

**THE IMPACT OF EARLY ONSET CONDUCT DISORDER ON DEPRESSION AMONG
ADOLESCENT GIRLS VERSUS BOYS: GENDER MATTERS**

by

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Abstract

Gender plays an important role in the development of conduct disorder (CD) and depression. Loeber and Keenan (1994) suggested that when females have CD, they suffer from more severe psychopathology which may be expressed in increased comorbidity of CD and depression. In addition, those with early onset CD have also been found to be at a higher risk for more serious psychopathology. This study examines the relationship between CD and depression in 213 adolescents (59.2% male) with early and late onset CD. Females were more likely to have a Major Depressive Episode, higher depressive symptoms, and a stronger relationship between depressive and CD symptoms. There was some evidence that males with early onset CD were at a higher risk for depressive symptoms compared to late onset males; however, females with early onset CD did not demonstrate the same increased risk. Clinical implications of these findings are discussed.

Keywords: Depression; Conduct Disorder; Comorbidity; Age of Onset; Gender

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Introduction

Conduct disorder (CD) is one of the most prevalent and costly disorders diagnosed in childhood and adolescence, particularly when onset occurs early in childhood (Frick & Kimonis, 2005; Loeber, Burke, Lahey, Winters, & Zera, 2000; Loeber & Keenan, 1994). Both CD and depression increase in prevalence over the course of adolescence (Cohen, Cohen, Kasen, & Velez, 1993; Wolff & Ollendick, 2006,) and often co-occur (Ingoldsby, Kohl, McMahon, Lengua, & Conduct Problems Prevention Research Group, 2006). This co-occurrence of depression and CD has attracted considerable attention, both in terms of the impact of comorbidity on symptom severity and the developmental sequence in which they appear.

Gender plays an important role in the onset, course and prevalence of both CD and depression, lending greater complexity to issues of comorbidity. CD is more prevalent in males in childhood; however, this gender gap closes during the course of adolescence as more females tend to develop the disorder after puberty (e.g., Moffitt, 2003). Loeber and Keenan (1994) have discussed the applicability of a *gender paradox model*, which suggests that when females develop a gender-atypical disorder such as CD, they suffer from more severe psychopathology than do males. This may be expressed in increased comorbidity of CD with other psychiatric conditions and/or through more severe CD symptoms (Loeber & Keenan, 1994). Depression is likely to co-occur, particularly in girls, as they are twice as likely as boys to become depressed during adolescence (e.g., Hankin, 2006; Wolff & Ollendick, 2006).

It is important to understand gender differences in the relationship between CD and depression because greater comorbidity is associated with lower academic and social competence (Ingoldsby et al., 2006) and higher rates of suicide (Vander Stoep, Adrian, McCauley, Crowell, Stone, & Flynn, 2011). Furthermore, research is needed to clarify whether the distinction between early versus late onset CD serves as an additional risk factor in the relationship between CD and depression in girls compared to boys. The current study examined the relationship between CD and depression in a clinical population. Findings extend previous research by investigating the impact of gender and early versus late onset CD.

Conduct Disorder and Gender

CD is associated with symptoms such as physical aggression, delinquency (i.e., breaking into homes, fire setting), and status violations (i.e., running away from home, school truancy, (APA, 2000). CD is conceptualized as being male-linked because in childhood it is diagnosed three times more frequently in boys than girls (Zoccolillo, 1993); however, this gender gap closes during adolescence (Silverthorn & Frick, 1999). This is consistent with research that has found females to be more frequently diagnosed with CD after puberty, as their conduct problems become more noticeable during adolescence (Keenan, Loeber, & Green, 1999). A meta-analysis of 46 studies including community, clinical, and at risk samples found the gender ratio (male to female) was higher for early onset (ranging from 10:1 to 15:1) than for late onset CD (ranging from 1.5:1 to 5:1; Fontaine, Carbonneau, Vitaro, Barker, & Tremblay, 2009). This idea has recently been challenged, as a large study demonstrated that for 92% of girls with CD, the age of onset ranged between 7 and 9 years old, suggesting early onset CD may be

more prevalent in females than previously thought (Keenan, Wroblewski, Hipwell, Loeber, & Stouthamer-Loeber, 2010).

Extensive research has shown that, among boys, early onset CD that begins prior to age 10 is associated with a more chronic course than the late onset type wherein symptoms tend to be more transient, referred to as the *dual taxonomy theory* (e.g., Moffitt et al., 2008; Odgers et al., 2008; Silverthorn & Frick, 1999). Only a handful of research has examined early versus late onset trajectories in girls (Silverthorn, Frick, & Reynolds, 2001) and findings are inconsistent (Frick & Dickens, 2006; Keenan et al., 2010). For example, some researchers have found that females with late onset CD share similar demographic characteristics to males with early onset CD (Silverthorn & Frick, 1999; Silverthorn et al., 2001); however, other studies have found no differences across gender in the expression of early versus late onset CD (Moffitt, 2003). In a longitudinal sample, Odgers and colleagues (2008) found that females follow similar early and late onset conduct problem trajectories to those of males. The presentation of early onset CD in females therefore remains unclear, as research on this group has been quite limited primarily due to small sample sizes (Silverthorn et al., 2001). Furthermore, in the few studies that have examined age of onset, there are significant methodological concerns, as studies do not use a consistent age or criteria for differentiating early and late onset. Studies will often use the age at which youth meet a cut-off score on a shortened measure of behavioural rating conduct problem scales, or a scale of delinquency, rather than using full measures of DSM criteria (e.g., Keenan et al., 2010; Odgers et al., 2008). These methodological inconsistencies have made it difficult to understand the impact of CD age of onset in females. Gender differences in early

onset CD are further complicated by the high rate of comorbidity of depressive symptoms in females.

Depression and Gender

Prior to adolescence (i.e., approximately 13 years of age), the rate of depressive disorders is approximately equal between boys and girls (Costello, Erkanli, & Angold, 2006). However, a gender gap emerges in adolescence wherein females are twice as likely as males to experience depressive symptoms (Hankin, 2006). Based on the National Comorbidity Study, 16.1% of females aged 15 to 24 and 9% of males experienced depressed mood in the previous 12 months (Costello, Swendsen, Rose, & Dierker, 2008), which is consistent with other rates reported in the literature (Costello et al., 2006). Girls are also more likely to report depressive symptoms earlier than males, typically starting around the age of 12 or 13 years (Hankin, 2006).

Overall, depression prevalence rates increase in two stages during the teen years (Kessler, Avenevoli, & Merikangas, 2001), with the first increase occurring in a slight linear fashion from pre- to mid-adolescence (Hankin, 2006). In contrast, the depression rate increases six-fold from mid- (3% at age 15) to late adolescence (15% at age 18; Hankin, 2006). Despite the prevalence of depression during adolescence, it may be overlooked among youth engaging in aggressive behaviour, especially in girls, as depression can manifest as irritation, hostility, and aggression (Boots, Wareham, & Weir, 2011).

Conduct Disorder, Depression, and Gender

Disorders are considered to be comorbid when they co-occur at a higher rate than would be expected by chance and are associated with more severe forms of

psychopathology (Loeber & Keenan, 1994). Wolff and Ollendick (2006) found the comorbidity of those who met criteria for CD and a depressive disorder to be higher in clinically referred youth than adolescents in community samples. Based on a large-scale review of population-based studies, Angold, Costello and Erkanli (1999) found that the average odds ratio of having both CD and a depressive disorder was 6.6. In contrast, studies with clinically referred youth found that more than 30% of children diagnosed primarily with Major Depressive Disorder (MDD) also met criteria for CD and of those diagnosed primarily with CD, 50% met criteria for a MDD (Greene, Biederman, Zerwas, Monuteaux, Goring & Faraone, 2002). There is debate as to whether the comorbidity between CD and depressive disorders is a product of the methodological artifact of referral bias, halo effects (i.e., a generalization from the perception of one outstanding personality trait through unstructured and idiosyncratic decision-making procedures), or effects of data collection strategies (e.g., use of multiple informants increases number of reported symptoms; Angold et al., 1999). Despite this, the comorbidity between CD and depressive disorders has been demonstrated in studies using structured interviews with clinical and population-based samples and in studies with single and multiple informants, supporting the notion that comorbidity rates are not the result of a methodological bias (e.g., Wolff & Ollendick, 2006).

Three models have been proposed to explain the development of co-occurring depressive and CD symptoms. The *shared risk factors model* posits that depressive disorders/ symptoms and CD have common environmental and social-emotional risk factors that can account for their relationship (e.g., parent-child relationships; Wolff & Ollendick, 2006). However, a recent study indicated that depression and delinquency share few environmental risk factors (Kofler, McCart, Zajac, Ruggiero, Saunders, &

Kilpatrick, 2011). The *failure model* (Capaldi & Stoolmiller, 1999) suggests that a child's negative behaviour at home is reinforced with attention and habituates to negative behaviour with peers, which leads to rejection by prosocial peers, academic failure, and association with other aggressive peers. The model suggests that conduct problems interfere with adaptation, leading to a developmental chain reaction of failures which creates greater susceptibility to depression. The third conceptualization, or *acting out* model, posits that CD symptoms are expressed as a means of acting out or compensating for feelings of depression (Kofler et al., 2011; Wolff & Ollendick, 2006). Depressed mood has been found to be associated with an increase in conduct problems throughout the course of adolescence, providing support for the acting out model (Beyers & Loeber, 2003).

Regardless of how comorbid CD and depressive symptoms develop, their co-occurrence has been consistently found to lead to more negative outcomes: Comorbid CD and depression exacerbate the negative effects of either disorder alone and contribute to higher levels of psychosocial impairment when compared to the impairment experienced with one disorder (Ingoldsby et al., 2006; Wolff & Ollendick, 2006). Higher rates of comorbid CD and depression are of special concern because of an increased risk for suicide, particularly in females (Keenan et al., 1999; Loeber & Keenan, 1994) and for those in youth custody (Smajkic & Clark, 2007). Comorbidity also has a substantial impact on health care systems and society as a whole, as co-occurring disorders require more treatment and are associated with greater impairment across multiple domains (e.g., Lewinsohn, Rohde, & Seeley, 1995).

Gender differences in the presence of comorbid CD and depression are consistent with the gender paradox effect: Compared to males, females are far more

likely to have co-occurring CD and depressive symptoms (Boots, Wareham, & Weir, 2011) in both normative (Weisner & Kim, 2006) and clinical samples (Lehto-Salo, Närhi, Ahonen, & Marttunen, 2009; Miller, Malone, Dodge, & Conduct Problems Prevention Research Group, 2010). Although the relationship between CD and depression for females is consistent across research and reviews (e.g., Keenan et al., 1999; Wolff & Ollendick, 2006), research on males has been somewhat mixed. Some researchers have suggested that depression is associated with a decrease in the seriousness of delinquent behaviours in males, particularly during mid-adolescence (Loeber & Keenan, 1994). However, other studies have found that stable depressed mood from mid- to late adolescence was instead associated with higher rates of delinquent behaviour in males (Beyers & Loeber, 2003).

While research has consistently found the relationship between CD and depression to be stronger for females, there are only two studies that have examined the impact of early onset CD on gender differences in the relationship between CD and depressive symptoms. The first study (Miller et al., 2010) drew from a longitudinal sample that was originally referred for having conduct problems in kindergarten. The authors examined gender differences among youth who had chronically high delinquent behaviours that began in childhood (i.e., early onset group) and those whose delinquent behaviours increased through adolescence (i.e., late onset group) and found no gender differences within these two groups. The second study (Barker, Oliver, & Maughan, 2010) examined emotional problems as a measure of depressive symptoms in a population-based sample of early adolescents and found no gender differences between those who displayed conduct problems in childhood (i.e., early onset persistent group) and a group who exhibited lower conduct levels in childhood but increased during

adolescence (i.e., adolescent onset group). They did, however, find that those with early onset persistent conduct problems were at a higher risk for the development of emotional difficulties and internalizing problems from ages 4 to 13. There are a few concerns with these particular studies that draw into question the generalizability of the findings. First, both studies use a scale of delinquent behavior rather than a specific measure of CD symptoms, making it difficult to evaluate how findings from these studies compare to studies of CD specifically. Although no gender differences were found in either study, it is possible that females display fewer overt delinquent symptoms of CD that are assessed in symptom checklists rather than delinquency scales. Second, the populations from which the samples were drawn are problematic. The first study examined a sample of children that met criteria for some conduct problems in kindergarten, and then compared youth who had chronically high delinquent behaviour versus those who had increasing delinquent behaviour, calling into question whether the sample represents a true late onset group. Furthermore, the second study uses population-based data, which may not accurately represent the same difficulties found in clinical samples.

Current Study

In sum, research has shown that girls with CD to be at a higher risk than males for more severe psychopathology, including depressive disorders (Lehto-Salo et al., 2009). Other research has shown that boys with early onset CD are at a higher risk of current and future psychopathology and comorbidity than males with late onset CD (Odgers et al., 2007). To date, few studies have examined the importance of gender in combination with early and late onset CD in determining differences in comorbidity. Therefore, the purpose of the current study is to test previous research by examining the

rates and relationships between CD and depressive symptoms in a selected sample of boys and girls with a diagnosis and equal levels of CD. It serves to extend the literature by examining gender differences and the impact of early or late onset CD on the rates of and relationships between CD and depressive symptoms.

There were several aims to the current study. The first objective was to determine whether the presence of a Major Depressive Episode (MDE) varied across gender in a conduct-disordered population. Based on previous findings, it is hypothesized that girls would be more likely to have a MDE than boys. The second objective was to evaluate whether the rates of CD and depressive symptoms significantly differed across gender. Consistent with the gender paradox theory, girls are expected to have higher levels of both concurrent CD and depressive symptoms. The third aim was to investigate whether the strength of the relationship between CD and depressive symptoms differed by gender. Based on the literature, the strength of the relationship between CD and depressive symptoms is hypothesized to be greater for girls than boys. The fourth objective was to explore whether gender differences were found across those with early and late onset CD. Within early and late onset groups, girls are predicted to have higher levels of MDE, CD, and depressive symptoms. Consistent with the dual taxonomy theory, it is also expected that those with early onset CD would have higher levels of MDE, CD, and depressive symptoms than those with late onset CD.

Method

Participants

Participants for this study were drawn from two samples. The first sample was drawn from a longitudinal study examining gender and aggression among high-risk youth. Participants were adolescents ($N = 103$, 42% female). Approximately half were drawn from two custody centres (53%) and a probation office (2%), and 45% from a provincial assessment centre providing mental health services to youth with severe behaviour problems. The second sample was obtained from a cross-sectional study examined gender and health in a clinical population. Participants were youth ($N = 107$, 37% females) drawn from the same provincial assessment centre serving youth with severe behaviour problems in BC. In all settings, parental consent and youth assent were obtained. Participants who met diagnostic criteria for CD (58% of the total combined sample) were included in this study. Exclusionary criteria included IQ below 70 and the presence of Axis I psychotic symptomatology based on a file review.

The combined sample included 126 boys ($M = 15.10$, $SD = .159$) and 84 girls ($M = 15.31$, $SD = .130$) with a diagnosis of CD (total $N = 210$). A high percentage of the youth were identified as having early onset CD (71.4 % of males, 56% of females). Participants were 58% Caucasian, 15% Aboriginal, 10% other, and 7% of participants did not indicate their ethnicity. Descriptive information based on participant location (i.e. Youth Forensic or Outpatient) can be found in Table 1. Location was not found to be

significantly related to diagnosis of early or late onset CD for boys ($\chi^2 (1) = .14, p = .44$) or girls ($\chi^2 (1) = .79, p = .26$).

Participants from the two samples did not differ on demographics, study measures, or in the relationships between measures. In addition, participants from the provincial assessment centre and the juvenile justice system did not differ on gender, CD symptoms ($F(1, 181) = 2.10, p = .15$), or depressive symptoms ($F(1, 180) = .06, p = .81$). Participants from the juvenile justice system were significantly older ($M = 15.91$) compared to those in the provincial assessment centre ($M = 14.88$). Youth in the provincial assessment centre were found to be more likely to have an MDE ($\chi^2 (1) = 5.16, p < .05$)¹.

Procedure and Measures

Measures were administered in three separate testing sessions to reduce fatigue and enhance validity of the responses. The three modules comprised a number of semi-structured clinical interviews, self-report measures, and computerized assessment. All measures were completed by the youth.

Diagnostic Measures. *The Diagnostic Interview for Children and Adolescents-Revised* (DICA-R; Reich, 2000) was used to assess CD and current MDE. The DICA-R is a criteria-based, structured, computer-assisted interview done with a trained interviewer that maps onto the DSM-IV (APA, 1994) diagnoses commonly seen in children and adolescents. A diagnosis of CD required three CD symptoms in the past 12 months and at least one symptom in the last 6 months. A diagnosis of MDE required at least 5 symptoms present for at least the past 2 weeks. The age of first CD and MDE

¹ Partialling out the effect of location did not change the results of any analyses.

symptom presentation was also recorded from the DICA-R interview. Age of first symptom refers to the age when youth “first started having these problems.” The DICA was also used to assess early onset CD as defined by the DSM-IV criterion as having one symptom present before the age of 10. Research conducted on the DICA-R has shown good validity and test-retest reliability ranging from $k = .59$ to $.92$ depending on the disorder being measured (De la Osa, Ezpeleta, Oomenech, Navarro, & Losilla, 1997).

CD and Depressive Symptom Severity. The severity of CD and depressive symptoms was assessed using the *Ontario Child Health Study (OCHS)* (Boyle et al., 1993). The OCHS was developed based on Diagnostic and Statistical Manual of Mental Disorders- Third Edition (American Psychiatric Association, 1980) descriptions of childhood disorders and items contained in the widely used and well-validated Youth Self Report (Achenbach & Rescorla, 2001). All items are scored on a 3-point scale ranging from 0 (*Never or not true of me*) to 3 (*Often or very true of me*), and ask about symptoms occurring in the present or in the past six months. The depression subscale includes 15 items which are summed to produce an overall score. Sample items included “I am unhappy, sad, or depressed” and “I get no pleasure from my usual activities.” Scores on the depression scale can range from 0 to 45, with higher scores indicating higher levels of depression. The scale has been shown to have good psychometric properties ($\alpha = .76$; test re-test $\alpha = .77$; Boyle et al., 1993). The measure showed good internal consistency in the current sample as well ($\alpha = .87$).

The CD scale includes 11 items which were summed to produce an overall score. Sample items included “I am mean to animals” and “I threaten to hurt people”. Scores on the CD scale can range from 0 to 33, with higher scores indicating higher

levels of CD. Similar to the depression subscale, this scale has good psychometric properties ($\alpha = .72$; test re-test $\alpha = .75$; Boyle et al., 1993). The internal reliability for the current sample showed good psychometric properties ($\alpha = .80$).

Results

Missing data.

The OCHS CD scale was missing for 14.1% of cases ($N = 28$), the OCHS depressive symptoms scales was missing for 14.6% ($N = 27$) of cases, and the ages of onset for MDE symptoms were missing for 36% of cases ($N = 76$). These cases were removed from relevant analyses. Missing item data were substituted with the person mean if the scale was missing 80% or less for CD symptoms and 70% or less for depressive symptoms². No significant differences were found in the demographics, CD symptoms, depressive symptoms, and rates of MDE for those cases that were missing data versus those that were kept for all variables.

Descriptive data.

Significantly more boys than girls were identified as having early onset CD ($\chi^2(1) = 5.32, p < .05$; see Table 1). As presented in Table 2, depression ($M = 8.87, SD = 5.44$) was slightly positively skewed ($.77 \pm .19$). CD ($M = 7.17, SD = 3.92$) was very slightly positively skewed ($.31 \pm .18$), and was also slightly platykurtotic ($-.79 \pm .36$).³

² Scale means for inputted missing data were consistent with the means without missing data inputted.

³ Although both depressive symptoms and CD symptoms were found to be slightly skewed this did not affect the results as confirmed with transformed data.

Research Questions

1. Compared to boys, are girls diagnosed with CD more likely to suffer from comorbid MDE?

In the current sample, 22.6% of girls and 8.7% of boys met criteria for a current MDE. Thus, as predicted, girls with CD were 2.6 times more likely to meet criteria for a MDE than boys with CD ($\chi^2 (1) = 7.53, p < .01$).

2. Compared to boys, do girls diagnosed with CD suffer from more severe CD and depressive symptoms?

Means and standard deviations for CD and depressive symptoms for girls and boys can be found in Table 3. No significant differences in the severity of CD symptoms emerged ($t (179) = .84, p = .40$). For depressive symptoms, a Levene's test indicated unequal variance ($F = 7.32, p < .01$), so degrees of freedom were adjusted from 178 to 132. As predicted, girls reported higher levels of depressive symptoms ($M = 11.55, SD = 5.90$) than boys ($M = 7.09, SD = 4.62; t (131) = -5.44, p < .001$).

3. Is the relationship between CD and depressive symptoms significantly stronger for girls than boys diagnosed with CD?

Spearman's rank correlations are presented in Table 3 by gender. Spearman's rank correlations were utilized due their resistance to correlation outliers (See Figures 1 and 2; Zayed & Quade, 1997).⁴ A two-tail Fisher's Z transformation (Preacher, 2012 December) was used to compare correlation coefficients to determine if the relationship between depressive symptoms and CD symptoms were different as predicted.

Depressive symptoms were found to be correlated with CD symptoms for both boys ($r = .22$) and girls ($r = .42$) accounting for 5% and 18% of the variance, respectively.

⁴ Pearson product moment correlations were compared to Spearman's rank correlations and no significant differences were found.

The relationship between depressive symptoms and CD symptoms was marginally stronger among girls compared to boys ($z = -1.75, p = .08$).

4. Does the frequency of MDE, severity of CD and depressive symptoms, and relationship between CD and depressive symptoms differ between girls and boys with early versus late onset?

In light of the significant differences in the frequency of MDE and the severity of depressive symptoms in girls versus boys with CD, further analyses were completed to determine whether these findings were similar in early versus late onset girls versus boys.

Boys and girls with early onset CD appeared to have higher CD symptoms levels ($M = 7.51, SD = 3.82$, and $M = 7.93, SD = 4.77$, respectively) than boys and girls with late onset CD ($M = 6.98, SD = 3.09$, and $M = 5.54, SD = 3.43$, respectively). CD symptoms were found to significantly differ by CD subtype ($F(1, 180) = 5.54, p < .05$), as those with early onset CD had significantly higher levels of CD symptoms. No gender differences were found.

Among early onset CD girls and boys, the frequency of MDE was 21% and 8.9%, respectively (see Table 4). A trend emerged indicating that early onset girls were more likely to have a MDE than boys ($\chi^2(1) = 3.21, p = .07$). For depressive symptoms, a Levene's test indicated unequal variance ($F = 6.86, p < .05$), so the degrees of freedom were lowered from 116 to 65 and the more robust Welch test was utilized to examine the difference in means. The severity of depressive symptoms was also significantly higher in girls ($M = 12.30, SD = 6.37$) than boys; ($M = 7.33, SD = 4.87; F(1, 65) = 19.04, p < .001$). Among early onset girls, CD and depressive symptoms were significantly correlated ($r = .41, p < .01$). This was also true among early onset boys, however, the

magnitude of this association was more modest ($r = .24, p < .05$). Overall, the relation between CD and depressive symptoms did not significantly differ in early onset girls versus boys ($z = .96, p = .34$).

Among late onset CD girls versus boys, the frequency of MDE was 24% and 8.3%, respectively. Girls with late onset CD were found to have a higher rate of MDE than boys with late onset ($\chi^2 (1) = 3.94, p < .05$). The severity of depressive symptoms was significantly higher in late onset girls ($M = 10.62, SD = 5.21$) than boys ($M = 6.44, SD = 3.86; F (1, 60) = 12.57, p < .01$). Among late onset girls, the relationship between CD and depressive symptoms was significant ($r = .45, p < .01$). This relationship was not significant for late onset boys ($r = -.02, p = .91$). Overall, the relationship between CD and depressive symptoms was marginally stronger for late onset girls than boys ($z = 1.88, p = .06$).

Girls and boys with early onset CD were at an increased risk for MDE ($\chi^2 (1) = 7.53, p < .01$), but not depressive symptoms ($F (1, 176) = .228, p = .63$). Girls and boys did not have a stronger relationship between CD and depressive symptoms compared to their late onset counterparts ($z = .2, p = .84$ and $z = -1.16, p = .25$, respectively).

Discussion

The purpose of this study was to examine the rate of MDE and level of depressive symptoms in adolescent girls and boys diagnosed with CD, and to assess the relationship between CD and depressive symptoms in this sample. The study extended past research by examining the rates and associations between CD and depressive symptoms across gender for those with early versus late onset CD. A particular strength of this study was the use of the large sample size of girls diagnosed with CD.

Gender and Comorbidity

Past research has focused on rates of a MDD in youth with CD (e.g., Keenan et al., 1999) or has examined levels of co-occurring CD and depressive symptoms within normative populations (e.g., Kolfer et al, 2010; Pepler, Jiang, Craig, & Connolly, 2010). Based on this work, a higher rate of MDE was predicted among girls than boys diagnosed with CD, and a stronger relationship between CD and depressive symptoms was expected. Consistent with the gender paradox model and previous research, girls were more likely to meet criteria for a MDE (e.g., Keenan et al., 1999). In addition, girls had higher levels of depressive symptoms than boys, which was in line with the higher odds ratios for comorbid depression in girls with CD reported in earlier studies (Angold et al., 1999; Wolff & Ollendick, 2006). Girls had more variance in their depressive symptoms than boys, which may have impacted the strength of the relationship between CD and depressive symptoms. Further analysis demonstrated that this difference was

due to a significantly higher variance in the early onset girls rather; however, caution was taken in interpreting these results. As predicted, the relationship between CD and depressive symptoms was significantly stronger for girls than boys, extending previous research that has focused on the co-occurrence of CD and depression (e.g., Chen & Simmons-Morton, 2009; Pepler et al., 2010). The current findings indicate that CD and depressive symptoms are more closely linked for girls than for boys. Girls with CD typically engage in more relational aggression than physical aggression (Moretti & Holland, 2001), which has been linked to peer rejection and loneliness (Hankin & Abramson, 2001). Conduct problems in girls have also been found to lead to an increase in harsh parenting (Hipwell et al., 2008). It could be that girls are more sensitive to these environmental stressors that give rise to both conduct problems and depression (Diamantopoulou, Verhelst, & van der Ende, 2011). Girls are also more likely to hold a negative view of themselves, which has been linked to relational aggression (Moretti & Holland, 2001). Girls who engage in problem behaviour may be more sensitive to the negative evaluations of others through relational self-regulation in which their negative self-representation is confirmed through the social rejection they face when they act aggressively (Moretti & Holland, 2001). This process could then in turn lead to more negative self-evaluation and feelings of depression. This explanation is consistent with research that shows girls internalize problems in social relations more than boys (Rudolph, 2002).

In contrast to previous research that found rates of comorbid MDE to be present in 50% of clinically referred youth with CD (Greene, Biederman, Zerwas, Monuteaux, Goring & Faraone, 2002), the current rate of comorbid MDE was just 17% (26% and 9% for girls and boys, respectively). The lower rate of MDE in this study may be due to the nature of the current sample. Previous studies (e.g., Greene et al., 2002) relied on

general clinical samples, whereas the current study recruited from juvenile justice and a treatment centre for youth with severe conduct problems.

Contrary to the gender paradox model, no gender differences were found for the level of CD symptoms. Participants for this study were from facilities that provided service to youth with severe conduct disorder; therefore, it is not remarkable that gender differences were not found.

Comorbidity in Early versus Late Conduct Disorder

Contrary to previous research that found a lower proportion of girls identified as early onset CD (e.g., Moffit, 2000; Odgers et al., 2008; Silverthorn et al., 2001), the current study revealed the proportion of girls with early onset CD (56%) was higher than the portion with late onset CD (44%). However, the current findings are consistent with recent studies that utilized both parent and self-report and also found a higher proportion of girls with early onset CD (Keenan et al., 2010). Differences in the proportion of early versus late onset girls may be related to differences in sampling. The proportion of girls with early onset CD may reflect the sample drawn from juvenile justice and a centre for youth with conduct disorder.

Support was found for the gender paradox based prediction of higher rates of MDE and depressive symptoms for girls compared with boys regardless of whether CD onset was early versus late: girls had higher levels of MDE and depressive symptoms in both early and late onset groups. However, early onset boys showed some evidence of comorbid depressive symptoms. These findings are contrary to earlier studies that found no gender differences in rates of depression when examining early onset delinquency versus late onset delinquency trajectories (Barker et al., 2010; Miller et al.,

2010). In addition, those with early onset CD had higher levels of CD symptoms than those with late onset CD, supporting the dual taxonomy theory (Moffitt, 1993).

Expanding this research to include CD age of onset in the relationship between CD and depressive symptoms, CD symptoms were found to account for 17% of the variance in depressive symptoms for girls with early onset CD, and 20% of the variance in girls with late onset CD. In contrast, CD symptoms accounted for just 6% of the variance in depressive symptoms in boys with early onset CD and 0% in boys with late onset CD. Girls with early onset CD had significantly more variance in their depressive symptoms compared to boys with early onset CD. However, there was homogeneity of variance for those with late onset CD and between girls with early and late onset CD. Correlation results for girls with early onset CD were therefore interpreted with a degree of caution. The relationship between CD and depressive symptoms was found to be stronger for girls with early and late onset CD than it was for boys with late onset CD. However, there was no difference between the girls and boys with early onset CD. Therefore, for all girls with CD and early onset boys, higher levels of depressive symptoms are related to higher levels of CD symptoms.

The significant relationship between CD and depressive symptoms among boys with early but not late onset CD is consistent with previous research (Barker et al., 2010) that found boys with early onset persistent conduct problems to have higher levels of emotional difficulties and peer problems in early adolescence. Boys with late onset CD may be demonstrating behaviours that are viewed as gender normative and have some value in terms of social status and power among peers (Berkout, Young, & Gross, 2011), therefore it would be unexpected that these behaviours would lead to feelings of depression. Boys with early onset CD tend to develop more chronic behaviour problems (Dandreaux & Frick, 2009), experience family dysfunction, parent-child conflict (Kofler et

al., 2011), and face peer rejection (Boots, Warham, & Weir, 2011) which put the youth at risk for depression. Research has found that failure across multiple relationships in early adolescence puts boys at a particularly high risk for the development of depressive symptoms (Boots et al., 2011), making early onset boys susceptible to depression.

Contrary to the hypothesis, the current study did not find early onset girls to be at an increased risk for depressive symptoms compared to late onset girls. These findings are inconsistent with previous research suggesting that girls with early onset CD are at a higher risk for comorbid psychopathology (Lehto-Salo et al., 2009, Odgers et al., 2007). One explanation for the difference in findings could be due to the difference in samples, as previous research has combined ODD with CD youth (Lehto-Salo, 2009). The late onset girls in the current study may have more severe psychopathology than previous research samples and are subsequently more sensitive to the effects of depression.

These findings extend previous research that has examined trajectories of early onset persistent and adolescent onset delinquent behaviours (i.e., Barker et al., 2010; Miller et al., 2010) by assessing the rate of depression in those meeting criteria for early and late onset CD. The current results suggest that gender plays a more important role as a risk factor for depression than having early onset CD.

Limitations

The results of the current study add to the literature by examining the relationship and rates of depression in those with early and late onset CD. However, there are also limitations to keep in mind. Although the overall sample size is adequate for the analyses conducted ($N = 213$), only 180 of those participants completed all of the scales. In addition, almost half of the sample (42%) were boys with early onset CD, limiting the sample sizes of girls with early onset CD ($n = 47$), boys with late onset ($n = 37$), and girls

with late onset ($n = 38$). Due to these small sample sizes, cautious inferences were made based on possible trends. Second, regarding the issue of generalizability, the sample was drawn from a custody centre and provincial centre for youth with severe conduct problems. As a result, the findings from this study may not replicate the comorbidity rates found in other types of clinical settings. Finally, the study relied on either self-report or interviewer-assisted instruments to assess adolescents' depressive symptoms, CD symptoms, and age of onset. Past research has shown that adolescents who provide self-reports of depression (Youngstrom, Loeber & Stouthamer-Loeber, 2000) and delinquent behaviour are accurate historians at reporting age of onset when compared to parent reports (Silverthorn et al., 2001); however, there are limitations in relying on self-report data for symptom severity from adolescents and collateral reports would have added to the validity of the diagnostic information.

Future Directions and Conclusion

This study involved an adjudicated and clinically referred sample, with CD and MDE assessed by self-report scales. In terms of next steps, it will be important to explore gender differences in symptoms such as physical aggression, delinquency, and status violations. Some research has found that CD in boys is associated with high levels of physical aggression, while CD in girls is associated with other symptoms such as relational aggression, status violations, and other delinquent behaviours (Loeber et al., 2000; Zahn-Waxler, Shirtcliff & Marceau, 2008). However, the DSM as well as many measures do not incorporate symptoms such as relational aggression and therefore miss the importance of this symptom in girls. Given the relationship between conduct problems and social rejection, it may be that gender-linked symptoms, such as relational violence, are related to depression.

Research is also needed to clarify the common risk factors and outcomes for boys and girls with early and late onset CD. This study supported previous work that found up to 90% of girls with CD experienced early onset (e.g., Keenan et al., 2010); however, this is in contrast to other studies (e.g., Moffitt, 2000, Silverthorn et al., 2001) that found a very small proportion of girls to have early onset CD. Although some research has suggested that girls with late onset CD have similar risk factors to boys with early onset CD (Silverthorn & Frick, 1999), other research contends that there are no gender differences in the risk factors or expression of early and late onset CD (Moffitt et al., 2003). Odgers and colleagues (2008) also found girls with early onset CD to experience the most severe consequences in adulthood including significant mental health difficulties. However, currently the largest known mixed gender early onset CD sample consisted of six girls (e.g., Moffitt & Caspi, 2001; Odgers et al., 2008). Such small sample sizes do not allow for strong inferences to be made about the common risk factors or outcomes of this group.

Future research is also needed to understand the longitudinal relationship between CD and depressive symptoms in a CD population throughout adolescence and into young adulthood. Previous research has linked the comorbidity of CD and depression to a higher risk for psychopathology, lower academic outcomes, psychosocial impairment (Ingoldsby et al., 2006; Wolff & Ollendick, 2006), and suicide (Keenan et al., 1999; Smajkic & Clark, 2007). However, research has focused on presence or absence of comorbidity and not the possible interaction of CD and depressive symptoms. Finally, the implications of gender and early and late onset CD are not clear in these outcomes.

Findings from this study suggest that, regardless of when girls develop CD, they are at a higher risk of developing a MDE and/or higher levels of depressive symptoms.

The study is also of considerable value in that it found that developing CD in childhood appears to place boys at a higher risk for comorbid depressive symptoms. However, developing CD in childhood did not put girls at an increased risk compared to developing CD in adolescence. When assessing youth with CD, clinicians should be aware of the increased risk for developing a depressive disorder in girls and early onset boys. Clinicians should also be aware that the level of CD symptoms may be affected by the level of depressive symptoms and that the most comprehensive intervention would target both the behavioural difficulties as well as the associated underlying depressive cognitions and behaviours.

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Appendices

Appendix A.

Tables

Table 1. Descriptive Information by Location.

		Total N (%)	Forensic N (%)	Clinical N (%)
Boys (N= 106)	Early onset	90 (71.4)	28 (43.1)	62 (42.7)
	Adolescent onset	36 (28.6)	10 (15.4)	26 (17.9)
Girls (N=84)	Early onset	47 (56.0)	17 (26.2)	30 (20.7)
	Adolescent onset	37 (44.0)	10 (15.4)	27 (18.6)

Table 2. Psychometric Properties for the Major Study Variables.

	M (SD)	Min	Max	Skew (Error)	Kurtosis (Error)
Age	15.20 (1.47)	11	19	-.11 (.17)	-.23 (.33)
Depressive symptoms (n = 182)	8.87 (5.61)	0	26	.75 (.18)	-.12 (.36)
CD symptoms (n =183)	7.17 (3.92)	0	17	.41 (.18)	-.68 (.36)

Table 3. Summary of Intercorrelations, Means and Standard Deviations for Scores on the Depressive Symptoms and CD Symptoms for Boys and Girls.

	1.	2.	<i>M</i>	<i>SD</i>
1. CD symptoms		.22*	7.36	3.63
2. Depressive symptoms	.42***		7.09	4.62
<i>M</i>	6.86	11.55		
<i>SD</i>	4.36	5.90		

Note: Correlations for boys ($n = 106$) are presented below the diagonal; correlations for girls ($n = 74$) are presented above the diagonal. Means and standard deviations for continuous variables for boys are presented in the vertical columns; means and standard deviations for continuous variables for girls are presented in the horizontal rows. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4. Summary of MDE Presence, Age of Onset and Occurrence Before CD Age of Onset by Gender

		Current MDE N (%)
Boys	Early onset CD	8 (8.9%)
	Late onset CD	3 (8.3%)
Girls	Early onset CD	10 (21%)
	Late onset CD	9 (24%)

Appendix B.

Figures

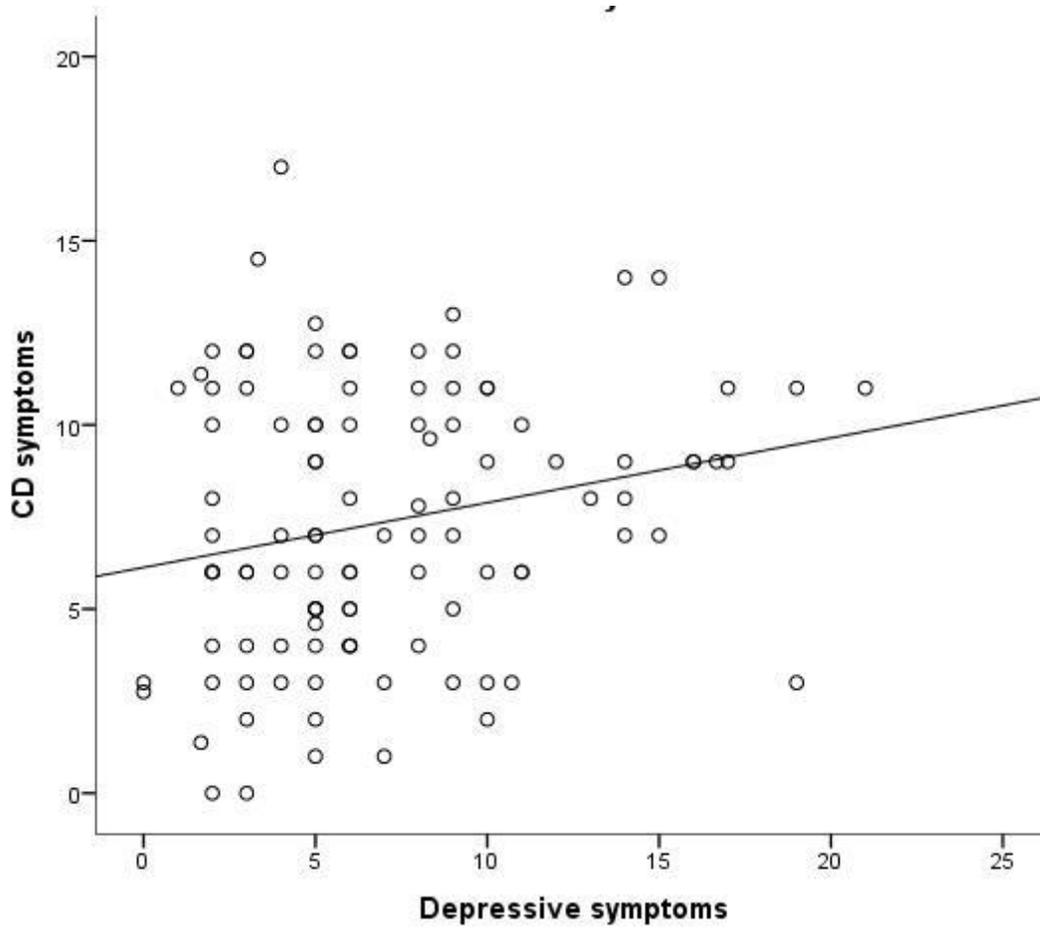


Figure 1. Correlation scatterplot with line of fit for boys.

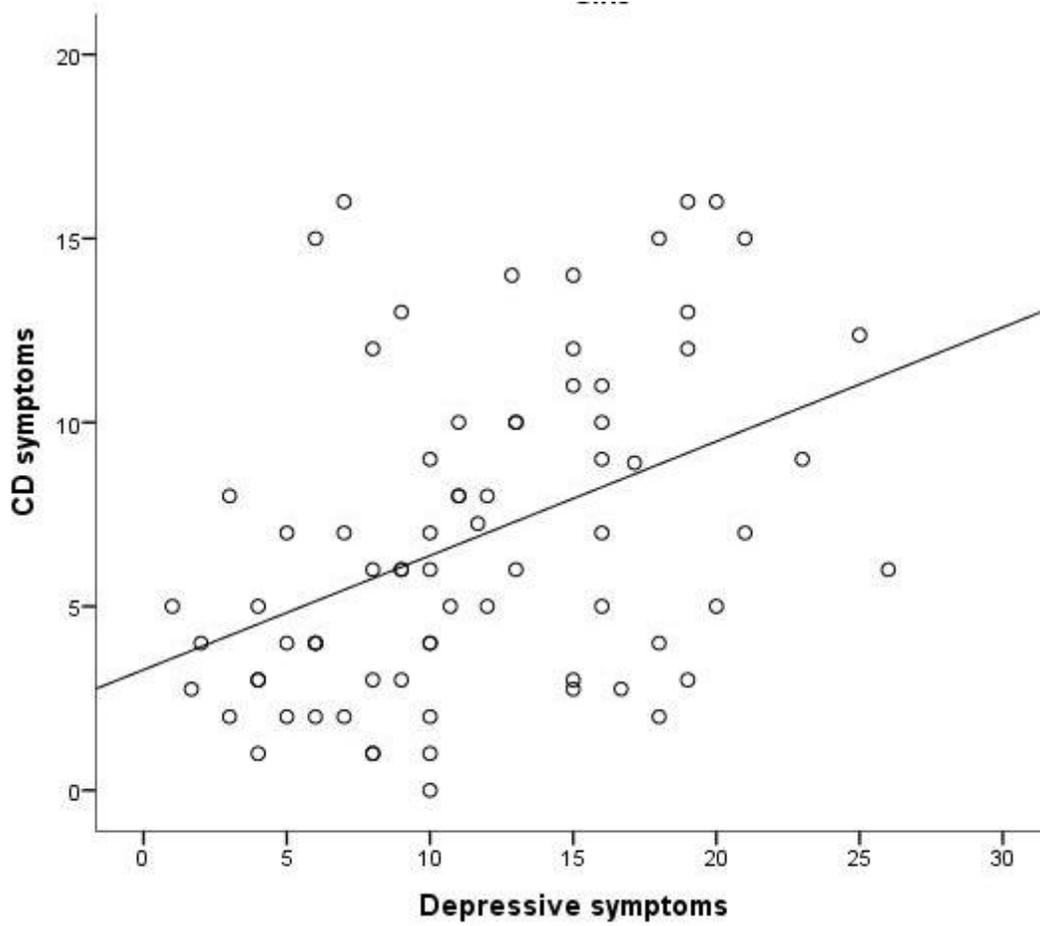


Figure 2. Correlation scatterplot with line of fit for girls.