggression. Observational field studies have been recommended as a way to overcome these obstacles and to better understand children’s aggression (Archer, 1989), but there are many complications that rule out their use. For example, there are ethical concerns involved in watching children aggress without
intervening (Archer, 1989). Also, an outside observer is not likely to be able to reliably perceive all forms of aggression (e.g., a child who is seen not playing with others at recess may be choosing to be on his/her own or may be actively excluded by certain peer groups). Moreover, the low frequency of aggression places high demands on observer time and resources (Archer, 1989). Finally, as is the case with peer reports, it is often not possible to conduct naturalistic observations of each child in a clinical sample. In short, the high cost and the ethical issues involved in collecting naturalistic observations for each child in a sample are often prohibitive, especially with clinical samples.

The most frequently used alternative to reports and field observations are laboratory aggression paradigms. In comparison to field studies, lab paradigms have the advantage of providing a safe place in which to observe aggression because the victim is a confederate or is not real (e.g., Frick & Loney, 2000). Moreover, lab paradigms involve informed consent and debriefing, and are time and resource efficient (Baron & Richardson, 1994). Most important for the present investigation, laboratory paradigms make it possible to observe aggression in clinical samples and overcome the problem of relying exclusively on others’ reports of aggression. Despite these advantages, taking aggression into the laboratory has obvious problems, and debates on the virtues and faults of this form of measurement have continued for decades (e.g., Buss, 1961; Tedeschi & Quigley, 2000). Before discussing the advantages and disadvantages of laboratory paradigms, I will first describe the most popular current childhood aggression paradigms.

Laboratory paradigms of aggression for children.

The most common laboratory paradigms used with children are variations on the Taylor Aggression Paradigm (TAP; Taylor, 1967), and the Point Subtraction Aggression Paradigm© (PSAP; Cherek, 1981). In the TAP, the participant is told that he/she is competing in a reaction-
time task against someone in the other room. The participant believes that the winner of each trial chooses a level of shock to give the other person. When used with children, bursts of white noise of varying decibels (e.g., Murphy, Pelham & Lang, 1992) or loss of varying numbers of game points (e.g., Pelham et al., 1991) are used in place of shock. In the PSAP, participants are also told that they are playing with another person in another room. Participants are told that both players can earn money by repeatedly pressing on one of the two buttons in front of them, and that they are able to deduct money from each other by pressing on the other button. Money is earned and deducted from the other player on a fixed ratio scale.

Perhaps the biggest argument against lab measures of aggression is that the results lack ecological validity (e.g., Siann, 1985; Tedeschi & Quigley, 1996). As Konecni (1984) commented, "Many of the behaviours that have been used as dependent variables are so esoteric as to strain both credibility and the logic that links them to theoretical ideas being tested in the experiment in question" (p. 25). Others, however, have adamantly disagreed with such arguments, stating that most of these concerns have been levelled at the physical or surface similarity between the lab and real world (i.e., that there exists a lack of mundane realism), which is not necessary for generalization to the external world. In contrast, proponents have argued that it is the psychological similarity that is important (e.g., Berkowitz, 1993, 1989; Bushman & Anderson, 1998). In accordance with this argument, the crucial factor for generalizability is that there is a conceptual similarity; specifically, that the participant performs the response with the intent to harm their opponent.

Proponents of lab aggression tasks further point out that although lab experiments lack mundane realism, there is overwhelming evidence that they are externally valid. Anderson and Bushman (1997; Bushman & Anderson, 1998) have reported considerable evidence that the relationships between independent and dependent variables are similar regardless of whether
aggression was measured in the field or in the lab. In addition, people who are more aggressive in the lab are generally also found to be more aggressive in real life (Berkowitz, 1993). For example, in one of the original TAP experiments, Taylor (1967) found that people who were more aggressive in "real" life used more intense shocks and were less responsive to changes in shock by the experimenter. In a more recent study with children, 26 boys with ADHD divided into low- and high- aggressive groups on the basis of parent and teacher ratings were asked to play a version of the TAP (Murphy, Pelham, & Lang, 1992). Aggressive responding on the lab task was correlated with observed negative peer interactions (.63) and daily counts of the frequency of negative verbalizations (.68). Also, the high aggressive ADHD group showed more aggression than the low aggressive group at high provocation levels. In sum, external validity seems to be well-supported by findings that laboratory aggression measures are significantly related to real-world aggression and that aggression in the laboratory is related to independent variables in similar ways as it is in the natural environment. Additionally, there is accruing research to support the external validity of measuring aggression with laboratory paradigms in boys with ADHD, some of which has been discussed above in the instrumental/hostile aggression review (e.g., Atkins & Stoff, 1993; Casat, Pearson, Davelaar, & Cherek, 1995; Murphy et al., 1992; Pelham et al., 1991).

The demand characteristics that are present and may be operating in laboratory aggression tasks (as in all laboratory experiments) have been another source of debate. Whereas some have argued that participants may behave aggressively in the lab because they are being implicitly told and/or expected to (Archer, 1989; Tedeschi & Quigley, 1996), others have argued that many laboratory tasks involve deception so that the participant does not know what the purpose of the experiment is (e.g., Berkowitz, 1993). Anderson and Bushman (1997) have argued that, if
anything, demand characteristics should decrease rates of aggression and act against the researcher’s hypothesis because aggression is socially undesirable.

There are other problems with existing lab tasks that are not as easily resolved. One serious problem is that a participant’s intent to harm someone is often assumed rather than assessed (Baron & Richardson, 1994; Tedeschi & Quigley, 1996, 2000), although more researchers are conducting post-experiment interviews to find out if malintent was present (e.g., Atkins et al., 1993). Another problem with current tasks is that the response options provided to participants are often inflexible and limited (Tedeschi & Quigley, 1996, 2000). For example, on the TAP children must perform the aggressive response when they win a reaction-time trial; the only choice is how severely to aggress. Obviously, given the social nature of aggression, tasks that offer alternatives to aggressive responding and more complex interactions between the participant and the supposed opponent would come closer to mimicking the real world. In addition, because both the TAP and PSAP involve competition, it is difficult to separate out how much of the results are due to an intent to win versus an intent to do harm (Tedeschi & Quigley, 2000), although others have argued that competition merely facilitates the expression of aggression (e.g., Berkowitz, 1962). Finally, Tedeschi and Quigley (2000) have pointed out that some paradigms make aggressing easier than not aggressing. This is especially relevant in the PSAP, in which money is earned slower (100 button presses earns the participant 1 cent) than it can be deducted from the other player (10 button presses deducts 1 cent from the participant’s competitor).

In summary, there is ample evidence for the validity of laboratory tasks of aggression, but there are problems with the existing tasks. The main advantages that a laboratory paradigm provides for this thesis include an opportunity to observe an individual child’s aggressiveness, the ability to study aggression without others being hurt or harmed in the process, having control
over extraneous variables that may threaten internal validity, time and effort efficiency, and informed consent of the parent and debriefing with the child. Unfortunately, the existing laboratory paradigms are insufficient, especially for use with females, and need to address the problems of being limited in the types of response options, providing alternative responses to aggression, assessing intent, and separating competition from aggression. Perhaps most relevant to the present research, none of the current lab paradigms for children allow for relational aggression to be assessed. Thus, for this study, a new lab paradigm that attempted to improve on many of these problems was created.

*Welcome to the “Girl's Club!”: A laboratory paradigm of aggression in girls.*

The “Girl’s Club!” is a laboratory aggression paradigm that I created specifically for this investigation to overcome some of the problems associated with the current lab paradigms that are used with children. I chose a computerized board game format because girls are generally accustomed to playing both computer and board games, and this familiarity might increase the ecological validity of the task. Also, this format easily allows for more than two players, which is necessary for some relationally aggressive acts (e.g., telling lies about another child to exclude him/her from play). To accommodate this, participating girls are told that they are playing against two other girls their age.

To briefly describe the task, the screen displays a game board, message centre, and section for each player’s name, playing piece and winnings. The winner of the game is the first player around the board. On their way around the board, each girl gains points that she cannot use to win, but can use to buy something. Every 10 points the girl must choose to: 1) black-out a player’s (or players’) screen for one turn (a measure of hostile aggression, as it does not interfere with the other girls’ progress), 2) deduct 2 points off of another player (or players) (a measure of instrumental aggression, as it interferes with that player’s progress towards buying something), 3)
adopt a computer pet (neutral), or 4) collect computer treasure (neutral). On occasion immediately before each girl reaches 10 points, she receives a provocation that she believes is from one of the girls that she is playing with. The girls’ choices following these provocations were used to assess reactive aggression; choices not preceded by provocation were used to assess proactive aggression. There are also “chat centres” on the board, which allow the participants to send a note to either or both of the other players. Excluding a player from receiving a message was used as a measure of relational aggression. The content of the messages were coded into mutually exclusive categories of overt aggression, relational aggression, prosocial, neutral, or socially awkward. At the end of the game, the participant wins and, as the new “Girl’s Club” president, makes decisions about her players (e.g., who she wants in her club), which are also used as measures of relational aggression.

This paradigm improves upon past research in several respects. First, it allows for an assessment of many different types of aggression, including: instrumental, hostile, proactive, reactive, overt, and relational aggression. Second, there is an array of response options available so that participants are not forced to aggress at any time during the game, and may even relate prosocially. Third, the chat centres, the message board, and having two other players gives the game a social quality which helps to overcome past criticisms that taking aggression into the laboratory divests it of its social nature (e.g., Archer, 1989). Fourth, I have attempted to separate competition from aggression by making how the game is won (i.e., getting to the end of the game first, which is determined only by dice rolls) independent of aggression (e.g., exclusions, name-calling, deducting points, etc.). Fifth, the aggressive and non-aggressive options cost the same (10 points or the opportunity to send a message), which overcomes criticisms that past laboratory measures have made it easier to aggress than not to aggress. Finally, girls are asked questions at the end of the game to assess if they associate malevolent intent with the aggressive options.
Purpose of the current investigation.

Despite the importance of aggression in influencing concurrent and later life adjustment, aggression in girls, and in particular, aggression in girls with ADHD, has been a neglected area of research. To address this need, this study is intended to explore the differences in instrumental, hostile, proactive, reactive, relational, and overt aggression used by girls with ADHD compared to girls without ADHD. In addition, this study examined the impact of comorbid ODD on aggression by comparing girls with ADHD and comorbid ODD, girls with ADHD in the absence of ODD, and girls without ADHD or ODD.

Finally, it is possible that aggression in girls with ADHD differs depending on ADHD subtype. However, one potential and serious complication of examining this question is the substantial overlap between hyperactive-impulsive and oppositional-defiant behaviours. It is generally well-accepted that children with ADHD-combined or ADHD-hyperactive-impulsive subtype are at a substantially higher risk for also having ODD, whereas children with ADHD-inattentive subtype are at a much lower risk (Lalonde et al., 1998; Teegarden & Burns, 1999). If these past findings hold true for the present study’s sample, analysis of subtype differences would be redundant with analyses of ODD comorbidity because the same children would be in both the ADHD-Combined subtype and comorbid ODD groups. Thus, the overlap between hyperactive-impulsive and oppositional-defiant behaviour was examined before pursuing such analyses. This possibility has not been explored in previous aggression work with girls with ADHD; thus, no hypotheses are offered.

To achieve the goal of examining differences in these types of aggression between girls with versus without ADHD, I compared rates of aggression between girls with ADHD and girls without ADHD on adult rating scales and the “Girls’ Club” laboratory aggression paradigm. The adults who were asked to complete the aggression rating scales include the child’s mother and
one additional adult who saw the child interact with similar-aged peers (in most cases this was the teacher). The rating scales chosen include the proactive and reactive aggression scale by Dodge and Coie (1987). The measure by Dodge and Coie (1987) is brief and limited in its assessment of proactive aggression, but was included to provide a comparison with past studies that have predominantly used this measure. Adults also completed a measure of overt and relational aggression designed for teachers (Crick, 1996). Unfortunately, given that there are no currently accepted adult-report measures of child instrumental and hostile aggression, these types of aggression were not measured through adult reports in this study.

Girls were not asked to complete self-report measures of aggression because evidence has generally not supported the validity of children's self-reports of aggression. However, girls were asked to complete the “Girl’s Club!” laboratory paradigm of aggression described above. This provides measures of instrumental, hostile, proactive, reactive, overt, and relational aggression.

A secondary research goal was to examine evidence for the concurrent validity of the “Girl’s Club!” lab paradigm. This was achieved by exploring correlations between the child’s scores on the laboratory measure and adult-report aggression scales. In addition, I explored relationships between the child’s scores on the laboratory measure and other measures of general psychopathology and social competence. Finally, relationships between adults’ reports of aggression, and between adults’ aggression reports and measures of general psychopathology and social competence, were similarly explored.

**Hypotheses for Primary Goals.**

This study is intended to examine group differences in types of aggression. Because the existing literature often does not provide a sufficient foundation on which to base specific hypotheses, several of the comparisons were conducted in an exploratory fashion. However,
some specific hypotheses appear to be justified on the basis of past research, and these were tested in this research. These include the following:

(i) **Reactive aggression.** Based on previous findings (Dodge et al., 1997) and theoretical explanations (Dodge, 1991) that inattentive and hyperactive symptoms are related to reactive aggression, I expected to find higher rates of reactive aggression in the girls with ADHD compared to their non-ADHD counterparts.

(ii) **Overt aggression.** Based on past research showing that parents and teachers rate girls with ADHD higher than girls without ADHD on measures that contain many overtly aggressive behaviours (e.g., Brown et al., 1991), I expected that girls with ADHD will score higher on measures of overtly aggressive behaviour than girls without ADHD.

Differences between the girls with ADHD and controls on other subtypes of aggression were also examined, but specific hypotheses were not formulated.

**Hypotheses for Secondary Goals.**

With respect to exploration of relationships amongst measures, I expected measures of aggression to correlate each other. I also expected that aggression would be positively related to measures of emotional and behavioural problems. In addition, given that aggression is a harmful social behaviour, I expected negative relationships between aggression measures and social competence.

**Methods**

**Participants.**

Forty girls with ADHD and 43 girls without ADHD aged 9 to 12 years and their mothers were recruited for this study. The 9- to 12- year age range was chosen primarily because children at this age have typically developed the language, social, and cognitive abilities that are needed to express aggression in all of the ways that were being assessed in the study. In addition, research
has shown that it is at this developmental stage when many forms of aggression that are important to this study (e.g., social aggression) are at their highest (e.g., Björkqvist, Östeman et al., 1992; Björkqvist, Lagerspetz, et al., 1992). Furthermore, the measures that were used have previously been tested on children of a similar age range. Finally, girls younger than 9 years were not included because the computer task requires fluent reading ability.

Demographic information gathered about the girls in both groups included child age and grade, mother’s age, father’s age, relationship between the child and her mother, marital status of mother, years parents married, socio-economic status, and number of siblings and step-siblings. Independent samples t-tests and chi-square tests were used to explore possible demographic differences between the girls with and without ADHD. None of the contrasts were significant (ps > .20). See Table 1 for means and standard deviations of these variables for girls in each of the groups.

Participants were recruited for the study through advertisements placed in community newsletters, local community centres, libraries, schools, fitness centres, and after-school day care centres. Advertisements for mothers of daughters with ADHD were also placed in parent ADHD support group newsletters, the ADHD clinic of BC’s Children’s hospital, community mental health associations, and family physician offices. Advertisements for girls with ADHD included calls for girls with “ADHD” or “ADD” (Attention Deficit Disorder, which was the label applied to ADHD in the DSM before 1987 and is sometimes still used today). Only girls who had been diagnosed with ADHD were included because there is evidence that girls with ADHD who have been referred for diagnostic evaluation differ from those who have not been referred on a variety of measures (Gaub & Carlson, 1997).

Mothers who were interested in the study were asked to contact the laboratory for more information. After the study was described, mothers completed a brief phone interview to screen
for ADHD. Mothers of daughters with ADHD were also asked if the daughter was taking medication for ADHD, and, if so, what type and dose of medication. Twenty-two of the 40 participating mothers of girls with ADHD said that their daughter was currently being prescribed medication (17 on methylphenidate and 5 on dextroamphetamine). Short-acting stimulant medication is a common treatment for the management of ADHD symptoms, and it provides fast-acting, short-term effects (it has a half-life of about 4 hours and is typically washed out of the child’s system in 24-hours) (Barkley, 1998). This pattern of effects means that mothers typically have ample opportunity to see their child’s behaviour off of medication. Mothers who indicated that their daughter is currently taking stimulant medication were asked to complete all measures, including the phone screen, describing the child’s behaviour off of medication.

There were three criteria for including a girl in the ADHD group. The first was maternal report that the girl was diagnosed with ADHD by a qualified professional. Of the 40 girls with ADHD, mothers reported that 12 girls were diagnosed by primary physicians, 11 by psychiatrists, 12 by psychologists, and 5 by paediatricians. The second criterion was the mother’s agreement to take the daughter off of medication prior to participating. All mothers agreed to take their child off the medication for a minimum of 24 hours (mean = 28 hours). This was done in order to gain a more accurate picture of the aggressiveness of girls with ADHD whose symptoms were not being treated with medication.

The third criterion was maternal report that the child met the ADHD criteria set forth in the current Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; APA, 1994). To determine whether the girls met the criteria for the number of DSM-IV required ADHD symptoms, mothers rated their daughter’s behaviour over the past 6 months on the 18 symptoms of ADHD on the DSM-IV rating scale (DSM-IV RS; DuPaul, Power, Anastopoulos, & Reid, 1998). The DSM-IV RS includes the 18 symptoms of ADHD, each of which the mother rated on
a 4-point scale ranging from 0 ("never or rarely") to 3 ("very often"). Ratings above the mid-point (i.e., ratings of "pretty often" or "very often") were counted as a present symptom. Factor analyses of the DSM-IV RS are consistent with the theoretical structure of ADHD (i.e., inattentive and hyperactive-impulsive symptoms clustered on separate but correlated factors) (DuPaul et al., 1998). Reliability is supported by the highly internally consistent subscales (above .90) and good test-retest reliability for parents’ ratings over a 1-month interval. There is evidence for external validity, as ratings correlate with classroom observations (DuPaul et al., 1998). Normative data on a large, stratified United States sample have been reported (DuPaul et al., 1998). Based on mothers’ ratings on this measure, 18 of the participating girls with ADHD met the predominantly inattentive subtype, and 22 of the participating girls with ADHD met the combined subtype (i.e., met criteria on both the inattentive and hyperactive-impulsive scales). No girls met the predominantly hyperactive-impulsive subtype. Finally, to ensure that girls met DSM-IV criteria for impairment and pervasiveness, mothers were asked to rate how impaired their daughter was as a result of the ADHD symptoms (on a 1 to 10 scale with higher numbers indicating greater impairment; ratings above the mid-point were required for participation but no girl was excluded on this basis), and in how many situations their daughter expressed the ADHD symptoms (e.g., school, church, home; at least two were required for participation).

In order to be included in the control group, girls had to have less than 6 of the 18 symptoms of ADHD required by the DSM-IV for a diagnosis. Thus, mothers of daughters in the control group were also asked to complete the ADHD symptoms ratings scale to ensure that the child was rated as having less than six symptoms on both subscales. One of the girls recruited for this study was excluded due to this criterion.

Exclusionary criteria for both groups included the presence of a pervasive developmental disorder (e.g., autism), and evidence of mental retardation. Mental retardation was judged by
maternal reports of academic problems in all academic subjects and more than half of the school week spent in a special assistance class or with a teacher’s aide. No girls in either group were excluded for these reasons.

Finally, all mothers were asked to rate their daughter’s behaviour on the DSM-IV symptoms of oppositional-defiant disorder (ODD) using a 0 (“never or rarely”) to 3 (“very often”) scale. A measure of ODD symptoms was collected because ODD levels may affect aggression levels. Wolraich, Feurer, Hannah, Baumgaertel, & Pinnock (1998) created a scale for parents and teachers containing the DSM-IV criteria for ODD, along with the DSM-IV ADHD criteria and some of the CD and anxiety and depression criteria. Each item is rated on a scale of 0 (“never”) to 3 (“very often”). The ODD and the select CD symptoms clearly loaded on a factor separate from the ADHD criteria and anxiety and depression items. The average internal consistency for the scales was .88 for the parent-report version (the internal consistency of the ODD symptoms alone was not given). In this study, only the parent-report version of ODD symptoms was used. The internal consistency of the scale in this study was .90 for mothers of girls with ADHD, and .84 for mothers of girls in the control group. Mothers were also asked if their daughter was impaired as a result of these oppositional and defiant behaviours. Again using ratings above the mid-point of the scale to indicate a present symptom and impairment, 24 of the 40 girls with ADHD in our sample had the minimal number of symptoms required by the DSM-IV definition of ODD. None of the girls in the control group met criteria for ODD.

Participating mothers. The mother of every girl in the study also participated. All 43 of the mothers and daughters in the control group were biologically related, and 38 of those in the ADHD group were biologically related (the remaining 2 mothers had adopted their daughters shortly after birth). The majority of participating mothers were married (30 of the ADHD group,
34 of the control group). The majority of girls were living with their biological fathers (28 of the ADHD group, 30 of the control group). Fathers were not required to participate.

The average socio-economic status (SES) of families was middle-class for both the ADHD and control group. Maternal reported ethnicity was primarily of European descent for both groups (37 ADHD, 34 controls), with Asian-Canadian the next most common (1 of the ADHD group, 4 of the control group), followed by Hispanic (1 of the ADHD group, 3 of the control group), and Indo-Canadian (1 of the ADHD group, 2 of the control group). With the exception of a lower proportion of Asian participants, this sample is generally representative of the ethnicity of the study location.

*Other participating adults.* Mothers were asked to identify an adult who was familiar with their daughter's interactions with peers her age and would be willing to complete questionnaires. The child's current teacher was preferred, but given that this was not always possible (e.g., moved to a new school, in home-school), another appropriate and feasible adult who was not a relative was identified. For girls with ADHD, a factor that was considered in choosing an appropriate other adult to complete the ratings scales was the use of medication treatment for ADHD symptoms. Although the impact of stimulant medication on aggression in girls with ADHD has not been studied, there is evidence that it decreases aggressiveness in boys with ADHD (Hinshaw, 1991). Thus, if the teacher only saw the child when she was medicated, another adult who saw the child off of medication was identified. The majority of the girls with ADHD, however, took doses of medication that wore off by the end of the school day and/or did not take medication every school day; thus the teacher had ample opportunity to see the child off of medication and was deemed appropriate. For the ADHD group, 36 of the adults completing these forms were teachers, 1 was a neighbour, and 3 were after-school care providers. For the control group, 39 were teachers, 1 was a neighbour, 1 was an after-school care provider, and 2
were girl-guide leaders. One of the control participants did not have another adult complete the forms and was excluded for this reason. Because of the vast majority of these forms were completed by teachers, I refer to this group of informants as “teachers” throughout this manuscript.

Measures.

*General Family Information Questionnaire.* This questionnaire was designed specifically for this study, and contains questions about demographic information, including: parents’ ages, parents’ relationship to the participating child (biological parent, adoptive parent, or guardian), socio-economic status, marital status, cultural background, child’s age and grade level, grade retentions, number of siblings and step-siblings in the home, if the child is receiving special education help, and if the child has been diagnosed with any behaviour disorders.

*Child Behavior Checklist (CBCL; Achenbach, 1991).* The CBCL is a general screening instrument for parents’ ratings of child behaviour competencies and problems. Mothers’ ratings on the CBCL problem items were used in this study to provide an estimate of the child’s general psychopathology, and their ratings on the CBCL competency items were used to provide an estimate of the child’s strengths and skills. The competency scales contain a series of questions tapping the child’s involvement in activities, friendships, and academic skills. The items are rationally clustered into social competency, activities, and school subscales on the basis of factor analytic findings. The problem scales contain 114 items that parents rate from never true (0) to often or always true (2) of their child. These items are grouped into syndrome scales that reflect the findings of factor analyses (e.g., attention problems, anxious/depressed, delinquency, social problems), and these syndrome scales are further grouped into broad-band factors reflecting internalizing (withdrawal, somatic complaints, and anxious/depressed behaviour) and externalizing (delinquent and aggressive behaviour) symptoms. The internalizing, externalizing,
attention problems, and social competency scales were used in this study. There is evidence for good test-retest reliability over 7 days (average, 0.89), inter-parent agreement (average, 0.70), and these scales have been shown to discriminate between clinic-referred and nonproblem children. Norms are based on a large sample of parents’ ratings of 5-18 year old girls in the United States.

*Proactive and Reactive Aggression Rating Scale (PRA; Dodge & Coie, 1987).* This scale was designed as a teacher-report measure of proactive and reactive aggression for grades three through six. Only the items that showed a stable factor structure in two samples of 259 and 339 elementary-school aged children were included in the final scale. As a result, three items were included in the proactive scale (internal consistency, .91) and three items were included on the reactive scale (internal consistency, .90). The factor structure of these items has since been replicated in samples of low socio-economic status boys (Poulin & Boivin, 2000a) and adolescent male inmates (Smithmeyer et al., 2001). Concurrent validity is supported by significant correlations between both scales and social rejection, and between the proactive scale and peers’ ratings of leadership and a sense of humour.

For the purposes of this study, the teacher report form was used and a parallel form was created for mothers (as had been used by Poulin & Boivin, 2000a). As recommended by the scale’s authors, the six items of this scale were embedded in a larger number of social skills items that are not part of the measure. The internal consistencies of the subscales were investigated in this study’s samples and found to be at least adequate. Specifically, the internal consistency of the proactive scale was .72 for mothers and .86 for teachers of girls with ADHD; and .89 for mothers and .85 for teachers of girls in the control group. The internal consistency of the reactive scale was .79 for mothers and .81 for teachers of girls with ADHD, and .61 for mothers and .73 for teachers of girls in the control group. The correlation between the scales for
the ADHD group was .57 for mothers and .62 for teachers (both \( p < .01 \)); the correlation between the scales for the control group was .23 (nonsignificant; \( p > .10 \)) for mothers and .54 for teachers \( (p < .01) \). See Appendix C for the teacher-report version of this measure.

_Amended Children's Social Behavior Scale--Teacher Form (CSBS-T; Crick, 1996)._ The CSBS-T is a teacher form of the peer report measure of overt and relational aggression that has been used by Crick and her colleagues (e.g., Crick, 1996, 1997; Crick & Grotpeter, 1995). The subscales in this scale include overt aggression (4 items), relational aggression (7 items), and prosocial behaviour (4 items). Based on ratings of a school sample of 245 third through sixth grade children (106 girls), these scales were found to be highly internally consistent (.94, .94, and .93 for overt aggression, relational aggression and prosocial behaviour, respectively). Correlations between scales were .77 between relational and overt aggression, -.65 between overt aggression and prosocial behaviour, and -.55 between relational aggression and prosocial behaviour (Crick, 1996). Furthermore, significant correlations have been obtained between peers' and teachers' ratings of relational aggression (.63), overt aggression (.74), and prosocial (.48) behaviour in girls.

For the present study, this form for teachers was included and a parallel form was created for mothers. See Appendix D for the teacher-report version of this measure. Internal consistencies were investigated and found to be at least adequate. Specifically, internal consistencies for the ADHD group were .69, .75, and .83 for the overt, relational aggression, and prosocial behaviour scales, respectively for mothers' reports; and .93, .97, and .92 for the overt, relational aggression, and prosocial behaviour scales, respectively, for teachers' reports. For girls in the control group, internal consistencies were .61, .73, and .82 for the overt, relational aggression, and prosocial behaviour scales, respectively, for mothers' reports, and .68, .87, and .82 for the overt, relational aggression, and prosocial behaviour scales, respectively, for teachers'
reports. Also in the current study, the correlations between scales were consistent with those obtained by the measure's authors for teachers (.78 and .61 between relational and overt aggression for ADHD and control groups respectively; -.57 and -.53 between relational aggression and prosocial behaviour for ADHD and control groups respectively; and -.67 and -.48 between overt aggression and prosocial behaviour, respectively; all ps < .01). However, these correlations for mothers were smaller (.29 and .17 between relational and overt aggression for ADHD and control groups respectively; -.21 and -.20 between relational aggression and prosocial behaviour for ADHD and control groups respectively; and -.35 and -.14 between overt aggression and prosocial behaviour, respectively; only correlations .29 or greater were significant at p = .05).

"Girl's Club" Laboratory Paradigm of Aggression. As aforementioned, the "Girl's Club!" game is a computerized board game that was created by the author for the purposes of this research to assess aggression in girls in a controlled laboratory setting. The computer game was programmed using Visual Basic 5.0 software and runs on IBM compatible personal computers with an 800 by 600 pixel video display resolution. A standard keyboard and mouse are needed to play the game.

Girls were not told the actual purpose of the game until debriefing at the end of the experiment. Before the game began, the research assistant told each girl that the game was developed specifically for girls her age, and that she was being asked to play it for her opinion. Each participating girl was told that she was playing online with two other girls who were in other rooms in the building, and that she would meet those girls when the game ended. The game began with a set of instructions that appeared on the screen and were read aloud by the research assistant. In the instructions, girls were told that the winner is the first person back to the clubhouse, and a dice roll determines how many spaces each playing piece is moved. There were three different kinds of spaces on the board: 1) chat centres, which allowed the player to
send a note to one or both of the other players, 2) coloured circles, which gave the player two points, and 3) bonus point spaces, which gave multiple points. Each time a player had 10 points, she was required to spend them on one of the following options: 1) blacking-out one or both of the other players for one turn (this was used as a measure of hostile aggression, as girls were told that this would not interrupt the other player’s progress on game, but make the game board section of the player’s computer screen go black), 2) deducting two points from one or both of the other players (this was used as a measure of instrumental aggression, as it interfered with the other players’ progress towards 10 points, even though it did not interfere with who won the game), 3) collecting computer treasure (these are icons of a walkman, teddy bear, stereo, and necklaces), or 4) adopting a computer pet (these are icons of a kitten, a dog, a dinosaur, and a fish). The aggressive choices (deducting two points and a black-out for one turn) were chosen because they were both thought to be equally malevolent; that is, on most turns each girl gained two points by landing on coloured circles and the black-out lasts one turn. This is supported by girls’ divided responses when asked which of the two options was meaner: 45% (n = 18) of girls with ADHD and 53% (n = 23) of control girls saw the blackout as meaner than the deduct two point option (whereas the remainder saw the deduct two point option as meaner than the blackout).

After receiving the instructions, each girl was asked if she wanted to play the game and, if so, to press a “Yes” button via the mouse to start the game. Every girl was free to not play the game (a “No thanks!” button was also available) or to stop playing at any time. No girls declined or stopped playing the game. The next screen was a simulation of hooking up to other laboratories in the department. The game screen then appeared, on which there is the game board, a message board, a “roll” button for the dice (this button changes to “wait” when it is the simulated players’ turns), and a space for each player’s score, name, playing piece, computer
pets, and computer treasure. Time was taken to explain the screen to the girl, and then she rolled the dice to see who went first (the participant always did). At this point, the research assistant sat behind the computer such that she could not see the computer monitor screen, and said, “Tell me when someone gets to the end, or if you have any problems or questions.” The girl then played the game.

All moves and dice rolls during the game were pre-determined. Throughout the game, the participant landed on three coloured circles, six bonus point spaces (two preceded by nothing, two preceded by provocation [one hostile, one instrumental] that she believed came from one of her fellow players, and two immediately preceded by having witnessed one of the simulated players aggress against the other simulated player [one hostile, one instrumental]), and three chat centres (one preceded by nothing, one preceded by a provocation, and one preceded by a relationally aggressive message from one simulated player against the other simulated player). At the end, the participant always won and was given the “Girl’s Club President” title. The research assistant then congratulated her and pointed out that as the new President she had some decisions to make, which included sending one last message to her players or ignoring them, and making all of the decisions relevant to running her club (e.g., who will be in her club).

**Calculation of measures from the “Girl’s Club”**. The dependent variables that were calculated from the participants’ responses are as follows. Recall that once the girl has earned 10 bonus points she had to choose from one of four options (black-out one or both of the other players, deducting points from one or both of the other players, adopting a computer pet, or collecting computer treasure). *Hostile* aggression was calculated as the number of players whom the girl chose to black-out. *Instrumental* aggression was calculated as the number of players from whom the girl chose to deduct points. Also, recall that two of these opportunities directly follow provocation from a simulated player (one hostile, one instrumental), and two were not
preceded by any aggression. The number of aggressive choices that were made directly following provocation was used as a measure of reactive aggression, and the number not preceded by provocation was used as a measure of proactive aggression.

With respect to the chat centres, I created a coding system for the messages that the girls sent. Messages were coded into the following categories (examples that appear in parentheses are from participating girls): 1) overt aggression (e.g., “shut up”, “looks like you lost Dionne!”), 2) relational aggression (e.g., sending “I agree with you totally Jasmine, I don’t like her very much either” regarding a previous relationally aggressive statement about one simulated player to the participant; “I like you but not Nina. PS Don’t tell Nina”), 3) prosocial comments (e.g., “good game to everyone”), and 4) awkward comments (e.g., “I like fish”). In addition to placing responses in categories, coders also rated the intensity of each message on a scale of 1 (least intense) to 5 (most intense). For example, in the prosocial category, the message “hi” received a score of 1, whereas the message “Congratulations for being in the lead! I like Computer pets, too!” received a 5. Within the overtly aggressive category, the message “I’m going to win!” received a score of 1, whereas the message “THBTHX!!(I’m spitting at you!!!!!)” received a score of 5. Finally, within the relationally aggressive category, the message, “My friends wouldn’t say that either” received a score of 1, whereas the message, “I’m not sure I like Nicole I haven’t met her personally, but she sounds like a brat on the computer. Let’s do something after” received a 5. Consistent with the scoring methods used for the other aggression measures included in this study as well as other report measures in clinical psychology more generally (e.g., CBCL), the intensity scores were totalled within each category (i.e., prosocial and relational aggression separately). These totals serve as the overt aggression, prosocial, awkward, and relational messages dependent variables.

The construct validity of the messages were also investigated by examining answers to
questions about how girls could be “mean” and “nice” during the game. For the messages, the majority of girls in both the ADHD (65.00%) and the control (76.40%) offered messages as a way to be “mean” during the game. Importantly, almost all girls (95.00% of girls with ADHD, 95.43% of girls in the control group) offered sending messages as a way to be “nice” to others during the game (e.g., by saying nice things and including everyone). This suggests that, as intended, girls in both groups saw the dual role of messages as associated with prosocial and aggressive intents.

I trained two individuals (one female graduate student, and one female undergraduate psychology student) to code girls’ responses using the coding manual, and I also served as a coder. This coding manual is included in Appendix E. After a training period, 50% of the responses were coded by two individuals (myself and another graduate student), and 33% were coded by all three individuals to check on reliability. Discrepancies were dealt with at group meetings. The group consensus was used as the final score for data analyses. Inter-rater reliability was examined in two ways; first, agreement across categories, and second, agreement within categories. Agreement for category assignment was calculated using the kappa coefficient, which corrects for agreement due to chance. For the prosocial category, the average kappa was .77; for the overt category, the average kappa was .84; for the relational aggression category, the average kappa was .88; and for the awkward category, the average kappa was .76. In addition, intraclass correlation coefficients were calculated in order to determine the agreement amongst raters in intensity codings. Within the prosocial category, the intraclass correlation coefficient was .92; within the relationally aggressive category, the coefficient was .91; within the overtly aggressive category, the coefficient was .85; and within the awkward category, the coefficient was .93.

At the end of the game, a series of questions appear that invite the participant to share her
opinion of her fellow players to ostensibly help out future Girl's Club Presidents who might be
playing with these same girls. These questions were designed to fall into categories of social
exclusions and rumour-spreading, and are therefore measures of relational aggression. Social
exclusions include answers to the questions: “Who do you want in your Club?” “Should the next
president let (player’s name) in her club?” “Should the next president ask (player’s name) to
play?” and “Will you let (player’s name) play again?” Rumours include answers to the
questions: “How much did you like (player’s name)?” “Would (player’s name) make a good
friend for other club presidents?” and “Would (player’s name) make a good club member for
other Club presidents?” Each question had multiple-choice answers that were provided on
buttons that the child selected and were scored on a 3-point scale. For example, the answer
options to “Should the next president let (player’s name) in her club?” were “yes,” “maybe,” and
“no.” The answer options to the question “Who do you want in your club” included both players,
player1 only, player2 only, and neither player. For each question, the most relationally
aggressive option was given a score of two, the middle option was given a score of one, and the
least aggressive option was given a score of zero. Scores for answers to the social exclusion and
rumour-spreading questions were summed separately, and these sums served as dependent
variables. The internal consistencies of the rumour-spreading answers were .86 and .81 for the
ADHD and control groups, respectively. For the social exclusions, the internal consistencies
were .71 and .74 for the ADHD and control groups respectively. The correlation between the
social exclusions and rumour-spreading was .43 ($p < .01$) in the ADHD group, and .32 ($p < .05$)
in the control group.

Participants' intent to harm other girls by using response options that were designed to be
aggressive was evident in the kinds of messages sent through chat centres. For example, one girl
commented, “let’s team up on Amanda, always give her black-outs!” and another girl, after using
a string of point deductions, sent a message asking another player, “should I keep on bullying
Marie.” Thus, it appears that the response options that I created to be aggressive were indeed
being used by girls with the intent to harm. Nonetheless, after the game was over, girls were
asked a series of questions about the game to ensure malevolent intent (see Appendix F), and
therefore construct validity. Two individuals (the author and an additional male graduate student
trained by the author) coded these responses into malevolent intent; neutral intent, and the intent
to achieve self-benefit. To assess reliability between raters, one-half of the statements were
double-coded and checked for agreement. Agreement between raters, as determined by kappa
coefficients, was excellent (.91 for malevolent intent, .94 for neutral intent, and .86 for self-
benefit). Disagreements were dealt with at coding meetings. The coding system is included in
Appendix G.

For the hostile aggression option (i.e., black-out another players’ screen), the majority of
girls with and without ADHD said that they would use (or used) this option with malevolent
intent, or that others would use this option with malevolent intent. Specifically, when asked an
open-ended question about how a player could be “mean” in the game, 84.21% of girls with
ADHD (n = 32) and 87.80% of control girls (n = 36) spontaneously identified the black-out
option. When asked a multiple choice question about how to make another player mad, more
than half the girls in both groups named the black-out option (n = 24 or 63.16% of the ADHD
group; n = 27 or 65.85% of the control group). This provides some evidence for the construct
validity of the hostile aggression measure in both groups.

For the instrumental aggression option (i.e., deduct two points from another player), there
was some variability in how it was perceived. Specifically, girls were divided between giving
self-beneficial and malevolent reasons for using the deduct two point option. Although this at
first appears counter-intuitive, it is consistent with the construct of instrumental aggression. That
is, instrumental aggression is harm that is done in the service of self-benefit; thus, it is both "mean" and "self-serving" by definition. However, when asked a multiple-choice question about how to be mean by interfering with a co-player's game, less than half of girls in the ADHD group named the deduct two points option \( (n = 16 \text{ or } 42.11\%) \), although a significantly greater proportion of girls in the control group \( (n = 29 \text{ or } 70.73\%) \) named the deduct two point option (\( \chi^2 = 3.92, p < .05 \)). This indicates that girls in the control group understood this option as more instrumental than did girls with ADHD. Still, 81.15\% of girls with ADHD \( (n = 31) \) and 85.37\% of control girls \( (n = 35) \) spontaneously included the deduct two point option when asked how a player can be "mean." See Table 2 for the proportions of girls in each group who gave malevolent, self-beneficial, and neutral reasons for using the hostile and instrumental response options.

*Procedure.*

After mothers contacted the laboratory and completed the initial screening process they were mailed a copy of the consent form and the questionnaire package and envelope for the teacher (or other adult) to complete. The other adult completed the questionnaire and returned it to the mother in the sealed envelope. Mothers were given a 24-hour reminder call for their appointment, and asked to bring this envelope with her when she came to the lab. Sending out the consent form and explaining the procedures in detail over the phone avoided the issue of giving informed consent when the daughter was present (as the daughter was deceived as to the purposes of the computer game). Two of the 40 participating mothers of girls with ADHD told their daughters of the deception before the daughter came to the lab, and two of the 43 girls in the control group said that they suspected that the game participants were not real. As a result the game responses for these four girls were excluded from analyses.
A research assistant that I trained or I was present to greet participants at the department. When the mother and daughter arrived, they were brought into a room measuring approximately 10 feet by 16 feet that was furnished with a couch, play area, bookshelves with toys and books, a round table, and a table with a computer monitor, mouse, and keyboard on it. Mothers were then asked to sign the consent form. Following this, the mother was seated in a waiting area where she completed her measures, and the research assistant (or author) and daughter returned to the room. Once in the room, the daughter was asked what she knew about the computer game. If there was any reason to believe that the girl’s mother informed her as to the actual purposes of the game or that the game players are computer simulations, that girl’s data was excluded (as reported above, this happened in two of the ADHD cases). The girl was shown the computer with the instructions and asked if she was familiar with computers and how to work the mouse. She was then told that the game that she was being asked to play was designed specifically for girls and that we were asking girls her age to play it and give us their opinions. The girl was then asked to play the game. After the game finished, the girl was asked the post-experimental task questions, followed by four questionnaires that were unrelated to the thesis work. Finally, the girl was debriefed as to the purposes of the game, and told that her co-players were not real but were computer simulations. The girl was given a chance to ask questions about the debriefing information. Girls typically showed surprise that their co-players were not real, but none of them appeared upset that this was the case. As reported above, two girls in the control group showed evidence of having suspected the deception, and their data for the lab task was excluded. After this, every girl was thanked for their time and help, and given a T-shirt emblazoned with a “University of British Columbia Research” logo in appreciation of their participation. Mothers were given a $20 honourarium for their participation.
Results

*Inspection of Measures*

Before beginning analyses, the distributions of all measures were inspected for normality and outliers for the ADHD and control groups separately. For parent and teacher measures, there were 40 girls in the ADHD group, and 43 girls in the control group. For lab task measures, there were 38 girls in the ADHD group, and 41 girls in the control group (these lower numbers are because girls who were told by their mothers about or who suspected the deception were excluded). There were 32 distributions (8 per group for the lab task, 4 per group for mother reports, and 4 per group for the teachers reports). Of the 32 distributions, 13 were not normal as defined by skewness and kurtosis estimates consistent with suggestions by Tabachnik and Fidell (2000). For both groups, the following distributions were not normal: mother and teacher reported overt aggression (on the CSBS-T), overt aggression used by girls in both groups during the lab task (messages sent in the “Girl’s Club”), awkward interactions during the lab task (messages sent in the “Girl’s Club”), and teacher reported proactive aggression (on the PRA). In addition, for the control group, mother and teacher reported relational aggression (on the CSBS-T) and mother reported proactive aggression (on the PRA) had problematic distributions. These distributions can be described as notably positively skewed with modal scores of the minimum possible value.

Nonlinear monotonic transformations to normalize the distributions and equate the variances were considered as a way to more closely meet statistical assumptions of normality and to increase power (Ferketich & Verran, 1994). Such transformation were dismissed, however, for the following reasons: 1) normalization of the data was not possible even under extreme transformations because the mode of the problematic distributions was the minimum possible value; 2) the possible repercussions of applying an “incorrect” transformation are not known
(Games, 1983); and 3) the ensuing statistical analyses performed are considered very robust to the effects of skew and are routinely used with skewed data.

**Group differences in aggression**

To test the primary research goals (i.e., to explore group differences in aggressiveness between girls with and without ADHD), independent samples $t$-tests were conducted. Hotelling's T-square tests (which is a MANOVA procedure allowing for multiple dependent variables), were originally planned rather than a multiple $t$-test procedure, but were dismissed because the omnibus tests do not provide adequate type-1 error control (Jaccard & Guilamo-Ramos, 2002). Specifically, although the Hotelling's or MANOVA type strategy controls for type-1 error when the complete null hypothesis is true, it does not provide adequate control when the partial null hypothesis is true (i.e., when the null hypothesis is accepted for only some of the dependent variables) (Jaccard & Guilamo-Ramos, 2002). To overcome this problem, Jaccard and Guilamo-Ramos (2002) recommended an alternative of organizing dependent variables into families of tests and conducting independent samples $t$-tests using a modified Bonferroni procedure. This approach was adopted here, and is explained below. As a note, a Levene's test for equality of group variances was conducted as part of each $t$-test and, where appropriate, $t$-tests with degrees of freedom modified for unequal variances were conducted and interpreted.

First, contrasts were organized into families. Each family of tests was defined based on the type of aggression assessed, including: overt-relational, proactive-reactive, and hostile-instrumental aggression. Families were defined this way because the purpose of this project is to understand differences in the ways that girls with and without ADHD express aggression. Family-wise type-1 error was held at .05. Various procedures were considered to adequately control for type-1 error within each family. Most notably, the Bonferroni method (i.e., dividing the type-1 error rate by the total number of tests in the family) was considered, but rejected as its
stringent control of family-wise error sacrifices power to detect true differences.

Holm (1979) recommended a modification of the Bonferroni method that maintains family-wise error rates at the desired alpha (type-1 error) level, but is advantageous because it has more power than the traditional Bonferroni approach. The Holm's modification was used here. In this method, a desired alpha level is specified for a family of contrasts. The individual contrasts within the family are conducted, and their significance levels (observed $p$ values) are ordered from smallest to largest. In the case of tests resulting in identical observed $p$ values, they are ordered using theoretical criteria or arbitrarily. In this study, tests with tied observed $p$ values were ordered arbitrarily. The contrast with the smallest $p$ value is evaluated for significance against the desired alpha level for the family of tests divided by the total number of tests in that family. Therefore, in this study, the most significant contrast for each family was evaluated for significance at $0.05/k$, where "k" represented the number of tests in that family. If the contrast is significant (i.e., the null hypothesis is rejected), then the contrast with the next smallest observed $p$ value is evaluated against the desired alpha level divided by the number of remaining contrasts in that family (i.e., $0.05/[k-1]$). This process is repeated such that the contrast with the next smallest $p$ value is evaluated for significance at the desired alpha level divided by the number of remaining contrasts (i.e., $0.05/[k-2]$). This process is repeated until a contrast is deemed non-significant, after which all remaining contrasts are deemed non-significant.

**Overt and relational aggression.** There were eight tests in total for this family. For overt aggression, three one-tailed $t$-tests were conducted to test the hypothesis that girls with ADHD are more overtly aggressive than girls without ADHD. Dependent variables were maternal reports on the CSBS-T, teacher reports on the CSBS-T, and girls' overtly aggressive messages sent during the "Girls' Club" lab task. Girls with ADHD were significantly more overtly aggressive on all measures, as determined by the Holm's step-down modification of the
Bonferroni procedure (maternal reports, \( t(1, 43.11) = 4.81, p < .001 \); teacher reports, \( t(1, 49.72) = 4.05, p < .001 \); lab task, \( t(1, 44.01) = 2.69, p < .005 \)).

For relational aggression, five \( t \)-tests were conducted to test for group differences between girls with and without ADHD. Tests were two-tailed, as no directional hypothesis had been offered. Dependent variables included maternal reports on the CSBS-T, teacher reports on the CSBS-T, girls' relationally aggressive messages sent during the “Girls’ Club” lab task, girls’ rumour-spreading ratings on the “Girls’ Club” lab task, and girls’ social exclusions on the “Girls’ Club” lab task. Using the Holm's step-down modification of the Bonferroni strategy, maternal reports of relational aggression were significant \( (t(1, 69.42) = 3.34, p < .001) \), as were teacher reports of relational aggression \( (t(1, 62.50) = 5.14, p < .001) \). According to both mothers and teachers, girls with ADHD were more relationally aggressive than control girls. In addition, there was a significant difference in social exclusions on the lab task \( (t(1, 75) = 3.58, p < .001) \), indicating that girls with ADHD excluded their players significantly more often than did comparison girls. However, other lab task measures of relational aggression, namely relationally aggressive messages and rumour-spreading, were not significant \( (ps > .18) \).

See Table 3 for descriptive information and effect sizes for the overtly and relationally aggressive measures. In sum, my hypotheses regarding higher levels of overt aggression were supported, and my exploration of group differences in relational aggression generally supported greater aggressiveness in girls with ADHD.

_Proactive and reactive aggression._ There were six tests in total for this family. For proactive aggression, three \( t \)-tests were conducted to test for group differences between girls with and without ADHD. Because no directional hypothesis had been offered, tests were two-tailed. Dependent variables included maternal reports on the PRA, teacher reports on the PRA, and girls’ unprovoked use of aggressive options after receiving bonus points on the “Girls’ Club” lab
task. Using the Holm's step-down modification of the Bonferroni, there was a significant effect on maternal ($t(1, 52.83) = 4.39, p < .001$) and teacher ($t(1, 46.64) = 5.69, p < .001$) reports, indicating that mothers and teachers viewed girls with ADHD as being more proactively aggressive than girls in the control group. However, the contrast for the lab task measure of proactive aggression was not significant ($p > .50$).

Three one-tailed $t$-tests were conducted to test for group differences between girls with and without ADHD in reactive aggression, as I had hypothesized that girls with ADHD would be more reactively aggressive than girls without ADHD. Dependent variables included maternal reports on the PRA, teacher reports on the PRA, and girls' use of aggressive options after receiving bonus points immediately after they had been provoked on the "Girls' Club" lab task. Using the Holm's step-down modification of the Bonferroni procedure, maternal reports of proactive aggression were significant ($t(1, 69.58) = 4.37, p < .001$), as were teacher reports of proactive aggression ($t(1, 81) = 6.42, p < .001$), indicating greater levels of reactive aggression in girls with than without ADHD. However, the lab task measure of reactive aggression was not significant ($p > .05$).

See Table 4 for descriptive information and effect sizes of proactive and reactive aggression measures. In sum, teacher and mother ratings supported my hypotheses regarding higher levels of reactive aggression, and my exploration of group differences in proactive aggression indicated that girls with ADHD are more aggressive. However, these differences were not found during the lab task.

_ Instrumental and hostile aggression._ Two contrasts were conducted in this family of tests. For instrumental aggression, one $t$-test was conducted to test for group differences between girls with and without ADHD. Because no directional hypothesis had been offered, the test was two-tailed. The dependent variable was the number of times the participant chose to deduct two
points from her players during the “Girls’ Club” lab task. Using the Holm’s step-down modification of the Bonferroni, this contrast was not significant ($p > .10$).

For hostile aggression, one two-tailed $t$-test was conducted to test for group differences between girls with and without ADHD. The dependent variable was the number of times the participant chose to black-out her players’ game boards during the “Girls’ Club” lab task. Using the Holm’s step-down modification of the Bonferroni, this contrast was not significant ($p > .13$).

See Table 5 for descriptive information and effect sizes for the instrumental and hostile measures. In sum, girls with ADHD did not appear to use more hostile and instrumental aggression than girls without ADHD on the lab task.

*Supplemental Analyses: Oppositional-Defiant Disorder (ODD) comorbidity.*

Given that differences between ADHD and control groups on most measures of aggression were established, tests were then undertaken to explore the impact of ADHD with comorbid ODD on aggression. ODD was defined as meeting the minimum number of symptoms set forth in the DSM-IV and being seen by mothers as impaired due to these symptoms. To achieve this, the above tests were repeated with three groups (control, ADHD without ODD [ADHD-ODD], and ADHD with comorbid ODD [ADHD+ODD]), using univariate analyses of variances (ANOVAs). Consistent with suggestions by Jaccard and Guilamo-Ramos (2002), the same strategy to control for family-wise error as used above was employed. Follow-up post-hoc tests for significant ANOVA models were the Tukey-Kramer Honestly Significant Difference Test for contrasts in which the groups had equal variances, and the Games-Howell test for contrasts in which the groups had unequal variances.

Originally, I had planned to also explore differences in aggression based on ADHD subtype (i.e., Combined versus Inattentive subtype). However, I did not follow this plan due to the high degree of overlap between ODD comorbidity and ADHD-Combined subtype.
Specifically, the majority of girls with ADHD-Combined subtype also had ODD (20 of 22), whereas the majority of girls with ADHD-inattentive type did not have comorbid ODD (13 of 18). Furthermore, ODD symptoms were moderately to highly correlated with the ADHD hyperactive-impulsive symptoms for the girls in this study ($r = .60, p < .01$ for the ADHD group; $r = .75, p < .01$ for the control group), although they were not highly correlated with inattentive symptoms ($r = .29, p < .05$ for the ADHD group; $r = -.13, p > .05$ for the control group). This result is relatively consistent with the literature on boys and girls with ADHD (e.g., Lalonde et al., 1998; Teegarden & Burns, 1999). However, it makes it very difficult to discern how much of the differences between girls with ADHD based on ODD comorbidity are actually due to ODD versus hyperactive-impulsive behaviour. As a note, I conducted the tests based on ADHD subtype using three groups (control, ADHD-Inattentive, ADHD-Combined), and the results mirrored those found for ODD comorbidity reported below although generally with less pronounced group differences. For the sake of parsimony, I only report the contrasts for ODD comorbidity.

**Overt and relational aggression.** Eight univariate ANOVAs were conducted for this family to test the hypothesis that girls with ADHD are more overtly aggressive than girls without ADHD. For overt aggression, three ANOVAs with three groups (control, ADHD-ODD, ADHD+ODD) were conducted, one for each dependent variable (i.e., maternal reports on the CSBS-T, teacher reports on the CSBS-T, and girls’ overtly aggressive messages during the “Girls’ Club” lab task). There was a significant effect of group on mother and teacher report measures, as determined by the Holm’s step-down modified Bonferroni procedure (maternal reports, $F (2, 81) = 14.40, p < .001$; teacher reports, $F (2, 81) = 16.21, p < .001$). Games-Howell follow-up tests were conducted for each of the contrasts due to unequal variances between groups. For both maternal and teacher overt aggression ratings, girls with ADHD+ODD were
significantly more aggressive than controls (mean difference for mothers, .55, \( p < .01 \); mean difference for teachers, .98, \( p < .001 \)), but no other groups significantly differed. For the lab task measure of overt aggression, there was no significant difference at the univariate level using the Holm's modified Bonferroni procedure (\( p = .02 \)).

For relational aggression, five ANOVAs were conducted, one for each dependent variable (i.e., maternal reports on the CSBS-T, teacher reports on the CSBS-T, and girls' relationally aggressive messages during the "Girls' Club" lab task, girls' exclusions during the lab task, and girls' rumours spread during the lab task). There was a significant effect of group on mother and teacher reports, as determined by the Holm's modified Bonferroni procedure (maternal reports, \( F(2, 81) = 16.77, p < .001 \); teacher reports, \( F(2, 81) = 7.96, p < .001 \)). Games-Howell follow-up tests indicated that for both maternal and teacher ratings of relational aggression, girls with ADHD+ODD were significantly more aggressive than controls (mean difference for mothers, .11, \( p < .001 \); mean difference for teachers, .92, \( p < .002 \)). No other group differences were significant. For the lab task measures of relational aggression, only social exclusions were significant (\( F(2, 74) = 9.54, p < .001 \)). Post-hoc tests using the Tukey-Kramer Honestly Significant Difference test indicated that girls with ADHD+ODD excluded significantly more players than controls (mean difference, 2.27 exclusions, \( p < .001 \)). No other group differences were significant.

For descriptive information and effect sizes of overt and relational aggression measures, see Table 6. In sum, the most pronounced differences were those between girls with ADHD and comorbid ODD relative to girls without either disorder. Such differences were evident on most measures.

Proactive and reactive aggression. Six univariate ANOVAs were conducted for this family to test differences in proactive and reactive aggression between girls with ADHD+ODD,
For proactive aggression, three ANOVAs with three groups (control, ADHD-ODD, ADHD+ODD) were conducted, one for each dependent variable (i.e., maternal reports on the PRA, teacher reports on the PRA, and girls’ unprovoked aggressive bonus point choices on the “Girls’ Club” lab task). Using the Holm’s step-down modification of the Bonferroni procedure, there was a significant effect of group on mother and teacher reports (maternal reports, $F(2, 81) = 21.84, p < .001$; teacher reports, $F(2, 81) = 20.24, p < .001$) but not for the lab task. Games-Howell post-hoc tests were conducted due to unequal variances between groups. For both maternal and teacher ratings of proactive aggression, girls with ADHD+ODD were significantly more aggressive than controls (mean difference for mothers, 1.13, $p < .001$; mean difference for teachers, 1.04, $p < .001$). No other differences were significant.

For reactive aggression, three ANOVAs were conducted, one for each dependent variable (i.e., maternal reports on the PRA, teacher reports on the PRA, and girls’ provoked aggressive bonus point choices on the “Girls’ Club” lab task). Using the Holm’s step-down modification of the Bonferroni procedure, there was a significant effect of group on mother and teacher reports (maternal reports, $F(2, 81) = 34.07, p < .001$; teacher reports, $F(2, 81) = 11.11, p < .001$) but not for the lab task. For maternal reports, the Tukey-Kramer Honestly Significant Difference test was used for post-hoc tests. This indicated that girls with ADHD+ODD were more reactively aggressive than girls in the control group (mean difference, 1.62, $p < .001$) and girls in the ADHD-ODD group (mean difference, 1.07, $p < .001$). In addition, girls in the ADHD-ODD group were more reactively aggressive than controls (mean difference, .55, $p < .05$). For teacher ratings, Games-Howell follow-up tests were conducted as post-hoc tests due to unequal variances between groups. Girls with ADHD+ODD were significantly more aggressive than controls.
(mean difference, 1.14, \( p < .001 \)). No other differences were significant based on teachers' reports.

For descriptive information and effect sizes for proactive and reactive aggression measures, see Table 7. In sum, the differences between girls with both ADHD and ODD and girls without these disorders were most significant and apparent on teacher and mother ratings. These differences were not, however, observed on the lab task.

*Instrumental and hostile aggression.* Two univariate ANOVAs were conducted for this family to test differences in instrumental and hostile aggression between girls with ADHD+ODD, girls with ADHD-ODD, and comparison girls. For instrumental aggression, the dependent variable was the number of times the participating girl chose to deduct two points from her other players during the "Girls' Club" lab task. Using the Holm's step-down modification of the Bonferroni procedure, this test was not significant (\( p > .05 \)).

For hostile aggression, one univariate ANOVA was conducted, with the number of times the participating girls chose to black-out the game boards of her other players during the "Girls' Club" lab task. Using the Holm's step-down modification of the Bonferroni procedure, this test was not significant (\( p > .17 \)).

For descriptive information and effect sizes of instrumental and hostile aggression, see Table 8. In sum, no differences between girls with both ADHD and ODD, girls with ADHD in the absence of ODD, and girls without these disorders were apparent.

*Related and exploratory analyses 1: Group differences in prosocial and awkward behaviour.*

To explore possible differences between girls with and without ADHD in prosocial and awkward behaviour, \( t \)-tests were conducted using the Holm's step-down modification of the Bonferroni strategy for controlling type-1 error.
For prosocial behaviour, three one-tailed $t$-tests were conducted, one for each of the following dependent variables: maternal reports on the CSBS-T, teacher reports on the CSBS-T, and girls' prosocial messages sent during the "Girls' Club" lab task. Using the Holm's modification of the Bonferroni procedure, all measures of prosocial behaviour indicated that girls with ADHD were significantly less prosocial than comparison girls (for maternal reports $t(1, 69.37) = 3.13, p < .005$; for teacher reports $t(1, 65.08) = 4.39, p < .001$; and for the lab task, $t(1, 75) = 2.35, p < .03$). For awkward messages sent during the lab task, the contrast indicated a trend for girls with ADHD to be more awkward than girls without ADHD ($t(1, 53.31) = 1.77, p < .08$). See Table 9 for descriptive information and effect sizes. In sum, girls with ADHD were less prosocial and tended to be more awkward during the lab task, and mothers and teachers also viewed them as less prosocial.

To explore possible differences between girls with ADHD and comorbid ODD, girls with ADHD but not ODD, and comparison girls, univariate ANOVAs were conducted. Again, to control for type-1 error, the Holm's step-down modification of the Bonferroni strategy was employed. Tests were significant for maternal and teacher reports of prosocial behaviour on the CSBS-T (for maternal reports $F(2, 81) = 17.36, p < .001$; for teacher reports $F(2, 81) = 7.83, p < .001$). Games-Howell post-hoc tests were conducted due to unequal variances between groups. For maternal reports, post-hoc tests indicated that girls with ADHD+ODD were significantly less prosocial than both control (mean difference, .95, $p < .001$) and girls with ADHD-ODD (mean difference, .72, $p < .002$). For teacher reports, girls with ADHD+ODD were significantly less prosocial than control girls (mean difference, .76, $p < .001$), but not girls with ADHD-ODD. Univariate ANOVAs for prosocial and awkward behaviour on the lab task were not significant ($p$'s > .13). For descriptive information and effect sizes, see Table 10.
Relationships amongst measures.

Correlations of the lab task measures with corresponding mother and teacher reports.

Correlations between the lab task measures of aggression and corresponding mother and teacher report measures of aggression were conducted. Correlations between overt and relational aggression measures were first considered, and are available in Table 11. For the ADHD group, 7 of the 16 correlations were significant: overtly aggressive messages were significantly correlated with mothers' reports of relational aggression; relationally aggressive messages were significantly correlated with mother reported overt and mother reported relational aggression; rumour-spreading on the lab task was significantly correlated with mother- and teacher- reported relational aggression, and social exclusions on the lab task were significantly correlated with mother reported overt and relational aggression. For the control group, only 2 of the 16 correlations were significant; specifically, rumour-spreading and social exclusions were significantly correlated with teacher reported relational aggression. Significant correlations were small to moderate in size, and in the expected directions.

Correlations amongst reactive and proactive measures are available in Table 12. For the ADHD group, two of the eight correlations were significant. Specifically, the relationships between mother-reported proactive aggression and proactive aggression on the lab task, and between teacher-reported reactive aggression and reactive aggression on the lab task were significant. For girls in the control group, five of eight correlations were significant. Specifically, the relationships between proactive aggression on the lab task and mother and teacher reported proactive aggression, and reactive aggression on the lab task and mother and teacher reported reactive aggression and mother reported proactive aggression were significant. These correlations were also small to moderate in magnitude, and in the expected directions.
These results show low to moderate support for the concurrent validity of the lab task relative to mothers' and teachers' perceptions of aggression, and little evidence for specificity of correlations between corresponding versus non-corresponding measures of aggression. In sum, these results indicate that the lab task is assessing behaviours that are different from what the parents and teachers reported.

Correlations between the lab task and psychopathology and social competence. Next, correlations between the lab task aggression measures and measures of psychopathology (internalizing and externalizing behaviour problems from the CBCL) and social competence (from the CBCL) were explored. For correlations between overt and relational aggression on the lab task and psychopathology and social competence, see Table 13. For girls with ADHD, 6 of the 12 correlations were significant. Specifically, overtly aggressive messages in the lab task were positively related to externalizing problems and negatively related to social competence, rumour-spreading on the lab task was positively related to externalizing problems and negatively related to social competence, and social exclusions during the lab task were positively related to externalizing problems and negatively related to social competence. For girls in the control group, 3 of the 12 correlations were significant. Specifically, rumour-spreading was negatively related to social competence, and social exclusions were positively related to externalizing problems and negatively related to social competence. Significant correlations were small to moderate in size, and in the anticipated direction.

Proactive and reactive aggression on the lab task were also correlated with mother reported internalizing behaviour problems, externalizing behaviour problems, and social competence, and these correlations are available in Table 14. For girls with ADHD, one of the six correlations was significant. Specifically, internalizing behaviour problems were correlated with reactively aggressive behaviour during the lab task. For control girls, four of the six
correlations were significant. Specifically, proactive and reactive aggression in the lab task were negatively related to social competence, and proactive and reactive aggression were positively related to externalizing problems.

Finally, instrumental and hostile aggression measures from the lab task were correlated with mother reported internalizing behaviour problems, externalizing behaviour problems, and social competence, and these correlations are available in Table 15. For girls with ADHD, none of the six correlations were significant. For control girls, three of the six correlations were significant. Specifically, instrumental aggression in the lab task was negatively related to social competence, and positively related to externalizing and internalizing problems.

In sum, correlations were very small but in the expected direction for the concurrent validity of overtly or relationally aggressive messages in both groups. For rumour-spreading and social exclusions, moderate evidence of concurrent validity as indicated by correlations with general behaviour problems and social competence was found for both groups of girls. For proactive, reactive, and instrumental aggression, good relationships with behaviour problems and social competence was found for girls in the control group. Finally, no evidence for relationships between the hostile aggression lab measure and mothers’ perceptions of general behaviour problems and social competence was found for either group.

Correlations for the parent and teacher reports of aggression. First, parent and teacher agreement on similar measures of aggression were correlated. Correlations between overt and relational aggression measures are available in Table 16. For girls with ADHD, mother and teacher reports of overt aggression were significantly related, as were mother and teacher reports of relational aggression. Also for girls with ADHD, mother-reported overt aggression was significantly related to teacher reported relational aggression. For girls in the control group, only mother and teacher reports of relational aggression were significantly related. In general,
Correlations were small, indicating low levels of agreement between mothers and teachers’ perceptions of girls’ aggression.

Correlations between reactive and proactive aggression reports were conducted and are available in Table 17. For girls with ADHD, the only significant relationship was between mother-reported reactive and teacher reported proactive aggression. For girls in the control group, mother reported reactive aggression was significantly related to both teacher reported reactive and proactive aggression. This indicates little agreement between mothers and teachers on girls’ aggressive behaviour.

Next, mother and teacher reported aggression were correlated with mother reported externalizing behaviour problems, internalizing behaviour problems, and social competence (on the CBCL). Correlations for overt and relational aggression are available in Table 18. For girls with ADHD, 4 of the 12 correlations were significant. All of the significant relationships were with the externalizing problem behaviours, including mother and teacher reported overt and relational aggression. For girls in the control group, 3 of the 12 correlations were significant. Externalizing behaviour problems were related to mother reported overt aggression, and teacher reported overt and relational aggression. In general, correlations were in the expected direction.

Finally, mother and teacher reports of proactive and reactive aggression were correlated with externalizing behaviour problems, internalizing behaviour problems, and social competence. Correlations are available in Table 19. For girls with ADHD, 4 of the 12 correlations were significant. Externalizing behaviour problems were significantly related to mother- and teacher-reported proactive and mother-reported reactive aggression, and mother-reported reactive aggression was significantly related to internalizing behaviour problems. For girls in the control group, 4 of the 12 correlations were significant. Specifically, externalizing behaviour problems were significantly related to mother and teacher reported reactive aggression and teacher reported
proactive aggression; and mother reported proactive aggression was significantly negatively related to social competence. Correlations were generally in the expected direction. In summary, evidence for low to moderate concurrent validity of the parent and teacher reports of aggression was found.

Summary of relationships among measures. In general, correlations between lab and adult measures and between parent and teacher measures of aggression were small but in the expected directions. Correlations between measures of aggression and externalizing behaviour problems and social competence also tended to be small, but again were in the expected directions. In sum, this indicates that each measure may contribute unique and valid information in assessing the child's aggressive behaviour.

Discussion.

The present work was designed to assess differences in aggression between girls with and without ADHD. To achieve this, a multi-assessment methodology was used, employing mothers' and teachers' ratings on a variety of aggression measures, and direct observation of girls' social interactions on a standardized lab task. The results obtained using these methods were broadly consistent with previous research findings and the hypotheses offered: namely, girls with ADHD were more aggressive than girls without ADHD. However, a closer examination of the types of aggression used by girls with ADHD revealed a number of interesting patterns of social behaviour. During the lab task, girls with ADHD used a strategy that involved more social exclusions and overtly aggressive messages, but were not more proactively or reactively aggressive than girls without ADHD. On the other hand, mothers and teachers rated girls with ADHD as much more aggressive on all measures, including proactive and reactive aggression. In addition, the results showed little agreement on girls' levels of aggression amongst mothers, teachers, and the lab task. In sum, the evidence suggested that
using a multi-assessment methodology is important to understanding the complexity of aggression in girls.

The discussion first begins with an overview of the group differences in social behaviour. Next, the relationships amongst the aggression measures and the implications of these findings are discussed. Finally, conclusions are offered based on the overall pattern of results. It is hoped that the findings of this investigation will aid in developing a fuller understanding of how ADHD is socially manifested in girls, and have implication for assessment and treatment of this significant but often under-recognized and under-served population.

*Group differences in aggression strategies.*

*Overt and relational aggression.* The most prominent and consistent difference between girls with and without ADHD was in their levels of overt aggression. Both mothers and teachers saw girls with ADHD as more overtly aggressive (e.g., bullying others, physically aggressive) in their social interactions than they saw girls in the control group. This was also borne out in the lab task, as compared to girls in the control group, girls with ADHD sent far more messages to their fellow players that were classified as overtly aggressive; for example, comments that threatened, mocked and bragged. Considered collectively with previous findings that mothers and teachers rate girls with ADHD as higher on aggression measures that include overt harm (Gaub & Carlson, 1997), results from the present work that employed both raters and behavioural observation methods are cause for concern. Decades of research have demonstrated the deleterious impact of childhood overt aggression on psychosocial adjustment in adulthood. For example, overtly aggressive children are at risk for criminal involvement and unemployment (Kokko & Pulkkinen, 2000; Parker & Asher, 1987). However, it is possible that girls who are overtly aggressive may be at even greater risk for poor future psychological adjustment than boys who are overtly aggressive. It is known that children who engage in gender non-normative forms
of aggression have more internalizing and externalizing psychopathology than those who engage in gender normative forms of aggression (Crick, 1997). Given that overt aggression is more typical of boys than girls (e.g., Crick & Grotpeter, 1995), the fact that girls with ADHD are engaging in this type of gender non-normative aggression suggests that they may be at greater risk for internalizing and externalizing psychopathology than boys with ADHD who engage in overt aggression.

It is also likely that children who aggress in non-gender normative ways are at greater risk for social problems than children who aggress in gender normative ways. This may be particularly true for overtly aggressive girls, as the tightly woven, intimate, small friendship groups favoured by girls (e.g., Lansford & Parker, 1999) may be unforgiving and intolerant of girls whose aggression does not follow gender standards. Unlike relational aggression, overt aggression is not a part of girls' culture, and as such may be viewed as especially inappropriate and uncouth behaviour and grounds for social ostracism, leaving overtly aggressive girls without constructive friendships or social support. On the other hand, boys who are overtly aggressive may be more easily forgiven within the less intimate, more mobile, hierarchical social structure favoured by boys (Benenson, 1996). Although speculative, this may help us to understand past research findings that girls with ADHD are even more disliked than boys with ADHD, even though they are less overtly aggressive (Carlson et al., 1997).

Mothers and teachers also perceived girls with ADHD as engaging in more relational aggression than did mothers and teachers of girls in the control group. In keeping with reports of overt aggression, these group differences were large in magnitude. However, unlike results with measures of overt aggression, this perception was not consistently echoed on the lab task. Instead, group differences on the lab task varied depending on how relational aggression was assessed. Specifically, girls with ADHD socially excluded their co-players significantly more
often than did girls in the control group, but did not spread more rumours or send more relationally aggressive messages than did control girls.

At first glance, it appears paradoxical that girls with ADHD were more socially exclusive than girls in the control group but no more likely to spread rumours, as rumour-spreading is an effective means of achieving social exclusion. Unlike socially excluding through direct confrontation (e.g., ignoring), spreading rumours may encourage others to also exclude the victim. However, although it may be as or more effective than simple exclusions, spreading rumours requires substantially more skill and close relationships. For example, the aggressing child must create a believable and yet damaging story, have a tight and protective peer network in which to tell the story without fear of it being divulged to the victim, and have good timing for telling the story (Crick & Rose, 2000). There is some evidence that girls with ADHD lack these qualities, as past research has found that they are more disliked and rejected (Carlson et al., 1997), have poorer social skills (e.g., Gaub & Carlson, 1997), and have lower verbal skills (at least at younger ages; Kato et al., 2001) than their non-ADHD female counterparts. This suggests that girls with ADHD may not have the necessary social skills and network to spread rumours effectively. Thus, girls with ADHD may not appreciate that spreading rumours is a way to socially exclude others or have the ability or means to do so, and instead choose simpler, more direct forms of relational aggression, such as ignoring.

Like rumour-spreading, there was also a lack of significant group differences on girls' use of relationally aggressive messages during the lab task. In fact, the effect size indicated that girls in the control group may have been more apt than girls with ADHD to send relationally aggressive messages. Sending relationally aggressive messages during the lab task, unlike overtly aggressive ones, required girls to quickly assess and manipulate a new-found friendship. Crick and colleagues (e.g., Crick, 1999; Crick & Rose, 2000) and Björkqvist and colleagues
(Björkqvist, Österman, et al., 1992) have commented and provided some empirical support for the hypothesis that socially aggressive behaviours become more complex over time, with social exclusions and direct relationship threats appearing during preschool, and more sophisticated gossiping and relationship manipulation appearing later in development. It is possible that girls with ADHD, who are slower in their social development (McKenney et al., 2001), more socially impaired (Greene et al., 2001) and have somewhat lower cognitive abilities (Gershon, 2002) compared to their well-adjusted peers, would lack the necessary skills to rapidly assess their social situation and implement this form of relational aggression.

Taken together, this pattern of results suggests that girls with ADHD, relative to girls in the control group, are more overtly and relationally aggressive in their daily social interactions as observed by mothers and teachers, and use an intimidating, bragging, and socially exclusive strategy when first meeting a peer as observed in the lab task. It is possible that the ecological validity of the lab task limits the generalizations that can be made to girls’ behaviour outside of the lab. However, to the extent that behaviour during the lab task reflected girls’ typical social interactions, the pattern of group differences observed in the lab task has interesting implications for understanding how ADHD is socially manifested in girls. That group differences were more pronounced on the simpler and more direct measure of relational aggression (social exclusions) and not observed on more complex and indirect measures (rumour-spreading, messages) indicates that girls with ADHD are more direct and confrontational but not more covert in their relationally aggressive strategies than well-adjusted peers, at least in a first-meeting situation. In sum, the results obtained using the combination of rating scale and behavioural measures indicate that girls with ADHD used a social strategy that is likely to bring them disapproval and prevent them from developing the friendships that they desire, and ultimately likely to have dire consequences for their future psychosocial adjustment.
Proactive and reactive aggression. According to both mothers and teachers, girls with ADHD were more proactively aggressive than girls in the control group. However, these highly significant differences were not reflected in the lab task. Rather, girls with and without ADHD did not differ significantly in their use of proactive aggression during the lab task, as operationalized by spending bonus points on aggressive options (i.e., deducting two points from co-players or blacking out their computer screens) in the absence of provocation.

One possible explanation for the lack of group differences on the lab task compared to the adult-report measures is that the social context created in the lab task did not foster proactive aggression. Research on proactively aggressive boys has indicated that they seek the company of other proactively aggressive boys (Poulin & Boivin, 2000b), and some experts have speculated that it is within this peer context that proactive aggression occurs and flourishes (e.g., Poulin & Boivin, 2000b; Vitaro/Tremblay et al., 1998). Supporting this explanation within samples of ADHD children, Murphy et al. (1992) found that high and low aggressive boys with ADHD did not differ in their use of aggression during a lab task under low provocation conditions, but that high aggressive boys with ADHD used significantly more aggression during the same lab task under high provocation conditions.

Consistent with this reasoning, it is possible that proactively aggressive girls are proactively aggressive primarily when in the company of similarly behaving peers. For example, several studies have suggested that having delinquent peers is important to the development of delinquent behaviours (which are a form of proactive aggression), in both girls and boys (Brengden, Vitaro, & Bukowski, 2000; O'Keefe, Carr, & McQuaid, 1998; Reichler, 1993). If this is the case, then levels of proactive aggression during the lab task might have been discouraged for girls who are customarily proactively aggressive and consort with proactively aggressive peers (presumably, several of those in the ADHD group) because only two
provocations were presented. On the other hand, girls who are not ordinarily proactively aggressive (presumably, most of those in the control group and some of those in the ADHD group), who might normally seek the company of non-proactively aggressive peers such as those in the lab task, may have used levels of proactive aggression similar to that used in their regular peer group. If this hypothesis is correct, it would help to explain the lack of group differences on this task, as the girls with ADHD who are normally proactively aggressive would have used less proactive aggression than they typically use when in the company of other proactively aggressive peers. On the other hand, the proactive aggression of girls in the control group would likely have been more representative of that used in their daily lives. To investigate this issue, future research should examine the impact of proactively versus non-proactively aggressive peers on the use of proactive aggression by girls with and without ADHD. Such research might provide important insights into how proactive aggression develops and functions in girls.

Another possible explanation for the discrepancy between findings from the lab task and mothers' and teachers' reports of girls' proactively aggressive behaviour is that it reflects a true difference in the behaviour of girls under varying circumstances. During the lab task, girls were in an unfamiliar setting, playing with peers whom they had never met. On the other hand, mothers and teachers typically observe girls interacting with familiar peers in familiar settings. Past research has suggested that children who are victims of proactive aggression (specifically, bullying) are more likely to be characterized by anxiety, timidity, and physical weakness (Atlas & Pepler, 1998; Olweus, 1993). This implies that children who bully take the time to assess their peers in order to determine which children are most vulnerable to intimidation. Such a process would depend on repeated observations, and thus would be difficult to do in a short-duration lab task involving unseen peers. Given that girls with ADHD are slower to develop socially (McKenney et al., 2001), this process may take even longer for them than for other children. In
an unfamiliar setting such as the lab task, girls with ADHD who are typically proactively aggressive may simply have chosen not to employ proactive aggression because they could not assess their co-players' likely reactions, thereby resulting in a lack of group differences. Importantly, this would not be the case at home or at school, where girls with ADHD have more extensive interactions with and repeated exposure to their peers.

To the extent that there is adult-report evidence that girls with ADHD show higher levels of proactive aggression than their socially well-adjusted peers, it is important to consider the possible impact of this behaviour on their future outcome. Unfortunately, most past research on the relationship between proactive aggression and psychosocial outcome has focused exclusively on male samples. These studies have shown that proactively aggressive boys are at high risk for juvenile delinquency, ODD and conduct disorder (Brengden et al., 2001; Vitaro et al., 1998). The extent to which these concerns hold true for girls, and in particular, girls with ADHD, cannot be certain without a longitudinal study, although there is an obvious possibility that girls who employ proactive aggression may risk the same poor future outcome as their male counterparts.

With respect to reactive aggression, findings of group differences were consistent with the findings of proactive aggression. Specifically, mother and teacher reports consistently indicated significantly higher levels of reactive aggression in girls with than without ADHD. However, no significant group difference was found on the lab task, on which reactive aggression was operationalized as spending bonus points on aggressive options (i.e., deducting two points from co-players or blacking out their computer screens) following provocation.

The lack of significant group differences in reactive aggression during the lab task is difficult to reconcile with previous research. Past findings on a combined sample of boys and girls has indicated that inattentiveness, which is central to ADHD, is related to reactive aggression (Dodge et al., 1997). Consistent with the definition of reactive aggression as an
unsophisticated and angry reaction to perceived provocation, the measure used in this lab task required a simple behaviour (i.e., clicking buttons with a mouse) following a provocation from a co-player. However, inconsistent with the definition of reactive aggression as an immediate reaction, the turn-taking scenario of the lab task necessitated approximately a 1-minute delay between when the co-player provoked the participant and when the participant received the option to aggress. Delaying this response may have been especially challenging for girls with ADHD who were not medicated because such delay would require them to attend to and hold the threat information in memory during a time period filled with attractive distractors, skills known to be impaired in children with ADHD (Barkley, 1998). Thus, tracking and holding information about co-players’ provocations in the face of other distracting features even over brief intervals may have exceeded the abilities of girls with ADHD and reduced their ability to use this form of aggression. In contrast, reactive aggression shown by girls in the control group during the lab task may not have been affected by the imposed delay because they do not have difficulties with attentional skills. In accordance with this possible explanation, in the lab task, reactive aggression levels in girls with ADHD might have decreased, whereas girls in the control group might have been unaffected. This may have resulted in levels of aggression that were similar between groups.

Again, given that there is adult report evidence that girls with ADHD are more reactively aggressive than control girls, the possible ramifications of this behaviour on their psychosocial adjustment should be explored. Research that has examined the concurrent adjustment of reactively aggressive children has found that they suffer many social relationship problems (e.g., Waschbusch et al., 1998). Research on girls with ADHD has found that these girls are more disliked and rejected by their peers, although the degree to which this is due to their reactively aggressive behaviour is at present speculative and would be an interesting subject of future
investigations. Furthermore, recently Poulin and Boivin (2000b) have reported that boys who were reported as reactively aggressive by mothers and teachers as children are at risk for dating violence in their teens. Although it is a common belief that females are much less domestically violent than males, research has in fact found that females are at least as likely to physically aggress against their intimate partners as males are (e.g., Archer, 2000; O'Leary, 2000). The extent to which reactive aggression in childhood may place girls with ADHD at later risk for hostile and aggressive interactions in their intimate relationships is an important avenue for future investigation.

In summary, both mothers and teachers reported substantially more proactive and reactive aggression in girls with ADHD compared to those in the control group; however, these differences were not apparent on the behavioural measure employed. Although it is difficult to determine the cause of this discrepancy, several possibilities have been offered, such as a possible attenuation of ADHD girls' aggression in a new setting with unfamiliar peers, and difficulty tracking aggressors over a delay.

*Instrumental and hostile aggression.* Given the lack of rating scales in this area, instrumental and hostile aggression were measured only by girls’ behaviour on the lab task (deducting two points from co-players, and blacking out co-players’ screens, respectively). Results indicated no significant group differences in the levels of instrumental and hostile aggression used by girls during the lab task.

The lack of group differences in the present work was not anticipated as previous research using a similar lab task with boys has shown differences between ADHD and typically developing control groups. Specifically, Atkins and Stoff (1993) used a computerized pinball game that boys believed they were playing with a child in another room. They found that boys with ADHD and comorbid ODD or conduct disorder (CD) were significantly more
instrumentally aggressive than non-disordered boys (as measured by their use of a button that the participating child believed interfered with their co-player's game). Moreover, the boys with ADHD and ODD or CD used significantly more hostile aggression than non-disordered boys (as measured by using a button that the boy believed emitted a blast of white noise to their co-player). These findings appeared despite little evidence for construct or concurrent validity for their task. Given the similarities between the task and measures used by Atkins and Stoff (1993) and the present lab task measure, the discrepancy in results is surprising. This suggests that the differences in study participants and/or between the tasks may be the cause of this discrepancy.

Gender may have a substantial impact on how children with and without externalizing disorders such as ADHD and ODD use these types of aggression. All participants in the Atkins and Stoff study were boys, whereas all of the participants in the present study were girls. Thus, it is possible that the lack of a significant group difference observed in the present study accurately reflect girls’ use of these forms of aggression. Future research involving both boys and girls in the same lab task would be necessary in order to empirically test this hypothesis.

In addition to gender, the participants in the Atkins and Stoff (1993) and the present study differed in the severity of their behaviour disorders. In the Atkins and Stoff investigation, all of the boys in their clinical groups had ODD or CD, and were recruited from a child psychiatry unit. By contrast, only about two-thirds of the girls in this study had ODD (rates of CD were not assessed but are presumed to be low), and all were recruited from the community. Considering that both studies used control groups consisting of non-disordered children in the community, the group differences in the Atkins and Stoff study may have been more pronounced by virtue of the severity of impaired behaviour of boys in their clinical groups.

Finally, it is possible that the differences in the two tasks account for some of the differences in the findings. One notable difference between tasks is the number of opportunities
to aggress. In the lab task used in the present study, girls had a maximum of 12 opportunities to buy instrumentally or hostile aggressive options, whereas boys in the Atkins and Stoff (1993) study had more opportunities to aggress, and their aggression did not "cost" anything. In addition, the task in this study was designed to introduce girls to each other for potential friendships, whereas the task developed by Atkins and Stoff was competitive in nature. Finally, girls in the present task had other ways of relating to their co-players (e.g., sending messages, including players in their club), whereas boys in the Atkins and Stoff study had no other options than to aggress.

In sum, the lack of significant group differences observed in girls' use of instrumental and hostile aggression during the lab task were unexpected, especially in light of previous research that has indicated substantial group differences in similar studies with male samples (Atkins & Stoff, 1993). It is possible that some of this discrepancy is due to differences between the lab tasks used in these studies. However, an important possible reason for this discrepancy that deserves attention is the gender of the participants. That is, it is possible that girls with and without ADHD do not significantly differ in their use of instrumental and hostile aggression. Future research into this possibility using other measures will be needed in resolving this important question.

The impact of comorbid ODD. Although the primary goal of this project was to examine aggression in girls with ADHD compared to their well-adjusted counterparts, the impact of comorbid ODD also was of interest. On measures where significant differences between girls with and without ADHD were found, it also was found that girls with ADHD and comorbid ODD were significantly more aggressive than girls in the non-disordered control group, with girls with ADHD but not ODD falling in between and generally not significantly different from either of the other two groups. These results are similar to a previous study of girls and boys
identified as meeting ADHD combined subtype and/or ODD symptom criteria by teachers (Carlson et al., 1997). This consistent pattern of results indicates that aggression in girls is especially heightened when ADHD occurs in the presence of ODD.

Although it may be tempting to attribute the observed differences in aggression levels solely to the co-presence of ODD, the reader is cautioned against drawing such conclusions. This is because there was a substantial overlap between girls who met criteria for comorbid ODD and girls who met criteria for ADHD combined subtype (specifically, 20 of 22 girls with ADHD-Combined subtype also met ODD criteria). In addition, there were only a few girls with ADHD-Inattentive subtype who met criteria for ODD. Thus, the heightened levels of aggression in girls with ADHD and comorbid ODD may at least in part be attributable to hyperactive-impulsive ADHD symptoms. It is difficult to discern the unique contributions of ODD and hyperactive-impulsive behaviour to aggression because these behaviours often co-occur (e.g., Lalonde et al., 1998; Teegarden & Burns, 1999). Given a large enough sample of girls with ADHD, it may be possible to find enough girls without overlapping ADHD-Combined subtype and ODD to address the unique contributions of each type of behaviour to aggression.

Summary of group differences in aggression. In summary, mothers and teachers consistently rated girls with ADHD as much more aggressive than did mothers and teachers of girls in the control group on all measures including overt, relational, proactive, and reactive aggression. These large differences mirror those of previous studies that have examined group differences on general aggression measures, with effect sizes of approximately one standard deviation (Gaub & Carlson, 1997). The measures used in the present investigation add to our knowledge from past studies on aggression, as previous research has only used aggression measures that tap physical aggression and are limited by their inclusion of items that describe non-aggressive behaviours (e.g., “mood changes,” “talks loudly”). In contrast, the measures
included in this study were designed to specifically tap aggressive behaviours, and to assess different forms of aggression that have been shown to be empirically and theoretically important to understanding children’s psychosocial adjustment.

In general, findings from the lab task revealed fewer significant group differences in aggressiveness than did mothers’ and teachers’ reports. Girls with ADHD used a more overtly aggressive and socially exclusive strategy during the lab task than girls in the control group, but did not differ in proactive, reactive, instrumental, or hostile aggression. Of particular interest were the findings that girls with ADHD sent messages that were more overtly aggressive but not more relationally aggressive than girls in the control group. Although not investigated for the purposes of the present study, an interesting avenue for future research would be to investigate group differences in the frequency of sending aggressive messages separately from the severity of the aggressive content of the messages. For example, it is possible that girls with ADHD do not relationally aggress more often than girls in the control group, but that when they aggress, they do so more severely.

The inclusion of a lab task was considered important in order to have a measure that is objective and free of the typical biases associated with rating scales (e.g., social desirability, halo effects). Given the large group differences in girls’ aggressive behaviour according to mother and teacher ratings, the generally smaller differences in their behaviour in the lab were unexpected. Research using other objective measures of social interactions is needed to replicate these findings and to determine the cause of this discrepancy.

Prosocial and awkward behaviour.

In addition to aggression, prosocial behaviour is also important in social development and an important contributor to an individual’s long-term psychosocial adjustment (Rubin, Bukowski, & Parker, 1998). Although not central to this investigation, group differences in
girls’ prosocial behaviour were also examined. Past research has found large differences in parent and teacher ratings of social skills, indicating that girls with ADHD are substantially behind girls without ADHD in their prosocial development (Gaub & Carlson, 1997).

Consistently, in the present study, mothers’ ratings, teachers’ ratings, and girls’ behaviour on the lab task all showed that girls with ADHD were less prosocial than girls in the control group. Further analyses to clarify the impact of comorbid ODD revealed that mothers and teachers saw girls with ADHD and ODD as significantly lower in their prosocial behaviour than girls in the control group. On teachers’ reports, girls with ADHD but not ODD fell in-between but were not significantly different from the other groups. For mothers’ reports, girls with ADHD but not ODD fell in-between the other two groups, but were seen as significantly less prosocial than girls with both ADHD and ODD. Similar effects, although not statistically significant, were also observed on the lab task. These marked and consistent group differences indicate that girls with ADHD, and particularly those with comorbid ODD, lack the positive behaviours that are necessary for making and maintaining friendships.

On the lab task, girls’ awkward social interactions, such as tangential and nonsensical messages, were also assessed. In the open-ended method used in the present investigation, these awkward behaviours were defined as those that were not harmonious with or appropriate to the conversation. Awkward social interactions have not been examined in past research in this area, which has used closed-ended assessment of prosocial or aggressive behaviour. These interactions were relatively infrequent during the lab task, but results indicated a trend for girls with ADHD to initiate more awkward social interactions than their non-ADHD counterparts. Future research examining social interactions in girls with ADHD using more open-ended and behavioural measures would be helpful in elucidating the possibility that girls with ADHD are
more tangential and inappropriate in their social interactions, as well as the implications of these behaviours for their psychosocial development.

In sum, these results are concerning for girls with ADHD. Not only do these girls use more aggression in their interactions, but they also use less prosocial behaviour than their typically developing female peers. Furthermore, these findings also suggest that girls with ADHD may be more awkward in their social interactions than their non-disordered counterparts. Together, these behaviours may be disastrous for forming solid, constructive, and supportive relationships.

*Relationships amongst measures.*

A number of different types of aggression were assessed in the present work using a variety of different methods including mother and teacher report, as well as a laboratory-analogue task. In general, the level of agreement between these different methods was low in both groups of girls, although the correlations were in the expected direction. It is interesting that this pattern held not only across lab task and adult-report measures, but also within the adult report measures where mothers' and teachers' ratings were completed on the same measure, resulting in shared method variance. Despite these generally low levels of agreement within each group, it is notable that mothers and teachers consistently agreed on levels of aggression between groups, as both reported large differences in aggression levels between girls without ADHD and girls in the control group on all measures.

One interpretation of the low levels of agreement between the measures of aggression is that they lack validity. In fact, an original intention of this study was to use the size of these relationships to provide evidence of concurrent validity of the lab task. However, this interpretation is limited. First, correlations were likely limited by a restriction in the range of scores on each of the aggression measures. Although this was a general problem across the
measures, it was a particular concern for mother and teacher reports of physical aggression and for members of the control group. A second and related problem was skewed distributions, as the tendency towards low levels of aggression in the lab task or adults' reports of low levels of aggression resulted in scores clustering towards the bottom of each scale. Obviously, both of these factors would attenuate the size of the correlations between the aggression measures.

Other research that has examined relationships between children's aggressive behaviour during lab tasks and parent reports has also found small to moderate correlations, although of a somewhat larger magnitude than those observed in the present study (e.g., Atkins & Stoff, 1993). However, these correlations in past research were conducted on combined samples of control and clinic children that differed significantly on the aggression measures. This practice is likely to have artificially inflated the correlations due to the influence of bimodal distributions (i.e., two clusters of scores at different ends of a distribution would yield a stronger correlation coefficient than there would be within either cluster). In comparison, the correlations presented in the present work were conducted separately for each group, providing a more conservative estimate of the relationship between aggression measures.

This issue of low agreement across measures of children's behaviour is not unique to the present investigation. In a seminal review paper, Achenbach, McConaughy, and Howell (1987) conducted a meta analysis of 119 studies that reported correlations between parents, teachers, and mental health workers on reports of children's emotional and behavioural problems. In general, agreement was low, with an average correlation of .27 between parents and teachers (.32 for externalizing behaviours, .21 for internalizing behaviours). On the basis of these results, Achenbach and colleagues concluded that "Low correlations between informants may indicate that the target variables differ from one situation to another, rather than that the informants' reports are invalid or unreliable" (p. 213). A similar explanation may apply to the current
investigation; that is, girls' aggressive behaviour may naturally vary across situations.

In summary, the strength of the relationships amongst the aggression measures were largely consistent with those found in previous research, both with aggression lab analogue tasks and of children's behaviour more generally. This does not necessarily comment on the low validity of these measures. In fact, despite the low relationships to each other, many of the aggression measures were significantly related to mothers' perceptions of general externalizing behaviour problems, and several of the lab task measures also shared significant negative relationships with mothers' ratings of social competence. Also supporting validity were findings of group differences on many of the measures. Thus, these results offer some preliminary evidence of validity for these measures. Moreover, they indicate that each informant and method provides a unique perspective on understanding the full complexity of child's aggressive behaviour. These observations, as well as those by Achenbach and colleagues (1987), indicate the necessity of using a multi-measurement methodology in assessing children's aggressive behaviour.

**Overall summary.**

The primary intention of this project was to examine types and levels of aggression used by girls with ADHD relative to their typically developing female counterparts using a multi-assessment methodology. In general, the results supported that girls with ADHD were more aggressive in most of the ways assessed. Most notably, mothers' and teachers' ratings indicated large group differences on every type of aggression assessed. In addition, mothers and teachers rated girls with ADHD as having less prosocial behaviour than girls in the control group. The results of the lab task indicated that girls with ADHD used a strategy that was more threatening, mocking, and bragging, and involved more social exclusions of their co-players. In addition,
girls with ADHD were less prosocial and tended to be more awkward in their interactions with their co-players than did girls in the control group.

On the lab task, there were some aggression measures that did not reveal group differences despite mothers and teachers both reporting substantial group differences. The disagreement between the lab and the adult report measures suggest interesting avenues for future investigations. Most notably, this finding may indicate that girls with ADHD are not universally more aggressive than girls without ADHD, but rather that they may favour aggressing in simpler, more direct and confrontational ways than girls without ADHD. Such differences between the lab task and the adult report measures indicate the need for further development of behavioural assessment techniques in measuring girls’ aggression, as such strategies allow for assessment of more indirect and secretive forms of aggressive behaviours.

Notably, the presence of ODD appeared to impact levels of aggression. Where aggression differences between girls in the ADHD and control groups were found, follow-up analyses to test for the impact of ODD in the ADHD group generally resulted in finding significantly higher levels of aggression in girls with ADHD and comorbid ODD compared to control girls, with girls with ADHD falling in between but not significantly different from the other groups. Although ODD is not a disorder of aggression, it seems logical that interpersonal opposition and defiance would influence a child’s use of aggressive strategies, and/or others’ perceptions of a child’s use of aggressive strategies. Unfortunately, the contributions of ODD to aggression cannot be determined for certain because of the large degree of overlap between comorbid ODD and ADHD hyperactive/impulsive type. Exploring this question is an interesting avenue for future research that may help to identify the girls at high risk for aggression and subsequent problems.
The low levels of agreement between mothers and teachers were surprising. In fact, there tended to be better agreement between the lab measures and adult reports than between the adults themselves, especially for proactive and reactive aggression. Nonetheless, there was evidence for the validity of both adults’ reports, suggesting that even though their observations and perceptions of a child’s aggression may differ, both are valid and contribute distinct information. Again, these findings indicate the importance of using a multi-assessment strategy to understanding girls' aggression, as information gleaned from each measure can uniquely contribute to our understanding of children’s social interactions and adjustment.

This present study has a number of important strengths in understanding aggression in girls with and without ADHD, such as the use of a standardized behavioural assessment approach as well as mothers’ and teachers’ ratings, larger samples of girls with ADHD than have generally been used in past research, and use of measures that tap a variety of theoretically and empirically important forms of aggression. Despite these strengths, this study has limitations that restrict the conclusions and generalizations that can be drawn. First, only preliminary evidence of the validity of some of the measures has been gathered here. Second, due to constraints imposed by the nature of investigating clinical samples, peers could not be used as informants in the study. This is unfortunate because classroom peers have generally been found to provide information that is helpful in understanding a child’s psychosocial adjustment. Finally, the large overlap between ADHD hyperactive/impulsive type and ODD is a noteworthy limitation in understanding the factors that are associated with aggression in girls with ADHD.

Nevertheless, the findings in this study provide some insights into developing an understanding of how ADHD is socially manifested in girls. The pattern of greater levels of aggression on a variety of measures, considered together with findings of prosocial behaviour deficits, in girls with than without ADHD indicate that these girls are at great risk for concurrent
and future psychosocial maladjustment. Clearly, future research that attends to recognizing this often under-served population with attention to assessment and treatment of these social behaviours is warranted.
Footnote

Impact of stimulant medication treatment. To explore the possible impact of stimulant medication treatment on aggression ratings by teachers and behaviour during the lab task, independent samples t-tests were conducted to compare girls with ADHD not being prescribed stimulant medication and girls with ADHD who were being prescribed stimulant medication. Tests were two-tailed as no hypotheses had been offered. Given the exploratory nature of these tests, the type-1 error level was held at .05 for each contrast. Of the 20 contrasts conducted, only one was significant. Specifically, girls being treated with stimulant medication were significantly more reactively aggressive during the lab task ($t(1, 39) = 2.12, p < .05$).

Next, correlations between aggression measures and medication dose were explored, using the same liberal approach to type-1 error. Medication dose was significantly correlated with two of the 20 aggression measures. Specifically, medication dose was significantly correlated with relationally aggressive messages sent during the lab task ($r(1, 21) = .52, p < .01$) and with hostile aggression on the lab task ($r(1, 21) = .54, p < .01$).
References


Findings from a large group of girls ascertained from pediatric and psychiatric referral sources. 

*Journal of the American Academy of Child and Adolescent Psychiatry, 38, 966-975.*


meeting of the International Society for the Study of Behavioural Development, Berne, Switzerland.


Appendix A.

*DSM-IV symptoms of ADHD (APA, 1994).*

Inattention Symptoms:

1. often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities.
2. often has difficulty sustaining attention in tasks or play activities.
3. often does not seem to listen when spoken to directly.
4. often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behaviour or failure to understand instructions).
5. often has difficulty organizing tasks and activities.
6. Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort.
7. often loses things necessary for tasks or activities.
8. is often easily distracted by extraneous stimuli.
9. is often forgetful in daily activities.

Hyperactivity-Impulsivity Symptoms:

1. often blurts out answers before questions have been completed.
2. often has difficulty awaiting turn.
3. often interrupts or intrudes on others.
4. often fidgets with hands or feet or squirms in seat.
5. often leaves seat in classroom or in other situations in which remaining seated is expected.
6. often runs about or climbs excessively in situations in which it is inappropriate.
7. often has difficulty playing or engaging in leisure activities quietly.
8. is often “on the go” or acts as if driven by a motor.

9. often talks excessively.

**Note.** For a diagnosis to be made, at least six of the inattentive or hyperactive-impulsive symptoms must be present in at least two situations (e.g., school, home). Also, symptoms must be present before the age of 7 and there must be evidence that the symptoms cause impairment. In addition, the symptoms cannot occur during the course of a pervasive developmental disorder, schizophrenia, or other psychotic disorder, or be better explained by another disorder (e.g., marked inattention as secondary to anxiety).
Appendix B.

DSM-IV Symptoms of ODD.

1. Often loses temper.
2. Often argues with adults.
3. Often actively defies or refuses to comply with adults’ requests or rules.
4. Often deliberately annoys people.
5. Often blames others for his or her mistakes or misbehaviour.
6. Is often touchy or easily annoyed by others.
7. Is often angry or resentful.
8. Is often spiteful or vindictive.

Note. For a diagnosis to be made, at least 4 of the above must be present for at least 6 months to a degree that causes significant impairment.
Appendix C.

Proactive and Reactive Aggression Rating Scale (Dodge & Coie, 1987).

Instructions: Think of how this child interacts with other children. To answer, please circle a number corresponding to what you think best describes this child in these interactions. The numbers range on a scale of 1 to 5, with 1 being not at all or never true, and 5 being very much or always true.

<table>
<thead>
<tr>
<th>Never/</th>
<th>Almost always/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all (1)</td>
<td>Very much (5)</td>
</tr>
</tbody>
</table>

1. Makes other people laugh (tells jokes, funny stories, etc.) 1 2 3 4 5
2. Helps a friend who is hurt 1 2 3 4 5
3. Walks up to people and starts a conversation 1 2 3 4 5
4. Says “thank you” and is happy when someone does something for her 1 2 3 4 5
5. * Threatens and bullies others 1 2 3 4 5
6. Sticks up for friends 1 2 3 4 5
7. Looks at people when they are speaking 1 2 3 4 5
8. Smiles at people she knows 1 2 3 4 5
9. Thinks good things are going to happen 1 2 3 4 5
10. * Uses physical force to dominate 1 2 3 4 5
11. Works well on a team 1 2 3 4 5
12. Takes care of others’ property as if it were her own 1 2 3 4 5
13. * Gets others to gang up on a peer 1 2 3 4 5
14. Calls people by their names 1 2 3 4 5
15. Asks if she can be of help 1 2 3 4 5
16. ** Over-reacts angrily to accidents.................................1......2......3......4......5
17. Feels good if she helps others.................................1......2......3......4......5
18. ** When teased, strikes back.................................1......2......3......4......5
19. Asks questions when talking with others.........................1......2......3......4......5
20. Feels sorry when she hurts others.................................1......2......3......4......5
21. Joins in games with other children.................................1......2......3......4......5
22. ** Blames others in fights.................................1......2......3......4......5
23. Plays by the rules of a game.................................1......2......3......4......5
24. Does nice things for others who are nice to her.................1......2......3......4......5
25. Asks others how they are, what they have been doing, etc......1......2......3......4......5
26. Is friendly to new people she meets.................................1......2......3......4......5

Note. Items marked with one asterisk are proactive; items marked with two asterisks are reactive.
Appendix D.

Amended Children's Social Behavior Scale (Crick, 1996).

Instructions: Below are some descriptions about how children might interact with other children (their peers).

Please think of how this child interacts with other children and decide where her behaviour falls on a scale of 1 (never true) to 5 (almost always true) in her interactions with other children her age.

<table>
<thead>
<tr>
<th>Behaviour description</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This child tries to cheer up peers when they are sad or upset about something.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. *This child spreads rumours or gossips about some peers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. *When angry at a peer, this child tries to get other children to stop playing with the peer or to stop liking the peer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. **This child tries to dominate or bully peers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. This child says supportive things to peers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. *When this child is mad at a peer, she gets even by excluding the peer from his or her clique or peer group.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. *This child threatens to stop being a peer's friend in order to hurt the peer or to get what she wants from the peer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. *When mad at a peer, this child ignores the peer or stops talking to the peer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. This child is helpful to peers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10. **This child initiates or gets into physical fights with peers. 1 2 3 4 5

11. **This child hits, shoves, or pushes peers. 1 2 3 4 5

12. *This child tries to get others to dislike
certain peers by telling lies about the peer to others. 1 2 3 4 5

13. This child is kind to peers. 1 2 3 4 5

14. *This child tries to exclude
certain peers from certain peer group activities. 1 2 3 4 5

15. **This child threatens to hit or beat up other children. 1 2 3 4 5

Note. Items marked with one asterisk are relational; those marked with two asterisks are overt.
Appendix E.

Coding Manual: Girls’ Chat Centre Responses.

Coding involves two steps:

1. Decide on what category the message belongs to;
2. Decide on the degree of severity or intensity of the message.

**STEP 1: ASSIGNING THE MESSAGE TO A CATEGORY.**

Below are descriptions that have been used to describe social relationships among elementary-school children. First are some general definitions to orient you towards what is meant by the category. This is followed by a description of the actual categories.

**Basic definitions:**

**Aggression:** an attempt to harm or hurt another being.

Within this general definition, we will be making more fine distinctions based on how this harm/hurt is achieved: OVERT and RELATIONAL (see below). Crick first proposed this distinction; please read the attached article (Crick & Grotpeter, 1995) before beginning.

-Overt aggression: Achieving harm through physical or verbal (mocking, intimidating) means. This aggression involves power or possessions as its way to harm the other person (e.g., hitting, kicking, calling names, mocking, hurling insults, uttering threats). In this lab task, overt aggression can be achieved at chat centers through:

- Bullying another child
  - e.g., “Should I keep sending Marie all the black-outs?”
• Getting back at a player
  o e.g., “you blacked me out, so here you go!” (and sending a black-out)

• Name-Calling or Insulting a child
  o e.g., “loser!”

• Throwing power around by bragging/boasting
  o e.g., “Ha Ha I beat you!”; “I am the best!!”

• Intimidating
  o e.g., “I am going to catch you, you know!!”; “Dear Dionne, I am very mad at you. I am gonna win. You think you’re going to win but that’s not what’s going to happen. I got new pets. I got a bear I git a dog. your are such a bad sucker. I am gonna win.”

• Describing a physical form of aggression
  o e.g., “THBTHX!! (I’m spitting at you!!!!)”

• Mocking a player
  o e.g., “it wasn’t bad being blacked out by you Sarah, you know”

-Relational aggression: Aggression that is achieved through the manipulation of a relationship (e.g., telling lies about the target, excluding the target from play), or threats to the relationship (e.g., threatening to end the relationship or playing together unless the victim complies).

In this lab task, relational aggression can be achieved at chat centers through:

• Ignoring a child
  o e.g., “Should we keep ignoring Natalie?”

• Threatening the relationship
• this may be implied, e.g., “I don’t know who I like better, you or Nina”

• Spreading rumours or talking behind the child’s back

  o e.g., “Natalie said some mean things about you braging. I don’t think you are, I think you’re cool.”

• Making an alliance with one child at the expense of the relationship of the other (this is usually done by tacit agreement that another player is not liked)

  o e.g., replying “I agree with you totally” or “you’re right Nicole non of my friends are like that – it’s called being braggie” to a relationally aggressive statement from a player

• Talking about a child behind her back

  o e.g., “Im not sure I like Nicole I haven’t met her personally, but she sounds like a brat on the computer”

• Keeping secrets from a player

  o e.g., “My real name is XXX. My friend is YYY! DO NOT tell Amanda!!”; “I cann’believe I got here first but if I didn’t come here first I was hoping you would. P.S don’t tell michelle”

It is absolutely crucial to consider the context of the message. What happened before? What player(s) is the child sending the note to? E.g., sending a message about one’s self to just one player may appear relationally aggressive because the third player is being excluded; however, if this happens after one player shared that she wants to purchase a teddy bear but is embarrassed about it, it is appropriate to sending a note to just that child to comfort her, and it would be aggressive to share this information with all players.

If you received this message, how would it make you feel?
**Prosocial Behaviour:** Behaviour or messages that invite a positive interaction between the child who does the behaviour (or sends the message) and the child at whom the behaviour (or message) is intended.

In this lab task, prosocial behaviour may be achieved at chat centers by:

- Complementing a child (without excluding another player)
  - e.g., "You sound like really good friends!", "you are cool!", "I like your pet fish"

- Sharing information about one’s self in a way that invites a response
  - e.g., "I like stuffed animals. Do you?"

- Social Pleasantries
  - e.g., "Hello", "I go to XXXX school!", "how are you"

- Commenting on the game
  - e.g., "this game is cool"

- Resolving conflict appropriately
  - e.g., "Yeah, maybe Angela does like to say something about it but she’s not bragging or anything. I’m not on anybody’s side. Let’s have fun"

- Showing Empathy or Comforting another child
  - e.g., "It’s cool you chose the teddy bear. He’s cute! Don’t be embarrassed!", "this is a cool game*I like the teddy too."

- Inviting the other children to play (without excluding a player)
  - e.g, "I’d like to see you guys sometime"

- Including all players in the fun/game
  - e.g., "You’re both in my club", "Okay listen up as you’re president I say this game rocks and you guys are the coolest"
Social Awkwardness: Messages that do not obey the basic rules of interaction. These do not invite an interaction, or the child does not know how to react as there is no clearly expected response. These strike the child at whom they are intended as odd, or out of synchrony with social expectations. It is very important to consider the context of the interchange to determine social awkwardness.

In this lab task, socially awkwardness may be achieved at chat centers by:

- Sending a blank message
- Tangential messages
  - e.g., sending “Yah, but do you live in XXXX?” after receiving a note making fun of another player
- Content of the message is nonsensical
  - e.g., “bia bia bbbbia bia”, “tey gvj”
- Content of the message is ‘out of the blue’
  - e.g., sending “what kind of pet do you like” when the child is sending her last message after becoming president; sending “and I adopted a kitten” after receiving a note from a child about how embarrassed she is that she still has a teddy bear
STEP 1: Flow chart for deciding on Category. *Consider context when making decisions!*

Could message cause harm?

- **Yes**
  - Is a relationship involved?
    - **Yes**
      - Relational
    - **No**
      - Overt

- **No**
  - Is the tone neutral or friendly?
    - **Yes**
      - Prosocial
    - **No**
      - Awkward

**Go back to definitions and examples in manual to verify that message meets category definition**

Meets definition

- **Yes**
  - Go to STEP 2 (intensity rating)

Does not meet definition

- **Yes**
  - Does it meet another category?
    - **Yes**
      - Code that category
    - **No**
      - Code most appropriate category, and bring to meeting

- **No**
STEP 2: CODING FOR INTENSITY.

Within each category, each message will be coded on a 1 to 5 scale from the most mild example of that category to the most intense example of that category.

1-----------------2-----------------3-----------------4-----------------5
fits the category, but a mild example an intermediate example of category very explicit, most intense

*Because this scale ranges from least to most intense example of the category in which it is coded, note that for the prosocial category, a score of 5 would be extremely prosocial, whereas for the aggressive categories, a score of 5 would be extremely malevolent/aggressive.

Examples for Each Category:

1. Overt aggression.

<table>
<thead>
<tr>
<th>Code</th>
<th>Example of Type &amp; Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = mild</td>
<td>Bragging/Boasting is typically ‘mild’ to ‘moderate’. A mild example:</td>
</tr>
<tr>
<td></td>
<td>e.g., <em>I’m catching up to you!</em>;</td>
</tr>
<tr>
<td></td>
<td><em>I beat you but I am just saying that did you like that game.</em></td>
</tr>
<tr>
<td></td>
<td>Getting back at a player in a ‘tit for tat’ manner (getting back in a more severe way than was provoked is moderate to severe)</td>
</tr>
<tr>
<td></td>
<td>e.g., <em>Sorry about the blackout but I owed you both!</em></td>
</tr>
<tr>
<td>3=moderate</td>
<td>Bragging/Boasting that is more explicit is generally ‘moderate’</td>
</tr>
</tbody>
</table>
e.g., *hah! You don't stand a chance!!! (hee, hee, hee!)*

*hahaha! I won peoples!!! *(Oh yeah I’m celebrating!!!!!!)* LOVE: (Name)

Bullying another child

e.g., *Should I keep sending Marie all the black-outs?*

Mocking a player

e.g., *it wasn’t bad being blacked out by Sarah, you know*

5=intense, severe

Describing physical aggression is typically ‘severe’

e.g., *THBTHX!! (I’m spitting at you!!!)*

Name-calling or insulting is typically ‘severe’

e.g., *Losers. I won. You LOST.*

Threatening and Intimidating

e.g., *Dear Michelle, I gonna beat you. When I’m club president, I’m going to be very happy and I hope I win. Good luch sucher.*

2. Relational Aggression.

**Code**

**Example of Message**

1 = mild

Keeping secrets from a player is generally mild.

e.g., *My real name is XXX. My friend is YYY! DO NOT tell Amanda!!; I cann’believe I got here first but if I didn’t come here first I was hoping you would. P.S don’t tell michelle*

Excluding a player by sharing information about one’s self with only one of the 2 players.
e.g., I love to go shopping and playing with pets. How about you?

- sent to only one player

I am 10 years old and I live in XXXXX. –sent to only one player

3=moderate

Making alliances – agreement with a relationally aggressive message from another player

  e.g., I agree, Thanks I’m looking forward in meeting you

Threatening the relationship may range from moderate to severe. A moderate example:

  e.g., I don’t know who I like better, you or Nina

Spreading rumours or talking behind the child’s back. Note. Lying about the other child would make the message ‘severe’.

  e.g., Natalie said some mean things about you bragging. I don’t think you are, I think you’re cool.

5=extreme

Making alliances by further insulting the other child – agreement with a relationally aggressive message from another player that is expanded.

  e.g., You’re right non of my friends are like that – it’s called being bragge.

Ignoring a child

  e.g., using the “ignore” button; Should we keep ignoring Natalie?

Talking about a child behind her back

  e.g., Im not sure I like Nicole I haven’t met her personally, but she sounds like a brat on the computer

<table>
<thead>
<tr>
<th>Code</th>
<th>Example of Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = mild</td>
<td>Social Pleasantries</td>
</tr>
<tr>
<td></td>
<td>e.g., <em>Hello, hi, how are you,</em></td>
</tr>
<tr>
<td></td>
<td><em>I go to XXXX school → sent to both players,</em></td>
</tr>
<tr>
<td>Commenting on the game</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e.g., <em>this game is cool,</em></td>
</tr>
<tr>
<td></td>
<td><em>I like this game</em></td>
</tr>
<tr>
<td>3 = moderate</td>
<td>Complementing a child (without excluding another player) is generally moderate, but sincere compliments that also have another prosocial element (e.g., an invitation to play), may be extreme. Moderate example:</td>
</tr>
</tbody>
</table>
| | e.g., *You sound like really good friends!*
| | *you are cool!* |
| Sharing information about one’s self in a way that invites a response | |
| | e.g., *I like stuffed animals. Do you?* |
| Inviting the other children to play | |
| | e.g., *I’d like to see you guys sometime* |
| Including all players in the fun/game | |
| | e.g., *You’re both in my club,*
| | *Okay listen up as you’re president I say this game rocks and you guys are the coolest* |
| Opening up appropriate personal information | |
| | e.g., *I’m having no luck at all.* |
| 5 = extreme | Addressing conflict appropriately, often with resolving it or an attempt to resolve it appropriately (an attempt to resolve it in a hostile tone or |
manner, such as, Wow! Take it easy I was just asking a question!!, would be overtly aggressive)

e.g., Yeah, maybe Angela does like to say something about it but she’s not bragging or anything. I’m not on anybody’s side. Let’s have fun

I’m sure that Nina was just joking. Good luck! → sent to only the player who commented negatively about Nina, or it would be relational aggression (as it would hurt that player’s relationship with Nina)

To Amanda you are my friend you to Jasmine but why did you only give the message to Jasmine?

Why did you guys leave me out of the chat?

Showing Empathy or Comforting another child is generally extreme, although some may be more moderate (e.g., this is a cool game*I like the teddy too.). An example of an extremely prosocial message:

e.g., It’s cool you chose the teddy bear. He’s cute! Don’t be embarrassed!

4. Awkward Messages:

<table>
<thead>
<tr>
<th>Code</th>
<th>Example of Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mild Sending a blank message</td>
</tr>
<tr>
<td>3</td>
<td>moderate Tangential messages</td>
</tr>
<tr>
<td></td>
<td>e.g., sending “Yah, but do you live in Vancouver?” after receiving a note making fun of another player</td>
</tr>
</tbody>
</table>
• Content of the message is 'out of the blue'
  o e.g., sending “what kind of pet do you like” when the child is sending her last
    message after becoming president; sending “and I adopted a kitten” after receiving
    a note from a child about how embarrassed she is that she still has a teddy bear

5 = severe Content of the message is nonsensical
  o e.g., “bia bia bbbbia bia”, “tey gvj”
Appendix F

*Questions asked after the “Girls’ Club” game.*

1. How much fun was the game?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>not too much</td>
<td>it’s okay</td>
<td>a lot!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. What did you like about the game?

____________________________________________________________________

____________________________________________________________________

3. What did you not like about the game?

____________________________________________________________________

____________________________________________________________________

4. Why do you think that a player would send you a black-out?

____________________________________________________________________

____________________________________________________________________

5. Why do you think that a player would deduct 2 points from you?

____________________________________________________________________

____________________________________________________________________
6. Why would you send someone a black-out?

7. Why would you deduct 2 points from someone?

8. What ways could someone be mean to another player?

   ... Any other way?

9. What ways could someone be nice to another player?

   ... Any other way?

If you could do just ONE thing...

   ...What could you do to make it harder for a player to get something she wants? (circle)
   Black-out her screen    Send her a note    Take 4 points off her bonus score

   ...What could you do to make a player mad? (circle)
   Black-out her screen    Send her a note    Take 4 points off her bonus score
Appendix G

Coding Manual: Post-game questions assessing girls' intent

CODING POST-GAME QUESTIONS: Girls were asked questions after completing the “Girls’ Club!” game. These questions were to ensure that they associated malevolent intent with behaviours that were assumed to represent aggression.

Immediately following the game, research assistants asked the girls the following questions:

Open-ended questions.

1. Why do you think that a player would send you a black-out?
2. Why do you think that a player would deduct 2 points from you?
3. Why would you send someone a black-out?
4. Why would you deduct 2 points from someone?

Girls’ answers should be coded into three categories:

- **Malevolent Intent:** Girls’ comments reveal that the intent of the person using the behaviour in question is to harm, hinder or impede a player. Girls might also express a desire to get revenge (“pay back”) another player, or to have fun at another player’s expense.

  For example:
  
  o **Impede:** “because you want to slow them down.”
  o **Revenge:** “Maybe they did it because I did it to them”, or “they did it to me”
  o **Harm/hinder:** “They don’t like me and were mad”
  o **Fun at other’s expense:** “I thought it was funny to do that to them when they can’t
do anything cuz they don’t got the points”, “To win”

- **Neutral Intent**: A response that indicates no attempt to impact any player, including the girl herself.

  For example:

  - “It’s just part of the game.”
  - “I don’t know why I did it” (said after further probing by RA)

- **Intent to Benefit Self**: A response that indicates a player (or participating child) used that response option in order to benefit herself. Many of these comments may not be logical or possible based on the set-up of the game, but it is the child’s perception or beliefs that are important

  For example:

  - “So that I could have an free turn.”
  - “So that I could have the most points.”
  - “Cuz I wanted the most stuff like pets and stuff.”
Table 1

Demographic information for girls with and without ADHD.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>Control</td>
</tr>
<tr>
<td></td>
<td>ADHD</td>
<td>Control</td>
</tr>
<tr>
<td>Child's age (years, months)</td>
<td>10, 7</td>
<td>10, 9</td>
</tr>
<tr>
<td>Mother's age (years)</td>
<td>41.40</td>
<td>41.37</td>
</tr>
<tr>
<td>Father's age (years)</td>
<td>45.18</td>
<td>44.13</td>
</tr>
<tr>
<td>Time parents married (years)</td>
<td>13.43</td>
<td>15.68</td>
</tr>
<tr>
<td>Number of siblings</td>
<td>1.31</td>
<td>1.27</td>
</tr>
<tr>
<td>Socio-economic class(^a)</td>
<td>2.50</td>
<td>2.38</td>
</tr>
<tr>
<td>Girl's grade</td>
<td>5.05</td>
<td>5.13</td>
</tr>
</tbody>
</table>

\(^a\)The calculation of socio-economic class is based on the 5-factor Hollingshead index (Hollingshead, 1975). Higher scores indicate lower socio-economic status.
Table 2

Girls’ reasons for deducting two points and blacking-out a player’s screen during the “Girls’ Club!” game.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Hostile</th>
<th>Instrumental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Own intent</td>
<td>Other’s Intent</td>
</tr>
<tr>
<td>Malevolence</td>
<td>32 (84.21%)</td>
<td>32 (84.21%)</td>
</tr>
<tr>
<td>Self-benefit</td>
<td>8 (21.05%)</td>
<td>8 (21.05%)</td>
</tr>
<tr>
<td>Neutral</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

ADHD

Control

Note. For the ADHD group, n = 38; for the control group, n = 41.
Table 3

*Descriptive information for overt and relational aggression measures.*

<table>
<thead>
<tr>
<th></th>
<th>Standard Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>Control</td>
</tr>
<tr>
<td><strong>Overt Aggression</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>1.48</td>
<td>1.09</td>
</tr>
<tr>
<td>Teacher</td>
<td>1.85</td>
<td>1.11</td>
</tr>
<tr>
<td>Lab task: Messages</td>
<td>2.20</td>
<td>0.37</td>
</tr>
<tr>
<td><strong>Relational Aggression</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>1.90</td>
<td>1.32</td>
</tr>
<tr>
<td>Teacher</td>
<td>2.34</td>
<td>1.66</td>
</tr>
<tr>
<td>Lab task: Exclusions</td>
<td>5.28</td>
<td>3.61</td>
</tr>
<tr>
<td>Rumours</td>
<td>2.82</td>
<td>3.16</td>
</tr>
<tr>
<td>Messages</td>
<td>1.55</td>
<td>2.89</td>
</tr>
</tbody>
</table>

**Note.** For mother and teacher ratings, *n* = 40 for the ADHD group, and *n* = 43 for the control group. For the lab task measures, *n* = 38 for the ADHD group, and *n* = 41 for the control group.

\(^a\)Mother and teacher ratings were from the CSBS-T. Scores are the average rating on a 1 to 5 scale, with higher numbers indicating more aggression.

\(^b\)Messages sent in chat centers during the “Girls’ Club” lab task were coded on a 1 to 5 scale (higher numbers indicate more aggression), and scores were summed.

\(^c\)Total number of times a participant excluded a player from the game or club.

\(^d\)Total number of rumours sent at the end of the “Girls’ Club” lab task about other players.
Table 4

*Descriptive information for proactive and reactive aggression measures.*

<table>
<thead>
<tr>
<th></th>
<th>Standard Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>Control</td>
</tr>
<tr>
<td><strong>Proactive Aggression</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.01</td>
<td>1.17</td>
</tr>
<tr>
<td>Teacher&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.92</td>
<td>1.22</td>
</tr>
<tr>
<td>Lab task&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.68</td>
<td>2.47</td>
</tr>
<tr>
<td><strong>Reactive Aggression</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.36</td>
<td>2.15</td>
</tr>
<tr>
<td>Teacher&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.85</td>
<td>1.90</td>
</tr>
<tr>
<td>Lab task&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.57</td>
<td>2.00</td>
</tr>
</tbody>
</table>

*Note.* For mother and teacher ratings, n = 40 for the ADHD group, and n = 43 for the control group. For the lab task measures, n = 38 for the ADHD group, and n = 41 for the control group.

<sup>a</sup>Mother and teacher ratings were from the PRA. Scores are the average rating on a 1 to 5 scale, with higher numbers indicating more aggression.

<sup>b</sup>Total number of players to whom the participant sent aggressive options immediately following or not following provocation from another player during the “Girls’ Club” lab task (maximum possible is 8 for proactive, and 4 for reactive).
Table 5

*Descriptive information for instrumental and hostile aggression measures.*

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Effect Size (d’)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>Control</td>
<td>ADHD</td>
</tr>
<tr>
<td><strong>Instrumental Aggression</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deduct points(^a)</td>
<td>1.63</td>
<td>2.18</td>
<td>1.37</td>
</tr>
<tr>
<td><strong>Hostile Aggression</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black-outs(^a)</td>
<td>2.74</td>
<td>2.21</td>
<td>1.75</td>
</tr>
</tbody>
</table>

*Note.* For the ADHD group, \(n = 38\); for the control group, \(n = 41\).

\(^a\)Total number of players to whom the participant sent aggressive options during the “Girls’ Club” lab task (maximum possible is 12).
Table 6

Descriptive information for overt and relational aggression measures for girls with and without comorbid ODD.

<table>
<thead>
<tr>
<th></th>
<th>ADHD+ODD Mean (SD)</th>
<th>ADHD-ODD Mean (SD)</th>
<th>Control Mean (SD)</th>
<th>Effect Size ($r^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overt Aggression</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>1.64a (.50)</td>
<td>1.24a,b (.60)</td>
<td>1.09b (.21)</td>
<td>.27</td>
</tr>
<tr>
<td>Teacher</td>
<td>2.11a (.86)</td>
<td>1.51a,b (.94)</td>
<td>1.11b (.19)</td>
<td>.29</td>
</tr>
<tr>
<td>Lab task: Messagesb</td>
<td>2.75a (3.74)</td>
<td>1.38a (3.97)</td>
<td>0.37a (.67)</td>
<td>.29</td>
</tr>
<tr>
<td><strong>Relational Aggression</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>2.03a (.76)</td>
<td>1.69a,b (.65)</td>
<td>1.32b (.37)</td>
<td>.30</td>
</tr>
<tr>
<td>Teacher</td>
<td>2.60a (.96)</td>
<td>2.00a,b (.75)</td>
<td>1.66b (.74)</td>
<td>.18</td>
</tr>
<tr>
<td>Lab task: Excludeb</td>
<td>5.88a (2.21)</td>
<td>4.33a,b (.1.80)</td>
<td>3.61b (1.76)</td>
<td>.21</td>
</tr>
<tr>
<td>Rumours</td>
<td>3.46a (1.98)</td>
<td>1.80a (1.61)</td>
<td>3.16a (1.92)</td>
<td>.10</td>
</tr>
<tr>
<td>Messagesb</td>
<td>1.78a (1.63)</td>
<td>1.16a (2.01)</td>
<td>2.89a (2.89)</td>
<td>.00</td>
</tr>
</tbody>
</table>

Note. For mother and teacher ratings, $n = 40$ for the ADHD group, and $n = 43$ for the control group. For the lab task measures, $n = 38$ for the ADHD group, and $n = 41$ for the control group.

aMother and teacher ratings were from the CSBS-T. Scores are the average rating on a 1 to 5 scale, with higher numbers indicating more aggression.

bMessages sent in chat centers during the “Girls’ Club” lab task were coded on a 1 to 5 scale (higher numbers indicate more aggression), and scores were summed.

cTotal number of times a participant excluded a player from the game or club.

dTotal number of rumours sent at the end of the “Girls’ Club” lab task about other players.
Means in the same row that do not share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.
Table 7

Descriptive information for proactive and reactive aggression measures for girls with and without comorbid ODD.

<table>
<thead>
<tr>
<th></th>
<th>ADHD+ODD</th>
<th>ADHD-ODD</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Effect Size ($\eta^2$)</td>
</tr>
<tr>
<td>Proactive Aggression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother $^a$</td>
<td>2.30 $^a$ (.84)</td>
<td>1.55 $^{a,b}$ (.79)</td>
<td>1.17 $^b$ (.31)</td>
</tr>
<tr>
<td>Teacher $^a$</td>
<td>1.73 $^a$ (.87)</td>
<td>1.40 $^{a,b}$ (.75)</td>
<td>1.22 $^b$ (.41)</td>
</tr>
<tr>
<td>Lab task: Unprovoked</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aggression $^b$</td>
<td>2.70 $^a$ (1.21)</td>
<td>2.65 $^{a}$ (1.34)</td>
<td>2.47 $^a$ (1.24)</td>
</tr>
<tr>
<td>Reactive Aggression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother $^a$</td>
<td>3.77 $^a$ (.58)</td>
<td>2.70 $^b$ (1.08)</td>
<td>2.15 $^c$ (.73)</td>
</tr>
<tr>
<td>Teacher $^a$</td>
<td>3.05 $^a$ (1.08)</td>
<td>2.59 $^{a,b}$ (1.13)</td>
<td>1.90 $^a$ (.79)</td>
</tr>
<tr>
<td>Lab task: Provoked</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aggression $^b$</td>
<td>1.48 $^a$ (.88)</td>
<td>1.70 $^a$ (1.80)</td>
<td>2.00 $^a$ (1.07)</td>
</tr>
</tbody>
</table>

Note. For mother and teacher ratings, $n = 40$ for the ADHD group, and $n = 43$ for the control group. For the lab task measures, $n = 38$ for the ADHD group, and $n = 41$ for the control group.

$^a$Mother and teacher ratings were from the PRA. Scores are the average rating on a 1 to 5 scale, with higher numbers indicating more aggression.

$^b$Total number of players to whom the participant sent aggressive options immediately following or not following provocation from another player during the “Girls’ Club” lab task (maximum possible is 8 for proactive, and 4 for reactive).
Means in the same row that do not share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.
Table 8

*Descriptive information for lab task measures of instrumental and hostile aggression for girls with and without comorbid ODD.*

<table>
<thead>
<tr>
<th></th>
<th>ADHD+ODD (Mean, SD)</th>
<th>ADHD-ODD (Mean, SD)</th>
<th>Control (Mean, SD)</th>
<th>Effect Size ($\eta^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deduct points</td>
<td>1.32 (1.20)</td>
<td>2.10 (1.50)</td>
<td>2.18 (1.47)</td>
<td>.07</td>
</tr>
<tr>
<td>Black-outs</td>
<td>2.95 (1.97)</td>
<td>2.42 (1.31)</td>
<td>2.21 (1.30)</td>
<td>.04</td>
</tr>
</tbody>
</table>

Note. For the ADHD group, $n = 38$; for the control group, $n = 41$.

$^a$Total number of players to whom the participant sent aggressive options (deduct two points or black-outs) during the “Girls’ Club” lab task (maximum possible is 12 for both instrumental and hostile aggression).

No contrasts were significant.
Table 9

*Descriptive information for prosocial and awkward social behaviour.*

<table>
<thead>
<tr>
<th></th>
<th>Standard Mean</th>
<th>Standard Deviation</th>
<th>ADHD</th>
<th>Control</th>
<th>ADHD</th>
<th>Control</th>
<th>Effect Size (d')</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prosocial behaviour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.83</td>
<td>4.50</td>
<td>.80</td>
<td>.52</td>
<td></td>
<td></td>
<td>-1.03</td>
</tr>
<tr>
<td>Teacher&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.67</td>
<td>4.20</td>
<td>.88</td>
<td>.61</td>
<td></td>
<td></td>
<td>-.74</td>
</tr>
<tr>
<td>Lab task&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.62</td>
<td>9.61</td>
<td>4.96</td>
<td>3.92</td>
<td></td>
<td></td>
<td>-.47</td>
</tr>
<tr>
<td><strong>Awkward behaviour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab task&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.85</td>
<td>.31</td>
<td>1.77</td>
<td>.77</td>
<td></td>
<td></td>
<td>.42</td>
</tr>
</tbody>
</table>

*Note.* For mother and teacher ratings, *n* = 40 for the ADHD group, and *n* = 43 for the control group. For the lab task measures, *n* = 38 for the ADHD group, and *n* = 41 for the control group.

<sup>a</sup>Mother and teacher ratings were from the CSBS-T. Scores are the average rating on a 1 to 5 scale, with higher numbers indicating more prosocial behaviour.

<sup>b</sup>Messages sent in chat centers during the “Girls’ Club” lab task were coded on a 1 to 5 scale (higher numbers indicate more prosocial or awkward messages), and scores were summed.
Table 10

*Descriptive information for measures of prosocial and awkward behaviour for girls with and without comorbid ODD.*

<table>
<thead>
<tr>
<th></th>
<th>ADHD+ODD</th>
<th>ADHD-ODD</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Prosocial behaviour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother $^a$</td>
<td>3.55 (.52)</td>
<td>4.28 (.59)</td>
<td>4.50 (.52)</td>
</tr>
<tr>
<td>Teacher $^a$</td>
<td>3.45 (.88)</td>
<td>3.99 $^{a,b}$ (.83)</td>
<td>4.20 (.61)</td>
</tr>
<tr>
<td>Lab task $^b$</td>
<td>7.60 (5.24)</td>
<td>7.63 (3.39)</td>
<td>9.61 (3.92)</td>
</tr>
<tr>
<td>Awkward behaviour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab task $^b$</td>
<td>.79 (1.90)$_a$</td>
<td>.94 $^{a}$ (1.18)</td>
<td>.31 $^{a}$ (.77)</td>
</tr>
</tbody>
</table>

Note. For mother and teacher ratings, $n = 40$ for the ADHD group, and $n = 43$ for the control group. For the lab task measures, $n = 38$ for the ADHD group, and $n = 41$ for the control group.

$^a$Mother and teacher ratings were from the CSBS-T. Scores are the average rating on a 1 to 5 scale, with higher numbers indicating more prosocial behaviour.

$^b$Messages sent in chat centers during the “Girls’ Club” lab task were coded on a 1 to 5 scale (higher numbers indicate more prosocial or awkward messages), and scores were summed.

Means in the same row that do not share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.
Table 11

Correlations between lab and corresponding adult-report overt and relational aggression measures.

<table>
<thead>
<tr>
<th>Lab Task</th>
<th>Mother report&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Teacher report&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overt</td>
<td>Relational</td>
</tr>
<tr>
<td>ADHD group (n = 38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overt messages</td>
<td>.14</td>
<td>.36**</td>
</tr>
<tr>
<td>Relational: messages</td>
<td>.27*</td>
<td>.35**</td>
</tr>
<tr>
<td>Relational: rumours</td>
<td>.22</td>
<td>.40**</td>
</tr>
<tr>
<td>Relational: exclusions</td>
<td>.37**</td>
<td>.39**</td>
</tr>
</tbody>
</table>

Control group (n = 41)

| Overt messages    | .13   | .07 | .18 | .03 |
| Relational: messages | .06 | .01 | .08 | .01 |
| Relational: rumours | .05 | .17 | .03 | .28* |
| Relational: exclusions | .15 | .10 | .13 | .32* |

Note. *Significant at the .05 level; **Significant at the .01 level.

Higher scores on all measures indicate more aggression.

<sup>a</sup>As measured by ratings on the CSBS-T.
Table 12

Correlations between lab and corresponding adult report proactive and reactive aggression measures.

<table>
<thead>
<tr>
<th>Lab Task</th>
<th>Mother report&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Teacher report&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overt</td>
<td>Relational</td>
</tr>
<tr>
<td>ADHD group (n = 38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proactive aggression</td>
<td>.30*</td>
<td>.26</td>
</tr>
<tr>
<td>Reactive aggression</td>
<td>.21</td>
<td>.16</td>
</tr>
<tr>
<td>Control group (n = 41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proactive choices</td>
<td>.31*</td>
<td>-.19</td>
</tr>
<tr>
<td>Reactive choices</td>
<td>.32*</td>
<td>.31*</td>
</tr>
</tbody>
</table>

Note. *Significant at the .05 level; **Significant at the .01 level.

Higher scores on all measures indicate more aggression.

<sup>a</sup>As measured on the PRA.
Table 13

Correlations between lab relational and overt aggression measures and mother-reported psychopathology and social competence.

<table>
<thead>
<tr>
<th>Lab Task</th>
<th>Measure</th>
<th>Mother-report CBCL</th>
<th>ADHD group (n = 38)</th>
<th>Control group (n = 41)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Internalizing</td>
<td>Externalizing</td>
<td>Social competence</td>
</tr>
<tr>
<td>Overt messages</td>
<td>.01</td>
<td>.32*</td>
<td>-.30*</td>
<td>-0.07</td>
</tr>
<tr>
<td>Relational: messages</td>
<td>-.10</td>
<td>.08</td>
<td>.01</td>
<td>.14</td>
</tr>
<tr>
<td>Relational: rumours</td>
<td>.19</td>
<td>.46**</td>
<td>-.28*</td>
<td>.11</td>
</tr>
<tr>
<td>Relational: exclusions</td>
<td>.24</td>
<td>.55**</td>
<td>-.33*</td>
<td>.22</td>
</tr>
</tbody>
</table>

Note. *Significant at the .05 level; **Significant at the .01 level.

Assessed by mother report on the CBCL.
Table 14

Correlations between proactive and reactive lab measures and mother-reported psychopathology and social competence.

<table>
<thead>
<tr>
<th>Lab Task</th>
<th>Internalizing</th>
<th>Externalizing</th>
<th>Social competence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD group (n = 38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proactive aggression</td>
<td>.21</td>
<td>.17</td>
<td>-.17</td>
</tr>
<tr>
<td>Reactive aggression</td>
<td>.38**</td>
<td>.15</td>
<td>-.07</td>
</tr>
<tr>
<td></td>
<td>Control group (n = 41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proactive aggression</td>
<td>.12</td>
<td>.41**</td>
<td>-.45**</td>
</tr>
<tr>
<td>Reactive aggression</td>
<td>.17</td>
<td>.40**</td>
<td>-.64**</td>
</tr>
</tbody>
</table>

Note. *Significant at the .05 level; **Significant at the .01 level.

*Assessed by mother report on the CBCL.
Table 15

*Correlations between instrumental and hostile lab measures and mother-reported psychopathology and social competence.*

<table>
<thead>
<tr>
<th>Lab Task</th>
<th>Measure</th>
<th>Internalizing</th>
<th>Externalizing</th>
<th>Social competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD group (n = 38)</td>
<td>Instrumental aggression</td>
<td>.06</td>
<td>.09</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td>Hostile aggression</td>
<td>.12</td>
<td>.07</td>
<td>-.22</td>
</tr>
<tr>
<td>Control group (n = 41)</td>
<td>Instrumental aggression</td>
<td>.30*</td>
<td>.39**</td>
<td>-.44**</td>
</tr>
<tr>
<td></td>
<td>Hostile aggression</td>
<td>.06</td>
<td>.13</td>
<td>-.09</td>
</tr>
</tbody>
</table>

Note. *Significant at the .05 level; **Significant at the .01 level.

aAssessed by mother report on the CBCL.
Table 16

Mother and teacher agreement on overt and relational aggression ratings.

<table>
<thead>
<tr>
<th></th>
<th>ADHD (n = 40)</th>
<th>Control (n = 43)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overt</td>
<td>Relational</td>
</tr>
<tr>
<td>Teacher report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overt</td>
<td>.24*</td>
<td>.19</td>
</tr>
<tr>
<td>Relational</td>
<td>.27*</td>
<td>.31*</td>
</tr>
</tbody>
</table>

Note. *Significant at the .05 level; **Significant at the .01 level.
Table 17

*Mother and teacher agreement on proactive and reactive aggression ratings.*

<table>
<thead>
<tr>
<th></th>
<th>ADHD (n = 40)</th>
<th>Control (n = 43)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proactive</td>
<td>Reactive</td>
</tr>
<tr>
<td>Teacher report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proactive</td>
<td>.07</td>
<td>.44**</td>
</tr>
<tr>
<td>Reactive</td>
<td>.07</td>
<td>.24</td>
</tr>
</tbody>
</table>

Note. *Significant at the .05 level; **Significant at the .01 level.
Table 18

*Correlations between adult reports of relational and overt aggression and mother-reported psychopathology and social competence.*

<table>
<thead>
<tr>
<th>Mother Reports</th>
<th>Internalizing</th>
<th>Externalizing</th>
<th>Social Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD group (n = 40)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother overt ratings</td>
<td>-.09</td>
<td>.35*</td>
<td>-.17</td>
</tr>
<tr>
<td>Mother relational ratings</td>
<td>.21</td>
<td>.40**</td>
<td>-.15</td>
</tr>
<tr>
<td>Teacher overt ratings</td>
<td>-.11</td>
<td>.28*</td>
<td>-.13</td>
</tr>
<tr>
<td>Teacher relational ratings</td>
<td>.05</td>
<td>.37**</td>
<td>.05</td>
</tr>
<tr>
<td>Control group (n = 43)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother overt ratings</td>
<td>-.16</td>
<td>.26*</td>
<td>-.01</td>
</tr>
<tr>
<td>Mother relational ratings</td>
<td>-.07</td>
<td>.07</td>
<td>-.15</td>
</tr>
<tr>
<td>Teacher overt ratings</td>
<td>-.09</td>
<td>.52**</td>
<td>-.20</td>
</tr>
<tr>
<td>Teacher relational ratings</td>
<td>.12</td>
<td>.55**</td>
<td>-.18</td>
</tr>
</tbody>
</table>

*Note.* *Significant at the .05 level; **Significant at the .01 level.*
Table 19

*Correlations between adult-reported proactive and reactive aggression and mother-reported psychopathology and social competence.*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Internalizing</th>
<th>Externalizing</th>
<th>Social Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mother Reports</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADHD group (n = 40)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother proactive ratings</td>
<td>.03</td>
<td>.34*</td>
<td>-.11</td>
<td></td>
</tr>
<tr>
<td>Mother reactive ratings</td>
<td>.43**</td>
<td>.75**</td>
<td>-.17</td>
<td></td>
</tr>
<tr>
<td>Teacher proactive ratings</td>
<td>-.02</td>
<td>.33*</td>
<td>.18</td>
<td></td>
</tr>
<tr>
<td>Teacher reactive ratings</td>
<td>.03</td>
<td>.19</td>
<td>-.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control group (n = 43)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother proactive ratings</td>
<td>-.06</td>
<td>.19</td>
<td>-.34**</td>
<td></td>
</tr>
<tr>
<td>Mother reactive ratings</td>
<td>.21</td>
<td>.39**</td>
<td>-.19</td>
<td></td>
</tr>
<tr>
<td>Teacher proactive ratings</td>
<td>.15</td>
<td>.49**</td>
<td>.16</td>
<td></td>
</tr>
<tr>
<td>Teacher reactive ratings</td>
<td>.22</td>
<td>.42**</td>
<td>.21</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* *Significant at the .05 level; **Significant at the .01 level.*