Predicting Risky Sexual Behaviour in Adolescence and Early Adulthood: The Unique and Interactive Roles of Childhood Conduct Disorder Symptoms and Callous-Unemotional Traits

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Ethics Statement

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Abstract

The relationship between conduct problems and risky sexual behaviour has been explored previously; however, how callous-unemotional (CU) traits and the interaction between conduct disorder (CD) symptoms and CU traits contribute to risky sexual behaviour has been explored infrequently. This study aimed to investigate the role that CD symptoms, CU traits, and their interaction play in predicting several risky sexual behaviour outcomes in adolescence and early adulthood. Results showed that CD symptoms and CU traits uniquely and interactively predicted a number of risky sexual behaviours during adolescence and early adulthood. This study provides meaningful information regarding the importance of both CD symptoms and CU traits in understanding health-risk behaviours. These findings may provide a foundation for developing and implementing interventions to address these behaviours among this population.

Keywords: risky sexual behaviour; health-risk behaviours; conduct disorder symptoms; callous-unemotional traits; youth psychopathology; developmental psychopathology

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Executive Summary

The relationship between conduct problems and risky sexual behaviour has been explored previously; however, how callous-unemotional (CU) traits and the interaction between conduct disorder (CD) symptoms and CU traits contribute to risky sexual behaviour has been explored infrequently. Further, the operationalization of risky sexual behaviour has varied among studies, with only moderate consensus. To address this gap in the literature, this study focused on a high-risk and normative sample of individuals to investigate the role that CD symptoms, CU traits, and their interaction play in predicting several risky sexual behaviour outcomes in adolescence and early adulthood. Further, the potential moderating role of sex (i.e., male or female) was explored. Given previous research in this area, multiple sexual behaviours were operationalized to aptly represent the variation of risky sexual behaviour outcomes that have been identified. Regression analyses were conducted to determine the association between CD symptoms, CU traits, and their interaction with: 1) age of first sexual intercourse, 2) condom use in adolescence and early adulthood, 3) pregnancy (or causing a pregnancy) during high school, 4) lifetime contraction of sexually transmitted infections (STIs), 5) lifetime engagement in sexual solicitation, and 6) a dichotomized composite risky sexual behaviour variable. Sex, race, site, age, socioeconomic status, ADHD (combined inattentive and hyperactive/impulsive types) symptoms, and substance use were included as control variables. CU traits and CD symptoms each significantly predicted age of first sexual intercourse and condom use in adolescence and early adulthood. CU traits, but not CD symptoms, predicted experiencing or causing a pregnancy during high school. CU traits, CD symptoms, and their interaction did not predict STI contraction during adolescence and early adulthood. CD symptoms solely predicted engaging in sexual solicitation during adolescence and young adulthood. CU traits and CD symptoms did not significantly uniquely predict the risky sexual behaviour composite; however, they approached significance (ps = 0.08-0.10). The CU trait by CD symptoms interaction significantly predicted the risky sexual behaviour composite. Among those with low CU traits, CD symptoms did not significantly predict the risky sexual behaviour composite.

Among those with high CU traits, CD symptoms did not significantly predict the risky sexual behaviour composite, but approached significance ($p = 0.07$). Exploratory analyses were also conducted to investigate the potential moderating role of sex. Race, site, age, socioeconomic status, ADHD (combined inattentive and hyperactive/impulsive types) symptoms, and substance use were included as control variables. CD symptoms and CU traits differentially predicted age of first sexual intercourse, such that CD symptoms and CU traits significantly predicted age of first sexual intercourse for males, but not for females. CD symptoms and CU traits interacted to predict condom use, such that males with both elevated CD symptoms and CU traits were more likely to engage in infrequent condom use than males with elevated CD symptoms and low CU traits. However, among females, only CD symptoms significantly predicted condom use. CU traits significantly predicted (causing) pregnancy among males, but did not significantly predict (experiencing) pregnancy among females. CU traits, CD symptoms, and their interaction did not predict contracting an STI during adolescence or young adulthood. CD symptoms predicted engaging in sexual solicitation among both males and females. Finally, CD symptoms and CU traits did not predict the risky sexual behaviour composite for either males or females. The current study provides meaningful information regarding the importance of both CD symptoms and CU traits in understanding risky sexual behaviour. These findings may provide a foundation for developing and implementing interventions to address these behaviours among this population.

Chapter 1.

Introduction

1.1. Introduction to Conduct Disorder and Risky Sexual Behaviour

Conduct disorder (CD) is a serious and pervasive problem, involving a repetitive and persistent pattern of behaviour in which the basic rights of others or major age-appropriate societal norms or rules are violated (American Psychiatric Association [APA], 2013). This disorder is manifested by symptoms that fall under four main umbrellas: aggression to people and animals, destructions of property, deceitfulness or theft, and serious violations of rules. CD is frequently diagnosed in children referred to mental health facilities. Additionally, CD is one of the most common disorders among all forms of childhood psychopathology, as evidenced by a 1-year population prevalence rate that ranges from 2-10% (APA, 2013). Previous research has shown this prevalence range to be stable across cultures and ethnicities (Canino, Polanczyk, Bauermeister, Rohde, & Frick, 2010).

Diagnosable CD is highly prevalent; however, not all individuals who display symptoms of CD meet full diagnostic criteria. A significant number of children display symptoms of CD such as fire-setting, destruction of property, and school truancy, but do not meet full diagnostic criteria for the disorder. These constellations of CD symptoms are referred to as sub-clinical CD or conduct problems. Conduct problems pose a serious risk to social and economic resources; children with serious conduct problems cost society ten times more than typically-developing counterparts by early adulthood (Scott, Knapp, Henderson, & Maughan, 2001). Further, childhood conduct problems are related

to a host of negative outcomes in adolescence and adulthood. Some of the most detrimental, serious, and frequently studied outcomes are antisocial behaviour, substance use, and risky sexual behaviour (Kimonis, Frick, & McMahon, 2014).

Of this risk triad of behaviours, risky sexual behaviour poses a particularly salient opportunity for detrimental health and social outcomes. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013) lists early onset of sexual behavior, unplanned pregnancy, and contraction of sexually transmitted infections (STIs) as common consequences of CD. Considerable research has found a significant relationship between conduct problems and risky sexual behaviour (Conduct Problems Prevention Research Group [CPPRG], 2014; Fergusson & Woodward, 2000; Paul, Fitzjohn, Herbison, & Dickson, 2000; Ramrakha, Caspi, Dickson, Moffit, & Paul, 2000; Ramrakha et al., 2007; Schofield, Bierman, Heinrichs, Nix, & CPPRG, 2008; Wu, Witkiewitz, McMahon, Dodge, & CPPRG, 2010). This relationship may exist on account of the fundamental disregard for, and violation of, rights of others and socially- and developmentally-appropriate norms that encompasses CD. However, this relationship is not well understood, and research has also explored the temporal positions of both antisocial behavior and substance use to further understand their contribution to risky sexual behaviour (CPPRG, 2014; Schofield et al., 2008; Wu et al., 2010). To further understand the heterogeneity among individuals with CD and to understand the relationship between CD symptoms and risky sexual behaviour, researchers have recently turned to exploring the contribution of callous-unemotional traits (Wymbs et al., 2013).

1.2. Introduction to Callous-Unemotional Traits and Risky Sexual Behaviour

Attempts to subgroup children with conduct problems have identified a particular group that displays a distinct affective and interpersonal style (Frick & Ellis, 1999). These features, such as lack of empathy, lack of guilt, and callous use of others for own gain, are referred to as callous-unemotional (CU) traits in children and youth (for a

review, see Frick, Ray, Thornton, & Kahn, 2014). A specifier "with limited prosocial emotions" was added to the DSM-5 (APA, 2013), as urged by many researchers in the area (e.g., Frick & Moffit, 2010). This specifier maps onto the construct of CU traits. In order to meet criteria for this specifier when diagnosed with CD, an individual must display at least two of the following: lack of remorse or guilt, a callous lack of empathy, a lack of concern with performance, or shallow or deficient affect.

Youth who display elevated CD symptoms and high scores on the dimension of CU traits are more likely to have police contact, engage in patterns of violence that are more severe and violent, and have higher rates of delinquency (Christian, Frick, Hill, Tyler, & Frazer, 1997; Kruh, Frick, & Clements, 2005; McMahon, Witkiewitz, Kotler, & CPPRG, 2010). CU traits have been shown to persist through childhood and adolescence. Research findings over the past decade have indicated that the youth psychopathy construct is stable across multiple-year intervals (e.g., Frick, Cornell, Barry, Bodin, & Dane, 2003a; Lynam et al., 2009). Lynam, Caspi, Moffitt, Loeber, and Stouthamer-Loeber (2007) conducted a follow-up assessment of psychopathy in a subsample of boys from the Pittsburgh Youth Study (n = 271) at the age of 24 using the Psychopathy Checklist: Screening Version (PCL:SV; Hart, Cox, & Hare, 1995). After controlling for demographics, parenting, delinquency, initial risk, and initial level of psychopathy, the construct of psychopathy was moderately stable (r = .31) from early adolescence to early adulthood. Additional studies have found evidence to support the stability of the CU traits construct from childhood to adolescence to adulthood (Loney, Taylor, Butler, & Iaconi, 2007; Obradovic, Pardini, Long, & Loeber, 2007).

Little research has investigated the relationship between CU traits and risky sexual behaviour in adolescence and early adulthood (Caputo, Frick, & Brodsky, 1999; Lawing, Frick, & Cruise, 2010; White, Cruise, & Frick, 2009). Further, most of the studies conducted have been confined to samples of juvenile offenders and have not concurrently explored CD symptoms or diagnosis. Given this, the generalizability of these studies to understanding the contribution of CD symptoms and CU traits to risky sexual behavior in community samples is weak.

The relationship between CU traits and risky sexual behaviour warrants further investigation for a number of reasons. First, individuals with CU traits are known to disregard the feelings of others (Blair, 1997). As appropriate sexual activity involves regarding the wishes of others, it may be that those with elevated CU traits are more likely to engage in certain forms of risky sexual behaviour (e.g., males causing pregnancies). Further, those with elevated CU traits have been found to be more fearless (Pardini, 2006) and sensation seeking (Essau, Sagagawa, & Frick, 2006) than their low CU trait counterparts. Previous research has found fearlessness and sensation seeking to be related to risky sexual behaviour (Fulton, Marcus, & Payne, 2010; Hoyle, Fejfar, & Miller, 2000). Moreover, children with elevated CU traits prefer novel, exciting, and dangerous activities compared to those with conduct problems and controls (Frick et al., 2003b), are less sensitive to punishment cues than clinic-referred children without elevated CU traits (Barry et al., 2000), and expect more positive rewards from aggression than those with conduct problems and controls (Pardini, Lochman, & Frick, 2003). Due to this, elevated levels on the CU trait construct may pose a greater risk for engaging in risky sexual behaviour than CD symptoms alone.

While previous research has demonstrated a link between childhood conduct problems and later risky sexual behaviour, only one study has examined the relationship between CD symptoms, CU traits, and risky sexual behaviour in a non-forensic sample. Wymbs and colleagues (2013) investigated the unique and synergistic qualities of CD symptoms and CU traits, measured at grade six, for predicting engaging in sexual intercourse by age 13 (i.e., vaginal, anal, or oral intercourse) as well as having unprotected sex (i.e., as operationalized by use of birth control) and experiencing or causing a pregnancy by 12th grade. The authors found that CD symptoms and CU traits interacted such that those with elevated CD symptoms *and* CU traits were more likely to have sexual intercourse by age 13 than those with elevated CD symptoms and low levels of CU traits. Neither CU traits nor CD symptoms alone predicted use of birth control at grade 12. Finally, CD symptoms, but not CU traits, significantly predicted experiencing or causing a pregnancy by grade 12, with individuals with elevated CD symptoms being

more likely to experience (if female) or cause (if male) a pregnancy. This was the first study to show that CD symptoms and CU traits interact to predict early initiation in sexual activity during adolescence. Further, this study provided additional evidence pertaining to the significant predictive value of CD symptoms on experiencing or causing pregnancy.

1.3. Risky Sexual Behaviour in Adolescence and Early Adulthood

Developmentally-appropriate sexual behaviour is not always safe; there exists a spectrum of sexual behaviour from extremely safe (or abstinent) to extremely unsafe. Activities at the latter end of the spectrum that deviate from developmental norms and put the individual at increased likelihood of harm are considered to be risky. Risky sexual behaviour is typically operationalized by a myriad of sexual activities such as early age of first engagement in sexual intercourse (Capaldi, Crosby, & Stoolmiller, 1996), infrequent use of condoms (Sonenstein, Ku, Lindberg, Turner, & Pleck, 1998), lifetime contraction of sexually transmitted infections (STIs; The Henry J. Kaiser Family Foundation, 2002), and receiving money for sexual services (Wilson & Widom, 2008; for a review of risky sexual behaviours, see Repetti, Taylor, & Seeman, 2002). Further, adolescent pregnancy (or causing a pregnancy, if male) is a commonly used marker of risky sexual behaviour (e.g., CPPRG, 2014; Wymbs et al., 2013).

1.3.1. Age of first sexual intercourse.

Engaging in sexual intercourse before adulthood is a common behaviour. However, having sexual intercourse in early adolescence is relatively uncommon and is related to later aggression, delinquency, substance use, and suicidal ideation (Albert, Brown, & Flanigan, 2003; Epstein & Spirito, 2010; Williams, Connolly, & Cribbie, 2008).

The data utilized for the present study were collected from 1997 – 2007. According to data collected between 1994 and 2009 for the National Longitudinal Study

of Adolescent to Adult Health and utilized in a study by Harden (2012), 23.3% of adolescents engaged in sexual intercourse for the first time before age 15 (“early”), 60.3% between age 15 to 19 (“on time”), and 16.4% after age 19 (“late”). Based on data collected by the Centers for Disease Control and Prevention (CDC) in 2002 (Mosher, Chandra, & Jones, 2005), approximately 25% of adolescents engaged in sexual intercourse by age 15. This number increased with age, with 37% engaging in sexual intercourse by age 16, 46% by age 17, 62% by age 18, 69% by age 19, and 85% by age 20/21.

The relationship between CD and early engagement in sexual intercourse has been frequently investigated. The DSM-5 itself outlines early onset of sexual behaviour as a common consequence of CD (APA, 2013). Youth with elevated CD symptoms are at increased risk for having sexual intercourse by age 16 (Monuteaux, Faraone, Gross, & Biederman, 2007; Paul, Fitzjohn, Herbison, & Dickson, 2000). Bardone, Moffitt, Caspi, Dickson, and Silva (1996) and Bardone et al. (1998) found that CD measured at age 15 was significantly positively related to the likelihood of initiating sexual intercourse before age 16. Similarly, Monteaux et al. and Paul et al. demonstrated that CD is a risk factor for sexual intercourse by age 16. Research conducted with a sample of females with CD showed a significant relationship between CD and engagement in sexual intercourse by age 17 (Pajer, Kazmi, Gardner, & Wang, 2007).

Ramrakha et al. (2007) found that antisocial behaviour between the ages of 5 and 11, such as fighting, bullying, and destructiveness, was associated with increased odds of early engagement in sexual intercourse. Specifically, they demonstrated that high levels of antisocial behaviour between the ages of 5 and 11 were associated with 2.17 greater odds of early engagement in sexual intercourse. Capaldi, Crosby, and Stoolmiller (1996) found that childhood antisocial behaviour significantly predicted age of first sexual intercourse in males, with those with higher antisocial behaviour being more likely to engage in sexual intercourse at a younger age.

CPPRG (2014) investigated the relationship between aggressive-disruptive behaviour (as measured by the externalizing scale of the Teacher's Report Form of the Child Behavior Checklist [CBCL]; Achenbach, 1991), substance use, and risky sexual behaviour. This study, employing a similar sample to the current study (i.e., the Fast Track study high-risk control and intervention groups, as well as normative group), found that aggressive-disruptive symptoms, measured in kindergarten, were highly significantly related with early engagement in sexual intercourse. Further, Schofield et al. (2008) investigated the relationship between aggressive-disruptive behaviour in kindergarten and grade 1, delinquency in grade 7, and sexual activity from grades 7 to 11. This study also employed the same sample as the current study and found that early aggressive-disruptive behaviour significantly predicted adolescent sexual activity (as measured by a construct that combined age of first sexual intercourse and years reported being sexually active), but was mediated by early adolescent school adjustment and substance use.

Little research has investigated the relationship between CU traits and age of first sexual intercourse. Given the evidence to suggest that youth with elevated CU traits are more likely to engage in sensation seeking and fearless behaviours (Essau, Sagagawa, & Frick, 2006; Pardini, 2006), these youth may be more likely to act on desires to have sex earlier than their low CU counterparts. As noted above, Wymbs and colleagues (2013) found that CD symptoms and CU traits interacted to predict engaging in sexual intercourse by age 13, such that those with elevated CD symptoms *and* CU traits were more likely to engage in sexual intercourse by age 13 than those with elevated CD symptoms and low levels of CU traits. In other words, those with elevated CD symptoms who did not feel guilty for wrongdoing or were not concerned about the feelings of others were especially likely to have sex by age 13.

1.3.2. Condom use.

Condom use is a useful marker for understanding and measuring the practice of safe sex. Data collected in 2006 by the CDC (2011) through the Survey of Family Growth indicates that for youth aged 15-19, when asked what percentage of the time they

used a condom during sexual intercourse in the 4 weeks prior to the interview, 42.8% indicated that it was used 0% of the time, 15.7% indicated that it was used some of the time, and 41.4% indicated it was used 100% of the time. Shaffi, Stovel, and Holmes (2005) found that 62% of adolescents reported condom use at first sexual intercourse, and that condom use at that point was associated with condom use throughout adolescence. Further, condom use is associated with lowered prevalence of STIs, such as gonorrhea and chlamydia (Shaffi et al., 2005).

Ramrakha et al. (2007) found that antisocial behaviour between the ages of 5 and 11, such as fighting, bullying, and destructiveness, was associated with 1.88 greater odds of engaging in risky sex (defined as "never or only sometimes" using a condom and having sexual intercourse with three or more different partners in the last year). Wu et al. (2010) explored the relationship between childhood conduct problems (as measured by the externalizing scale of the CBCL from kindergarten to grade 5; Achenbach, 1991), adolescent conduct problems (as measured by the Self-Reported Delinquency [SRD] questionnaire from grade 7 to 12; Huizinga & Elliott, 1986), substance use, and risky sexual behaviour in a subset of the sample used for the current study (i.e., high-risk control group only). They found that childhood conduct problems significantly predicted adolescent conduct problems and substance use. Individuals who displayed elevated conduct problems and substance use in adolescence were twice as likely to not use condoms during sex throughout high school than those with low or normative scores on either adolescent conduct problems or substance use. The relationship between condom use and CU traits has not been examined.

1.3.3. Adolescent pregnancy.

Adolescent pregnancy is also an important marker of risky sexual behaviour. Rates of adolescent pregnancy peaked in the United States in 1990, but this is still a widespread social and economic issue resulting in higher risk for economic adversity and poor school performance (Perper, Peterson, & Manlove, 2010). Teenage pregnancy is significantly related to depression in mothers (Hodgkinson, Colantuoni, Roberts, Berg-

Cross, & Belcher, 2010). Moreover, significantly more teen fathers suffer from anxiety and depression than do older fathers (Quinlivan & Condon, 2005). A pregnancy during adolescence bears the risk of disrupting the potential for educational attainment and thus potential for related socioeconomic security and improved occupations (Frisco, 2008; Schvaneveldt, Miller, Berry, & Lee, 2001). In 2000, the pregnancy rate for females under age 15 in the US was 2.1/1000 (0.02%; Ventura, Abma, Mosher, & Henshaw, 2004). Rates for those aged 15-17 were 53.5/1000 (0.54%) and 129.9/1000 (1.3%) for those aged 18-19 (Ventura et al., 2004).

Research supports the link between CD and teenage pregnancy. According to the DSM-5, unplanned pregnancy is a common consequence of CD (APA, 2013). In a study employing a sample similar to the current study, CPPRG (2014) found that aggressive-disruptive symptoms, measured in kindergarten, were highly significantly positively related with adolescent pregnancy. Woodward and Fergusson (1999) reported that conduct problems measured at age 8 were significantly related to risk of teen pregnancy among females by age 18, with those with the most severe childhood conduct problems being most at risk for later teen pregnancy (i.e., those in the top 10% for conduct problems were 5.3 times more likely to become pregnant than those in the lowest 50% for conduct problems). In a later study, Fergusson and Woodward (2000) also found that childhood conduct problems measured at age 13 were predictive of female pregnancy by age 18, with those with more severe conduct problems being more at risk for teen pregnancy. Further research has shown that CD among girls increases risk of pregnancy by age 17 (Pajer et al., 2007). Kovacs, Krol, and Voti (1994) found that early-onset CD (i.e., before age 12) in girls was strongly related to experiencing a pregnancy during adolescence, with those with early-onset CD at higher risk for pregnancy at a younger age than those with late-onset CD or the absence of CD.

Little research has explored the relationship between CU traits and teenage pregnancy. Wymbs et al. (2013) found that CU traits did not significantly predict experiencing or causing a pregnancy by grade 12.

1.3.4. Lifetime history of STI(s).

Contraction of STIs is frequently used as a marker of risky sexual behaviour. According to data collected by the CDC (2001) in 2000, rates of primary and secondary syphilis in the United States at the time were 0.1/100,000 (0.0001%), 2.3/100,000 (0.0023%), and 4.9/100,000 (0.0049%), for those aged 10-14, 15-19, and 20-24, respectively. Rates of chlamydia for those aged 10-14, 15-19, and 20-24 were 73.9/100,000 (0.0739%), 1348.5/100,000 (1.3485%), and 1381.7/100,000 (1.3817%), respectively. For gonorrhea, rates were 30.3/100,000 (0.0303%), 516.3/100,000 (0.5163%), and 622.5/100,000 (0.6225%) for those between the ages of 10-14, 15-19, and 20-24, respectively.

Bardone et al. (1996, 1998) found that CD at age 15 was associated with a greater prevalence of STIs at age 21 than for typically-developing adolescents, those with an anxiety disorder, and those with a depressive disorder. The DSM-5 (APA, 2013) states that contracting an STI is a common negative outcome associated with CD. Previous research by CPPRG (2014) found that aggressive-disruptive behaviours were associated with a greater risk of contracting an STI. Wu et al. (2010) found that individuals with elevated conduct problems and substance use in adolescence were four times as likely to contract an STI during high school than those with low or normative scores on either adolescent conduct problems or substance use. The relationship between lifetime history of STI contraction and CU traits has not been examined.

1.3.5. Sexual solicitation.

A strong marker of risky sexual behaviour is receiving money for sexual services; however, base rates are extremely low (Repetti, Taylor, & Seeman, 2002; Wilson & Widom, 2008). Wu et al. (2010) found that individuals with elevated conduct problems and substance use in adolescence were five times more likely to receive money for sexual services during high school than those with low or normative scores on either adolescent

conduct problems or substance use. The relationship between lifetime history of STI contraction and CU traits has not been examined.

1.4. Sex Differences in Risky Sexual Behaviour

Limited research investigating risky sexual behaviour, CD symptoms, and/or CU traits has concurrently investigated sex differences (i.e., male versus female). However, some researchers have investigated the moderating properties of sex and have not found that it significantly differentiates the sample. For example, Wymbs et al. (2013) did not find that sex moderated the relationship between CD symptoms, CU traits, and early sexual activity, pregnancy, or birth control use. However, other research has demonstrated that antisocial childhood behaviour is related to sex-specific risky sexual outcomes in adolescence (Ramrakha et al., 2007). In particular, antisocial behaviour is associated with higher rates of sexual activity among males (Moffit, 1993; Ramrakha et al., 2007), and multiple sexual partners and higher rates of teen pregnancy among females (Ramrakha et al., 2007; Woodward & Fergusson, 1999).

1.5. Purpose of the Current Study

Given the lack of previous research in this area, this study aimed to investigate whether CD symptoms, CU traits, or their interaction predict various forms of risky sexual behaviour in adolescence and early adulthood. Further, this study aimed to explore the potential moderation of sex (i.e., male versus female). Given that attention-deficit hyperactivity disorder (ADHD) and substance use are commonly comorbid with conduct problems (Kimonis et al., 2014), they were included as control variables. Specifically, ADHD symptoms for both the inattentive and hyperactive/impulsive subtypes were summed to create an ADHD-combined score. Age, race, socioeconomic status (SES), and site of data collection were also included as control variables.

The current study aimed to extend research conducted by Wymbs et al. (2013) examining the relationship between risky sexual behavior, CD symptoms, and CU traits. However, the current study differs from the Wymbs et al. study in a number of important ways. The current study employed a more diverse socioeconomic sampling of participants, as well as a larger sample size. Further, Wymbs et al. collected risky sexual behaviour data at a single time point (i.e., grade 12), and did not investigate how CD symptoms and CU traits may contribute to risky sexual behavior longitudinally throughout adolescence. Moreover, Wymbs et al. operationalized unprotected sex as birth control use ("How often do you use birth control?" from 0 – never to 2 – always) and sexual intercourse as vaginal, anal, or oral sex. The current study more accurately measured unprotected sex by using data collected regarding frequency of condom use and sexual intercourse as vaginal sex only. Further, risky sexual behaviour outcome variables regarding contraction of STIs and engagement in sexual solicitation were also included in the current study.

Similarly to Wu et al. (2010), a composite variable of risky sexual behaviour was created for the current study to evaluate the predictive value of CD symptoms and CU traits (as well as the interaction of CD symptoms and CU traits) on overall risky sexual behaviour. As aforementioned, Wu et al. explored the relationship between conduct problems, substance use, and risky sexual behaviour in a subset of the sample used for the current study (i.e., Fast-Track high-risk control group only). They found that conduct problems in childhood predicted a greater likelihood of adolescent conduct problems and substance use, which further predicted risky adolescent sexual behaviour (operationalized as a dichotomous variable that was scored as risky if the individual engaged in sexual intercourse early, used condoms infrequently, or contracted an STI during grades 7 to 12). In the current study, each of the five risky sexual behaviour variables were dichotomized to contribute to the dichotomous risky sexual behaviour composite variable in the same way as Wu et al. (i.e., presence of any of the five risky sexual behaviour variables was scored as a 1/yes on the composite; absence of all of the five risky sexual behaviour variables was scored as a 0/no on the composite). The current study examined

the relationship between CD symptoms, CU traits, their interaction, and this risky sexual behaviour composite.

The primary research question of the current study is whether risky sexual behaviour in adolescence and early adulthood is predicted by CD symptoms, CU traits, and/or the interaction of CD symptoms and CU traits, after controlling for age, site, race, SES, ADHD–Combined symptoms, and early substance use. A secondary research question is whether sex (i.e., male versus female) moderates the relationships between CD symptoms and/or CU traits and risky sexual behaviour.

Given that the research base in this area is limited, no specific hypotheses were made. The unique effects of CD symptoms and CU traits and the interactive effect of CD symptoms and CU traits in accounting for significant variance in the prediction of each risky sexual behaviour (i.e., early engagement in sexual intercourse, infrequent condom use, experiencing or causing a pregnancy, contracting an STI, and engaging in sexual solicitation) were examined. Separate exploratory analyses were conducted by sex for each of the five risky sexual behaviours as well as the risky sexual behaviour composite.

Chapter 2.

Method

2.1. Participants

Participants came from the control schools of a longitudinal multisite investigation of the development and prevention of childhood conduct problems, the Fast Track project (CPPRG, 1992, 2000). Schools within four sites (Durham, NC; Nashville, TN; Seattle, WA; and rural Pennsylvania) were identified as high risk based on crime and poverty statistics of the neighborhoods that they served. Within each site, schools were divided into sets matched for demographics (i.e., size, percentage free or reduced lunch, ethnic composition), and the sets were randomly assigned to control and intervention groups. Using a multiple-gating screening procedure that combined teacher and parent ratings of disruptive behaviour, 9,594 kindergarteners across three cohorts (1991–93) from 55 schools were screened initially for classroom conduct problems by teachers, using the Teacher Observation of Child Adjustment-Revised (TOCA-R) Authority Acceptance score (Werthamer-Larsson, Kellam, & Wheeler, 1991). Those children scoring in the top 40% within cohort and site were then solicited for the next stage of screening for home behaviour problems by the parents, using items from the CBCL (Achenbach, 1991) and similar scales, and 91% agreed (n = 3,274). The teacher and parent screening scores were then standardized and summed to yield a total severity-of-risk screen score. Children were selected for inclusion into the high-risk sample based on this screening score, moving from the highest score downward until desired sample sizes were reached within sites, cohorts, and groups. Deviations were made when a child failed to matriculate in the first grade at a core school (n = 59) or refused to participate (n = 75), or to accommodate a rule that no child would be the only girl in an intervention group. The outcome was that 891 children (control = 446 and intervention = 445) participated. In addition to the high-risk sample of 891 children, a stratified normative sample of 387 children was identified to represent the population normative range of risk scores and was

followed over time. From among the control schools (n = 27), normative, within-site stratified samples of about 10 children each (within each decile of behaviour problems) were randomly selected based on teachers' completed ratings of child disruptive behaviour.

The current study utilized data from the high-risk control group (65% male; 49% African American, 48% Anglo American, 3% other race) and normative sample (51% male; 43% African American, 52% Anglo American, 5% other race). Because 79 of those recruited for the high-risk control group were also included as part of the normative sample, the sample included 754 participants. Participants from the high-risk intervention sample were not included in this study. Among the sample of 754 participants, 70 participants were missing data on all risky sexual behavior measures, reducing the study sample to 684. Further, one participant did not have a necessary weighting variable, so that participant was excluded. The 71 attrited participants did not differ on any demographic or predictor variables relative to the 683 participants included in analyses. Of the 683, 27.1% (n = 185) came from the Durham site, 22.4% (n = 153) came from the Nashville site, 26.6% (n = 182) came from the rural Pennsylvania site, and 23.9% (n = 163) came from the Seattle site. Overall, 41.7% (n = 285) were female. Of the entire sample, 47.4% were African American (n = 324), 49.3% were Anglo American (n = 337), and 3.2% were Hispanic, Asian, Native American, or "other" (n = 22).

Probability weights were constructed to compensate for the over-representation of higher-risk children, relative to the population of children screened, when the high-risk control and normative samples are combined. These weights were calculated based on the distributions of within-site stratification of the TOCA-R (Werthamer-Larsson, Kellam, & Wheeler, 1991; teacher report) and the distribution of T-scores of behaviour problems on the CBCL (Achenbach, 1991; parent report). When used, these probability weights correct for the disproportionate number of high-risk control youth presented when the high-risk control and normative samples are combined, such that the weighted sample approximates a normative distribution, within the population sampled, across the

screening variables. Weighting was used in all analyses to account for the oversampling of high-risk children.

2.2. Procedure

All procedures followed American Psychological Association guidelines for the ethical conduct of research and were approved by the institutional review boards at each of the four sites. Each summer, two research interviewers visited each home; one interviewed the primary caregiver and the other interviewed the youth. The interviewer read all questionnaires and recorded the caregiver's response. Computer-assisted interviews were conducted with the youth, who wore headphones and listened to items being read to them on a laptop computer, answering directly. Parents and youth were compensated financially for their participation. Data collection staff were naïve concerning the normative or high-risk control status of the families and youth they interviewed. Data were processed at a central data center that served all four sites.

2.3. Measures

The data was gathered by interview, self-report, and parent-report measures. Table 1 presents the timeline of measures utilized in the current study.

2.3.1. Family Information Form

The Family Information Form (FIF; CPPRG, 1990) was given to parents during the summer interview after each grade year. The FIF was mainly used to derive demographic information, information concerning family structure, and SES. From this measure, the *Socioeconomic Status Continuous Code* was created, whose scoring was based on a formula derived by Hollingshead (1975). The score was "calculated by multiplying the scale value for an occupation by a weight of five and the scale value for education by a

weight of three" (Hollingshead, 1975). These scores were then summed. If both parents worked, the score of both parents was summed and then the total score was divided by two.

The FIF was further used to gather information regarding the participating child's race (African American, Anglo American, Hispanic, Asian, Native American, or other) and sex. For the purposes of this study, due to low base rates in the categories of Hispanic, Asian, Native American, and other, participants were assigned into either the African American group (1) or the not African American group (0).

2.3.2. Antisocial Process Screening Device

The parent-report version of the Antisocial Process Screening Device (APSD; Frick & Hare, 2001) was administered in the summer after 7th grade. The APSD is a 20-item questionnaire that assesses antisocial processes in youth aged 6 to 13. The APSD includes three subscales: impulsivity (5 items), narcissism (7 items), and CU traits (6 items). The scoring of all items is based on a 3-point scale: "0" (not at all true), "1" (somewhat/sometimes true), or "2" (definitely true). For the purposes of this study, only scores on the CU traits subscale were used. Individuals' scores may range from 0 to a maximum of 12 on the CU traits subscale of the APSD.

There is substantial support for the construct validity (Frick et al., 2003a), concurrent validity (r = 0.40 with the Psychopathy Checklist: Youth Version; Lee, Vincent, Hart, & Corrado, 2003), and predictive validity (of future antisocial behaviour; r = 0.50-0.54; Muñoz & Frick, 2007) of the APSD, in general. Further, the APSD has been shown to have adequate test-retest reliability (Christian et al., 1997). Research has also demonstrated the CU traits subscale of the APSD to have moderate internal consistency (Poythress, Dembo, Wareham, & Greenbaum, 2006) and high predictive validity (McMahon et al., 2010). The APSD showed acceptable internal reliability in this sample (α = 0.66).

2.3.3. Diagnostic Interview Schedule for Children – Version IV

CD criterion counts were measured using the parent-report Diagnostic Interview Schedule for Children–Version IV (DISC-IV; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). The DISC-IV, a highly-structured, laptop computer administered clinical interview, is appropriate for use in regards to children aged 6-17. The parent-interview DISC-IV has well-established psychometrics, including good test–retest agreement (κ = .66) and concurrent validity (κ = .70) for parent-reported CD (Schwab-Stone et al., 1996). The parent-report DISC-IV showed acceptable internal reliability in this sample, α = 0.61. This interview was administered in the summer following grade 6. Further, ADHD criterion counts were measured using the DISC-IV. This measure collected information regarding ADHD-Inattentive (ADHD–I) subtype criterion counts, ADHD-Hyperactive/Impulsive (ADHD–H) subtype criterion counts, and ADHD-Combined (ADHD–C) criterion counts (i.e., the addition of criterion counts for ADHD–I and ADHD–H). This study utilized the ADHD–C scores. CD scores are based on 15 criteria derived from 23 symptom items. ADHD–C scores are based on 18 criteria derived from 21 symptoms items.

2.3.4. Tobacco, Alcohol, and Drugs Survey

The Tobacco, Alcohol, and Drugs (TAD) survey was administered during the summer after grade 7. This 57-item instrument is based on measures used in the National Longitudinal Study of Adolescent to Adult Health (Resnick et al., 1997), and assesses tobacco, alcohol and illegal drug use. Reports of use of legal and illegal drugs prompts further questions about frequency of use and type of substances used. The response options vary based on the type of question asked (e.g., yes-no and open-ended responses). Schofield et al. (2008) examined three binary TAD items: (a) tobacco use in the past year (0 = no, 1 = yes), (b) consuming alcohol in the past year (beer, wine, wine coolers or liquor; 0 = no, 1 = yes), and (c) illegal drug use in the past year (marijuana, cocaine, crack, inhalants, heroin, LSD, PCP, ecstasy, mushrooms, speed, or pills not prescribed by a physician; 0 = no, 1 = yes). Three similar binary TAD items were examined in this

study: (a) lifetime tobacco use (0 = no, 1 = yes), (b) consuming alcohol in the past year (beer, wine, wine coolers or liquor; 0 = no, 1 = yes), and (c) lifetime illegal drug use (marijuana, cocaine, crack, heroin, LSD, PCP, ecstasy, mushrooms, speed, or pills not prescribed by a physician; excluding inhalants; 0 = no, 1 = yes)[1]. These binary TAD scores were combined to give a score of 0 – 3.

2.3.5. Romantic Relationships Questionnaire

The Romantic Relationships questionnaire, administered to participants each summer after grades 7 to 11, is a 41-item instrument based on measures used in the National Longitudinal Study of Adolescent to Adult Health (Child Health and Illness Profile – Adolescent Edition; Starfield et al., 1994). This questionnaire gathered information regarding age of first sexual intercourse ("When I say sexual intercourse, I mean when a male inserts his penis into a female's vagina"), condom use, and contraction of STIs.

2.3.6. Sexuality and Consequences Questionnaire

During the summer after grade 12 and the 2 years following, participants were administered the Sexuality and Consequences questionnaire (based on questions from Wave II of the National Longitudinal Study of Adolescent to Adult Health; Resnick et al., 1997). This questionnaire gathered information regarding condom use in the last year, having been pregnant or having impregnated in the last year, and contraction of STIs.

2.3.7. Pregnancy Questionnaire

The Pregnancy questionnaire, based on measures used in the National Longitudinal Study of Adolescent to Adult Health (Resnick et al., 1997), was used to gain information regarding whether an individual had been pregnant or impregnated someone

[1] Due to an error during data collection, it is not possible to determine annual tobacco or illegal drug use. Therefore, lifetime tobacco and drug use were used instead.

(for females and males, respectively) during grades 7 to 11.

2.3.8. Self-Reported Delinquency Questionnaire

The Self-Reported Delinquency questionnaire (Huizinga & Elliot, 1986) collected information regarding whether the individual had ever received money for sexual services. This information was collected annually from grade 7 to 2-years post-high school.

2.3.9. Operationalization of Risky Sexual Behaviour Variables

Age of first sexual intercourse. Previous researchers using Fast Track data (i.e., CPPRG, 2014) coded "very early initiation" of sexual intercourse as age 14 (grade 8) and under, "early initiation" as between ages 15-17 (grades 9-11), and "later initiation" as all other youth (i.e., later age of first sexual intercourse or non-initiators; grade 12 and later). Further, Schofield et al. (2008) used a similar approach to coding age of first sexual intercourse, with "very early initiation" operationalized as age 14 and under for girls and age 13 and under for boys, "early initiation" operationalized as age 15-16 for girls and age 14-16 for boys, and "normative initiation" operationalized as age 17 or older for boys and girls. In the current study, first engagement in sexual intercourse was operationalized on the basis of previous research (i.e., CPPRG, 2014; Schofield et al., 2008), as well as data collected regarding frequencies of engagement in sexual intercourse throughout adolescence (e.g., Harden, 2012; Mosher, Chandra, & Jones, 2005). Similarly to CPPRG, first engagement in sexual intercourse at age 14 or before was coded as 2 in the present study. First engagement in sexual intercourse between ages 15-16 was coded as 1 in the present study. Similarly to Schofield et al., later initiation (i.e., at age 17 or older) or non-initiation in sexual intercourse was coded as 0 in the present study.

Condom use. In the Romantic Relationships questionnaire, condom use was measured by the following question: "Thinking of all the times you have had sexual intercourse, about what proportion of the time {have you/has a partner of yours} used a

condom?" Respondents rated from 1 – none of the time to 5 – all of the time. In the Sexuality and Consequences questionnaire, condom use was measured by the following question: "Thinking of all the times you have had sexual intercourse in the past year, about what proportion of the time {have you/has a partner of yours} used a condom?" Respondents rated from 1 – none of the time to 4 – all of the time. Given the differences between the two rating scales, they were re-scaled to have a maximum of 20 and a minimum of 4 (e.g., a score of 2 on the Romantic Relationships scale would become an 8 on the new scale, while a score 2 on the Sexuality and Consequences scale would become a 10 on the new scale). Scores collected at each of the eight time points (grade 7 to 2-years post-high school) were totalled and averaged to obtain a score between 4 and 20.

Pregnancy (or causing pregnancy). Pregnancy was scored dichotomously. If a female participant indicated that she had experienced a pregnancy or a male participant indicated he had caused a pregnancy during the period between grades 7-12 (data collected at the end of the year), this was coded as 1. Experiencing a pregnancy or causing a pregnancy post-high school, or absence of pregnancy (experiencing or causing) throughout data collection, was coded as 0. Pregnancy or causing a pregnancy in the 2-years post-high school was not coded as risky because of the relative normalcy of starting a family post-high school (Klein, 2005).

Lifetime presence of STIs. As has been employed in previous research using Fast Track data (CPPRG, 2014), lifetime presence of STIs was scored dichotomously. Therefore, if at any point during data collection a participant reported contracting an STI, this was coded as 1. The absence of STIs during data collection was coded as 0. Both the Romantic Relationships and the Sexuality & Consequences questionnaires collected data regarding STIs.

Solicitation of sexual services. The Self-Reported Delinquency (Huizinga & Elliot, 1986) measure, collected from grade 7 to 2-years post-high school, includes one item that asks whether the individual has received money for sexual services in the last year. Answers of "yes" were scored as 1 and answers of "no" were scored as 0. Receiving

money for sexual services was scored dichotomously. If the individual scored 1 (i.e., yes) at any time during data collection from grade 7 to 2-years post-high school, this was coded as 1.

Risky sexual behaviour composite. In addition to examining each risky sexual behaviour variable separately, a risky sexual behaviour composite variable was constructed. To create this composite, the remaining two risky sexual behaviour variables that were scored as multinomial (i.e., age of first sexual intercourse) and continuous (i.e., condom use) were dichotomized. Condom use was scored as a continuous variable with scores ranging from 4 (most risky) to 20 (least risky). To dichotomize this variable, scores greater than one standard deviation below the mean (> 10.17) were assigned a score of 0 and scores less than or equal to one standard deviation below the mean (≤ 10.17) were assigned a score of 1. Further, age of first sexual intercourse was originally scored as multinomial (i.e., scored as 0, 1 or 2). To dichotomize this variable, first sexual intercourse at age 17 or older, or non-initiation, was coded as 0, while first sexual intercourse at age 16 or younger was coded as 1.

Participants were assigned a risky sexual behaviour composite score of 0 or 1. If a participant scored a 1 on any of the five risky sexual behaviour variables, they scored a 1 on the risky sexual behaviour composite. If a participant scored a 0 on all available risky sexual behaviour variables, they scored a 0 on the risky sexual behaviour composite.

Table 1. Timeline of Measures Used in Current Study

Measure	Gr6	Gr7	Gr8	Gr9	Gr10	Gr11	Gr12	1yrpst	2yrpst
FIF	x	x	x	x	x	x	x	x	x
APSD		x							
DISC-IV	x								
TAD		x							
Romantic Relationships		x	x	x	x	x			
Sexuality & Consequences							x	x	x
Pregnancy			x	x	x	x			
SRD		x	x	x	x	x	x	x	x

Note. Gr = Grade; 1yrpst = 1-year post-high school; 2yrpost = 2-years post-high school; APSD = Antisocial Process Screening Device; TAD = Tobacco, Alcohol, Drugs survey; Romantic Relationships = Romantic Relationships questionnaire; Sexuality & Consequences = Sexuality & Consequences Questionnaire; Pregnancy = Pregnancy questionnaire; SRD = Self-Reported Delinquency measure

2.4. Ethics Approval

Ethics approval for analysis of secondary data was obtained from the Social and Behavioural Sciences Subcommittee of the Office of Research Ethics (ORE) at Simon Fraser University (study number: 2014s0089). The request for ethics approval included the rationale for the study, purpose, and method. This study was deemed "minimal risk."

2.5. Data Analytic Tools

Regression models were conducted using saturated path analysis with Mplus Version 7.3 (Muthén & Muthén, 1998-2012). Full-information maximum likelihood estimation with robust standard errors was used to account for missing values and non-normality of outcomes.

Chapter 3.

Results

3.1. Descriptive Information

Descriptive statistics for the covariates are presented in Table 2. Table 3 displays descriptive statistics for the predictor variables. The descriptive statistics for the outcome variables are presented in Table 4, for the total sample as well as for males and females separately. Descriptive information for each dichotomous and categorical variable is presented as percentages, whereas means and standard deviations are presented for continuous and multinomial variables. Table 5 displayed skewness and kurtosis of the continuous variables.

Table 2. Covariate Descriptives

Variable	% (*N*)	*M* (*SD*)
Sex		
Male	58.30 (398)	
Female	41.70 (285)	
Race		
African American	47.40 (324)	
Anglo American	49.30 (337)	
Hispanic	1.30 (9)	
Asian	0.30 (2)	
Native American	0.30 (2)	
Other	1.30 (9)	
Socioeconomic Continuous Code		27.35 (10.92)
ADHD–C Criterion Counts		1.51 (2.59)
Age (in years) in Kindergarten		6.38 (0.45)
TAD Survey Final Score		0.45 (0.83)
0	58.50 (400)	
1	12.00 (82)	
2	6.70 (46)	
3	3.70 (25)	

Note: TAD = Tobacco, Alcohol, Drugs

Table 3. Predictor Descriptives

Variable	*M* (*SD*)
CU Traits	0.62 (0.37)
CD Criterion Counts	0.40 (0.92)

Table 4. Outcome Variable Descriptives

Variable	% (*N*)	*M* (*SD*)
Age of First Sexual Intercourse		
0 *(age 17 or older; non-initiators)*	34.2 (213)	
Males	30.9 (112)	
Females	38.8 (101)	
1 *(between ages 15-16)*	36.8 (229)	
Males	33.3 (121)	
Females	41.5 (108)	
2 *(age 14 and under)*	29.0 (181)	
Males	35.8 (130)	
Females	19.6 (51)	
Condom Use		
(4 – most risky – to 20 – least risky)		14.8 (4.6)
Males		15.5 (4.4)
Females		13.8 (4.7)
Pregnancy (Causing or Experiencing)		
0 *(no pregnancy between grades 8-12)*	69.1 (458)	
Males	73.1 (280)	
Females	63.6 (178)	
1 *(pregnancy between grades 8-12)*	30.9 (205)	
Males	26.9 (103)	
Females	76.4 (102)	
STI		
0 *(no lifetime contraction of STI)*	84.3 (543)	
Males	90.6 (339)	
Females	75.6 (204)	
1 *(lifetime contraction of STI)*	15.7 (101)	
Males	9.4 (35)	
Females	24.4 (66)	
Sexual Solicitation		
0 *(no lifetime engagement in sexual solicitation)*	94.9 (648)	
Males	94.0 (374)	
Females	96.1 (274)	
1 *(lifetime engagement in sexual solicitation)*	5.1 (35)	
Males	6.0 (24)	
Females	3.9 (11)	
Risky Sexual Behaviour Composite		

0 *(absence of all risky sexual behaviour variables)*	30.6 (209)
Males	31.4 (125)
Females	29.5 (84)
1 *(presence of 1 or more risky sexual behaviour variables)*	69.4 (474)
Males	68.6 (273)
Females	70.5 (201)

Note: STI = Sexually-transmitted infection

Table 5. Skewness and Kurtosis of Continuous Variables

Variable	Skewness (*SE*)	Kurtosis (*SE*)
Socioeconomic Continuous Code	0.49 (0.098)	0.117 (0.195)
ADHD-Combined Criterion Counts	2.686 (0.099)	8.904 (0.198)
Age	0.666 (0.094)	2.775 (0.187)
TAD	1.799 (0.104)	2.215 (0.207)
CU Traits	0.092 (0.098)	-0.658 (0.196)
CD Criterion Counts	3.168 (0.099)	12.159 (0.199)
Condom Use	-0.558 (0.105)	-0.680 (0.209)

Note: TAD = Tobacco, Alcohol, Drugs Survey

3.2. Missing Data

Across analyses, there was some variation in missing data of demographic, predictor, and outcome variables. If an individual refused or forgot to answer a question, that information was coded as missing. Percentages of missing data for each variable are reported below in Table 6.

Table 6. Percentage and Frequency of Missing Data

Variable	Missing % (*N*)	Available % (*N*)
Age	0 (0)	100 (683)
Socioeconomic Continuous Code	8.3 (57)	91.7 (626)
Sex	0 (0)	100 (683)
Race	0 (0)	100 (683)
ADHD–C	11.3 (77)	88.7 (606)
TAD	19.0 (130)	81.0 (553)
CU Traits	9.7 (66)	90.3 (617)
CD Symptoms	11.6 (79)	88.4 (604)
Age of First Sexual Intercourse	8.8 (60)	91.2 (623)
Condom Use	20.4 (139)	79.6 (544)
Pregnancy	2.9 (20)	97.1 (663)
STI	5.7 (39)	94.3 (644)
Sexual Solicitation	0 (0)	100 (683)
RSB Composite Variable	0 (0)	100 (683)

Note: ADHD–C = ADHD-Combined symptoms; TAD = Tobacco, Alcohol, Drugs Survey; STI = sexually transmitted infection: RSB = Risky Sexual Behaviour

Participants were excluded if they had no risky sexual behaviour data available. However, there was variation in the amount of risky sexual behaviour data present for participants in the remaining sample ($N = 683$). Table 7 describes the number of risky sexual behaviour variables present for participants in the current study.

Table 7. Total Number of Available Risky Sexual Behaviour Variables

Number of Available RSB Variables	% (*N*)
1	1.2 (8)
2	2.0 (14)
3	4.1 (28)
4	20.5 (140)
5	72.2 (493)

3.3. Correlation Analyses.

Correlations were produced to investigate relationships between continuous covariates, predictor variables, and outcome variables. Pearson product-moment correlations were used to analyse the relationship between continuous variables (e.g., age and socioeconomic status). Point-biserial correlations were used to analyze the relationship between continuous and discrete-dichotomous variables (e.g., CU traits and pregnancy). Spearman correlations (i.e., Spearman's rho) were used to analyze the relationship between continuous and categorical (multivariate) variables (e.g., CD symptoms and substance use score) and the relationship between categorical (i.e., dichotomous – continuous or discrete – and multivariate; e.g., sex and age of first sexual intercourse) variables. Table 8 displays correlations of all covariates (i.e., sex, race, site, age, SES, ADHD–C symptoms, and substance use), predictor variables (i.e., CD symptoms and CU traits), and outcome variables (i.e., age of first sexual intercourse, condom use, pregnancy, contraction of STIs, sexual solicitation, and the risky sexual behaviour composite).

Table 8. Correlations of All Covariate, Predictor, and Outcome Variables

Variable	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Sex	.03	**.08***	-.03	-.03	.03	**-.10***	.03	-.00	**.16****	**.16****	**.15****	**.19****	**-.10****	**-.21****	.05	-.02
2. Race	---	.02	-.02	-.00	.05	.05	.05	-.06	.08	**.22****	**.26****	**.14****	**.24****	**-.20****	.07	.03
3. Site1		---	**-.33****	**-.37****	-.01	-.04	-.03	.01	.05	.03	-.05	-.05	.03	-.02	-.01	**.15****
4. Site2			---	**-.32***	-.02	-.02	.08	-.06	-.04	-.02	.02	.03	.05	.04	.00	.05
5. Site3				---	.01	-.02	.01	.01	-.01	.01	.00	-.05	-.04	.01	.03	**-.20****
6. Age					---	-.07	-.07	.06	.00	-.00	-.00	.01	-.01	-.03	-.03	-.02
7. SES						---	-.05	.07	-.05	-.03	-.06	.03	-.02	-.02	-.02	.08
8. ADHD-C							---	.02	**.20****	**.08**	**.19****	-.05	.05	.02	.04	-.06
9. Substance Use								---	-.02	-.01	-.03	.02	-.04	-.01	-.06	.03
10. CD symptoms									---	**.15****	**.30****	**-.12***	.08	.03	**.22****	-.03
11. CU Traits										---	**.30****	-.01	**.16****	**.10***	**.08***	-.06
12. Age of First Sexual Intercourse											---	**-.15****	**.35****	**.24****	**.21****	-.01
13. Condom Use												---	**-.22****	**-.14****	-.04	.07
14. Pregnancy													---	**.26****	.06	.02
15. STI														---	**.14****	.00
16. Solicitation															---	.01
17. RSB Composite																---

Note: * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$

3.4. Regression Analyses

3.4.1. Analytic Framework

For each model below, regression analyses were conducted to determine the association between CD symptoms, CU traits, and their interaction on each risky sexual behaviour outcome variable (i.e., age of first sexual intercourse, condom use, pregnancy, contraction of STIs, sexual solicitation, and the risky sexual behaviour composite), after controlling for sex, race, site, age in kindergarten, ADHD–C symptoms, and substance use at grade 7. Within each model, if the interaction between CD symptoms and CU traits was not found to significantly predict the outcome variable, the model was trimmed to examine the main effects of CD symptoms and CU traits only.

3.4.2. Research Question 1: Do Conduct Disorder Symptoms, CU Traits, or Their Interaction Predict Age of First Sexual Intercourse?

Ordinal logistic regression analyses were used to determine the association between CD symptoms, CU traits, their interaction, and age of first sexual intercourse. Table 9 presents the results of these analyses. An ordinal logistic regression, as opposed to multinomial logistic regression, was conducted based on the assumption that the relationship between each pair of outcome groups is the same (Liao, 1994). First engagement in sexual intercourse at or before age 14 was coded as 2, first engagement in sexual intercourse at age 15-16 was coded as 1, and later initiation (i.e., age 17 or older) or non-initiation in sexual intercourse was coded as 0.

Table 9. Multivariate Logistic Regression Model Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Age of First Sexual Intercourse

Variable	*B*	*SE*	*OR*
Sex	0.161	0.249	1.175
Race	0.829**	0.262	2.291
Site1	-0.536	0.330	0.585
Site2	0.016	0.332	1.016
Site3	-0.039	0.345	0.961
Age	0.287	0.284	1.332
SES	-0.013	0.011	0.987
ADHD–C	0.073	0.050	1.076
Substance use	-0.044	0.165	0.957
CD symptoms	0.174	0.553	1.190
CU traits	1.119*	0.434	3.063
CD symptoms x CU traits	0.682	0.664	1.978

Note: OR = Odds ratio; * = $p < 0.05$; ** = $p < 0.01$

The overall model accounted for approximately 27% of the variance ($R^2 = 0.266$). CU traits significantly predicted age of first sexual intercourse ($p < 0.05$), but CD symptoms and the interaction between CD symptoms and CU traits did not *(p*s = 0.30-0.75). As the interaction between CD symptoms and CU traits was not significant, the model was trimmed to examine the main effects of CD symptoms and CU traits on age of first sexual intercourse. Table 10 presents the ordinal logistic regression model estimating the main effects of CD symptoms and CU traits on age of first sexual intercourse.

Table 10. Multivariate Logistic Regression Model Estimating the Effects of CD Symptoms and CU Traits on Age of First Sexual Intercourse

Variable	*B*	*SE*	*OR*
Sex	0.148	0.250	1.159
Race	0.806**	0.258	2.238
Site1	-0.555	0.328	0.574
Site2	0.014	0.330	1.014
Site3	-0.050	0.345	0.952
Age	0.277	0.284	1.319
SES	-0.014	0.011	0.986
ADHD–C	0.074	0.050	1.076
Substance use	-0.044	0.166	0.957
CD symptoms	0.614**	0.191	1.848
CU traits	1.293**	0.391	3.642

Note: OR = Odds ratio; ** = $p < 0.01$

The overall model accounted for approximately 25% of the variance ($R^2 = 0.252$). Both CD symptoms and CU traits significantly predicted age of first sexual intercourse ($ps < 0.01$). Controlling for the effects of sex, race, site, age, SES, ADHD–C symptoms, and substance use at grade 7, the model indicated that for every one-unit increase in CD symptoms, the odds of first engagement in sexual intercourse by age 14 versus first engagement in sexual intercourse at age 15-16 or at age 17 or older, were 1.848 times greater when all of the other variables in the model were held constant. Further, for every one-unit increase in CU traits, the odds of first engagement in sexual intercourse by age 14 versus first engagement in sexual intercourse at age 15-16 or at age 17 or older, were 3.642 times greater when all of the other variables in the model were held constant.

3.4.3. Research Question 2: Do Conduct Disorder Symptoms, CU Traits, or Their Interaction Predict Condom Use during Adolescence and Early Adulthood?

Multiple linear regression analyses were used to determine the association between CD symptoms, CU traits, their interaction, and condom use in adolescence and young adulthood. Table 11 presents the results of these analyses. Condom use scores ranged from 4 (most risky; least frequent use of condoms) to 20 (least risky; most frequent use of condoms).

Table 11. Multiple Linear Regression Model Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Condom Use

Variable	*B*	*SE*	β
Sex	2.206***	0.508	0.245***
Race	1.256*	0.537	0.139*
Site1	-1.285	0.726	-0.105
Site2	-0.391	0.772	-0.038
Site3	-1.269	0.784	-0.124
Age	-0.027	0.630	-0.002
SES	0.014	0.024	0.032
ADHD–C	-0.172	0.129	-0.084
Substance use	-0.282	0.452	-0.052
CD symptoms	-0.447	0.905	-0.088
CU traits	-1.483	0.832	-0.119
CD symptoms x CU traits	-0.457	1.198	-0.071

Note: * = $p < 0.05$; *** = $p < 0.001$

The overall model accounted for approximately 12% of the variance ($R^2 = .119$). However, neither CD symptoms, CU traits, nor their interaction significantly predicted condom use in adolescence and early adulthood. Given that CD symptoms and CU traits did not interact to predict condom use, the model was trimmed to examine the main effects of CD symptoms and CU traits on condom use. Table 12 presents the results of these analyses.

Table 12. Multiple Linear Regression Model Estimating the Effects of CD Symptoms and CU Traits on Condom Use

Variable	*B*	*SE*	β
Sex	2.236***	0.505	0.248***
Race	1.281*	0.545	0.142*
Site1	-1.258	0.730	-0.103
Site2	-0.387	0.773	-0.037
Site3	-1.251	0.780	-0.122
Age	-0.009	0.631	-0.001
SES	0.014	0.024	0.033
ADHD–C	-0.174	0.130	-0.085
Substance use	-0.275	0.452	-0.051
CD symptoms	-0.799*	0.318	-0.158**
CU traits	-1.618*	0.784	-0.130*

Note: * = p < 0.05; ** = p < 0.01; *** = p < 0.001

The overall model accounted for approximately 12% of the variance (R^2 = .121). Both CD symptoms and CU traits significantly predicted condom use in adolescence and early adulthood (*p*s < 0.05). For every one standard deviation increase in CD symptoms, condom use scores decreased 0.799 standard deviations. CU traits significantly predicted condom use, such that condom use scores decreased 1.618 standard deviations for every one standard deviation increase in CU symptoms.

3.4.4. Research Question 3: Do Conduct Disorder Symptoms, CU Traits, or Their Interaction Predict Experiencing or Causing a Pregnancy?

Binary logistic regression analyses were used to determine the association between CD symptoms, CU traits, their interaction, and pregnancy during high school. Individuals were assigned a score of 1 if they caused or experienced a pregnancy during high school, and a score of 0 if they did not. Table 13 presents the results of these analyses.

Table 13. Binary Logistic Regression Model Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Pregnancy

Variable	*B*	*SE*	*OR*
Sex	-0.813**	0.275	0.444
Race	1.333***	0.274	3.792
Site1	0.630	0.409	1.859
Site2	0.558	0.389	1.748
Site3	0.240	0.378	1.271
Age	0.081	0.319	1.084
SES	0.002	0.013	1.002
ADHD	0.101	0.058	1.106
Substance	-0.062	0.207	0.940
CD symptoms	-0.509	0.431	0.601
CU traits	0.849	0.474	2.337
CD symptoms x CU traits	0.586	0.525	1.797

Note: OR = Odds ratio; ** = p < 0.01; *** = p < 0.001

The overall model accounted for approximately 23% of the variance ($R^2 = 0.231$). CD symptoms, CU traits, and their interaction did not significantly predict pregnancy. Since the interaction between CD symptoms and CU traits did not significantly predict pregnancy, the model was trimmed to examine the main effects of CD symptoms and CU traits on pregnancy. Table 14 presents the binary logistic regression model estimating the effects of CD symptoms and CU traits on pregnancy.

Table 14. Binary Logistic Regression Model Estimating the Effects of CD Symptoms and CU Traits on Pregnancy

Variable	*B*	*SE*	*OR*
Sex	-0.836**	0.275	0.433
Race	1.293***	0.268	3.644
Site1	0.605	0.408	1.832
Site2	0.552	0.389	1.736
Site3	0.218	0.380	1.244
Age	0.075	0.320	1.078
SES	0.001	0.013	1.001
ADHD	0.108	0.058	1.114
Substance	-0.075	0.207	0.928
CD symptoms	-0.058	0.131	0.943
CU traits	1.032*	0.429	2.806

Note: OR = Odds ratio; * = p < 0.05; ** = p < 0.01; *** = p < 0.001

The overall model accounted for approximately 23% of the variance ($R^2 = 0.229$). CU traits significantly predicted pregnancy ($p < 0.05$). For every one-unit increase in CU traits, the odds of pregnancy (experiencing or causing) during high school were 2.806 times greater given that all of the other variables in the model were held constant.

3.4.5. Research Question 4: Do Conduct Disorder Symptoms, CU Traits, or Their Interaction Predict Contracting an STI during Adolescence or Early Adulthood?

Binary logistic regression analyses were used to determine the association between CD symptoms, CU traits, their interaction, and contracting an STI during adolescence or young adulthood. Individuals were assigned a 1 if they had ever contracted an STI, and 0 if they had not. Table 15 presents the results of these analyses.

Table 15. Binary Logistic Regression Model Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Contracting an STI

Variable	*B*	*SE*	*OR*
Sex	-1.119**	0.372	0.327
Race	1.435***	0.410	4.201
Site1	-0.411	0.475	0.663
Site2	-0.120	0.454	0.887
Site3	0.088	0.438	1.092
Age	-0.182	0.366	0.834
SES	0.000	0.018	1.000
ADHD	0.001	0.062	1.001
Substance	-0.221	0.232	0.801
CD symptoms	-0.116	0.451	0.890
CU traits	0.787	0.572	2.197
CD symptoms x CU traits	0.080	0.881	1.083

Note: OR = Odds ratio; ** = $p < 0.01$; *** = $p < 0.001$

The overall model accounted for approximately 24% of the variance ($R^2 = 0.235$). CD symptoms, CU traits, and their interaction did not significantly predict contracting an STI. As such, the model was trimmed to examine the main effects of CD symptoms and CU traits on pregnancy. Table 16 presents the results of these analyses.

Table 16. Binary Logistic Regression Model Estimating the Effects of CD Symptoms and CU Traits on Contracting an STI

Variable	*B*	*SE*	*OR*
Sex	-1.121**	0.373	0.326
Race	1.429***	0.408	4.175
Site1	-0.410	0.475	0.663
Site2	-0.117	0.455	0.890
Site3	0.091	0.439	1.095
Age	-0.185	0.366	0.831
SES	0.000	0.018	1.000
ADHD	-0.001	0.062	0.999
Substance	-0.219	0.232	0.803
CD symptoms	-0.055	0.165	0.947
CU traits	0.816	0.530	2.261

Note: OR = Odds ratio; ** = p < 0.01; *** = p < 0.001

The overall model accounted for approximately 23% of the variance ($R^2 = 0.234$). Neither CD symptoms nor CU traits significantly predicted contracting an STI (*p*s = 0.12-0.74).

3.4.6. Research Question 5: Do Conduct Disorder Symptoms, CU Traits, or Their Interaction Predict Engaging in Sexual Solicitation during Adolescence or Early Adulthood?

Binary logistic regression analyses were used to determine the association between CD symptoms, CU traits, their interaction, and engaging in sexual solicitation during adolescence or young adulthood. Table 17 presents the results of these analyses.

Table 17. Binary Logistic Regression Model Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Sexual Solicitation

Variable	*B*	*SE*	*OR*
Sex	0.529	0.654	1.697
Race	0.881	0.528	2.412
Site1	1.217	0.650	3.378
Site2	1.331*	0.674	3.783
Site3	1.027	0.761	2.793
Age	-0.109	0,812	0.897
SES	-0.025	0.025	0.975
ADHD–C	-0.093	0.124	0.911
Substance use	-0.726	0.373	0.484
CD symptoms	0.947*	0.408	2.579
CU traits	1.165	0.768	3.205
CD symptoms x CU traits	-0.112	0.459	0.894

Note: OR = Odds ratio; * = $p < 0.05$

The overall model accounted for approximately 42% of the variance ($R^2 = 0.423$). CD symptoms significantly predicted engagement in sexual solicitation ($p < 0.05$). CU traits and the interaction between CD symptoms and CU traits did not significantly predict engagement in sexual solicitation (ps = 0.13-0.81). The model was trimmed to examine the main effects of CD symptoms and CU traits on sexual solicitation. Table 18 presents the results of these analyses.

Table 18. Binary Logistic Regression Model Estimating the Effects of CD Symptoms and CU Traits on Sexual Solicitation

Variable	*B*	*SE*	*OR*
Sex	0.533	0.656	1.703
Race	0.870	0.521	2.388
Site1	1.252	0.655	3.498
Site2	1.340	0.685	3.819
Site3	1.060	0.768	2.888
Age	-0.109	0.818	0.897
SES	-0.026	0.025	0.974
ADHD–C	-0.112	0.129	0.894
Substance use	-0.810	0.433	0.445
CD symptoms	0.881***	0.192	2.413
CU traits	1.135	0.822	3.110

Note: OR = Odds ratio; *** = p < 0.001

The overall model accounted for approximately 44% of the variance ($R^2 = 0.436$). CD symptoms significantly predict engagement in sexual solicitation ($p < 0.001$). For every one-unit increase in CD symptoms, the odds of engaging in sexual solicitation during adolescence or young adulthood were 2.413 times greater given that all of the other variables in the model were held constant.

3.4.7. Research Question 6: Do Conduct Disorder Symptoms, CU Traits, or Their Interaction Predict the Occurrence of the Risky Sexual Behaviour Composite Variable during Adolescence or Early Adulthood?

Binary logistic regression analyses were used to determine the association between CD symptoms, CU traits, their interaction, and engaging in risky sexual behaviour during adolescence or young adulthood (i.e., risky sexual behaviour composite variable). The five separate risky sexual behaviours were dichotomized, if not already so (i.e., condom use and age of first sexual intercourse); scores of 1 were assigned if an individual scored a 1 on any of the five dichotomous risky sexual behaviour variables and

scores of 0 were assigned if the individual scored a 0 on all five dichotomous risky sexual behaviour variables. Table 19 presents the results of these analyses.

Table 19. Binary Logistic Regression Model Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Risky Sexual Behaviour

Variable	*B*	*SE*	*OR*
Sex	-0.351	0.276	0.703
Race	0.266	0.276	1.304
Site1	0.799	0.411	2.224
Site2	-0.069	0.370	0.933
Site3	-0.927**	0.341	0.396
Age	0.081	0.314	1.084
SES	0.003	0.012	1.003
ADHD–C	-0.016	0.053	0.984
Substance use	0.019	0.178	1.019
CD symptoms	-0.650	0.394	0.465
CU traits	-0.765	0.439	0.522
CD symptoms x CU traits	1.182*	0.024	3.261

Note: OR = Odds ratio; * = p < 0.05; ** = p < 0.01

The overall model accounted for approximately 13% of the variance *(R^2* = 0.129). The interaction between CD symptoms and CU traits significantly predicted risky sexual behaviour ($p < 0.05$). CD symptoms and CU traits alone did not significantly predict risky sexual behaviour, however there was a trend towards significance (ps = 0.08-0.10). As the interaction between CD symptoms and CU traits was significant, the model was split by those with low versus high CU traits, to examine differences in the predictive quality of CD symptoms depending on the level of CU traits. A median split of CU scores was used to determine membership to the low or high CU traits categories. CU trait scores lower than the median were assigned to the low CU traits group and CU trait scores greater than or equal to the median were assigned to the high CU trait group. Table 20 presents the results of those analyses.

Table 20. Binary Logistic Regression Model Estimating the Effects of CD Symptoms on Risky Sexual Behaviour, by Low and High CU Traits

Variable	Low CU Traits			High CU Traits		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Sex	-0.436	0.398	0.647	-0.293	0.355	0.746
Race	0.922*	0.425	2.513	-0.146	0.359	0.864
Site1	-0.197	0.607	0.821	1.755***	0.468	5.782
Site2	-0.706	0.555	0.494	0.570	0.477	1.768
Site3	-1.325**	0.496	0.266	-0.455	0.455	0.635
Age	-0.378	0.498	0.685	0.410	0.388	1.506
SES	-0.010	0.018	0.990	0.013	0.016	1.014
ADHD–C	-0.034	0.098	0.966	-0.002	0.065	0.998
Substance use	0.050	0.240	1.051	0.096	0.239	1.101
CD symptoms	-0.268	0.255	0.765	0.319[a]	0.179	1.376

Note: OR = Odds ratio; * = p < 0.05; ** = p < 0.01; *** = p < 0.001; [a] = (*p* = 0.07)

The low CU traits model accounted for approximately 16% of the variance (R^2 = 0.159). CD symptoms did not significantly predict risky sexual behaviour among those low on CU traits (*p* = 0.30).

The high CU traits model accounted for approximately 19% of the variance (R^2 = 0.191). CD symptoms did not significantly predict risky sexual behaviour among those high on CU traits; however, there was a trend towards significance (*p* = 0.07). For every unit increase in CD symptoms, the odds of an individual with high CU traits engaging in risky sexual behaviour increased by a factor of 1.376.

3.4.8. Exploratory Sex Analyses: Analytic Framework

For each model below, exploratory regression analyses were conducted to investigate possible sex differences in the relationship between CD symptoms, CU traits, and their interaction on each risky sexual behaviour outcome variable. Control variables included race, site, age in kindergarten, ADHD–C symptoms, and substance use at grade 7. Preceding the exploratory sex analyses, the dataset was split into separate samples of males and females. As such, the regression analyses did not include interaction variables regarding sex (e.g., sex by CU traits). Analyses were conducted separately within the two samples (i.e., within the sample of males and within the sample of females). For each set of analyses, if the interaction of CD symptoms and CU traits did not significantly predict the outcome variable, the model was trimmed to examine the main effects of CD symptoms and CU traits on the outcome variable.

3.4.9. Exploratory Sex Analyses: Age of First Sexual Intercourse

Exploratory analyses were conducted to investigate sex differences in the relationship between CD symptoms, CU traits, and their interaction on age of first sexual intercourse. Table 21 presents the results of these analyses.

Table 21. Multivariate Logistic Regression Models Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Age of First Sexual Intercourse, Separately by Sex

Variable	Males			Females		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Race	1.304***	0.364	3.686	0.607	0.385	1.834
Site1	-0.063	0.406	0.939	-0.825	0.524	0.438
Site2	0.356	0.485	1.428	-0.073	0.449	0.929
Site3	0.245	0.494	1.278	-0.152	0.435	0.859
Age	0.248	0.414	1.281	0.419	0.423	1.521
SES	-0.017	0.014	0.983	-0.011	0.017	0.989
ADHD–C	0.041	0.070	1.042	0.168	0.105	1.183
Substance use	-0.439	0.264	0.645	0.181	0.203	1.198
CD symptoms	0.809	0.598	2.247	-0.738	0.787	0.478
CU traits	2.345***	0.620	10.431	0.247	0.560	1.280
CD symptoms x CU traits	-0.199	0.688	0.820	1.786	1.039	5.968

Note: OR = Odds ratio; *** = p < 0.001

The male and female models accounted for approximately 43% ($R^2 = 0.433$) and 15% ($R^2 = 0.148$) of the variance, respectively. CU traits significantly predicted age of first sexual intercourse for males ($p < 0.001$), but not for females ($p = 0.66$). CD

symptoms and the interaction between CD symptoms and CU traits did not significantly predict age of first sexual intercourse for males or females. As the interaction between CD symptoms and CU traits was not significant, the models were trimmed to examine the main effects of CD symptoms and CU traits on age of first sexual intercourse, separately by sex. Table 22 presents the results of these analyses.

Table 22. Multivariate Logistic Regression Models Estimating the Effects of CD Symptoms and CU Traits on Age of First Sexual Intercourse, Separately by Sex

Variable	Males			Females		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Race	1.323***	0.367	3.755	0.633	0.389	1.884
Site1	-0.062	0.404	0.940	-0.846	0.519	0.429
Site2	0.365	0.484	1.440	-0.117	0.444	0.889
Site3	0.229	0.501	1.258	-0.169	0.438	0.845
Age	0.241	0.417	1.273	0.416	0.410	1.515
SES	-0.015	0.014	0.985	-0.011	0.017	0.989
ADHD–C	0.036	0.070	1.036	0.166	0.100	1.181
Substance use	-0.424	0.263	0.654	0.191	0.202	1.211
CD symptoms	0.667**	0.214	1.949	0.224	0.530	1.251
CU traits	2.227***	0.549	9.273	0.511	0.526	1.668

Note: OR = Odds ratio; ** = $p < 0.01$; *** = $p < 0.001$

CU traits and CD symptoms differentially predicted age of first intercourse for males and females. For males, the model accounted for approximately 43% of the variance ($R^2 = 0.432$). For every one-unit increase in CD symptoms and CU traits, the odds of first engagement in sexual intercourse by age 14 versus first engagement in

sexual intercourse at age 15-16 or at age 17 or older, were 1.949 ($p < 0.01$) and 9.273 ($p < 0.001$) times greater, respectively, when all of the other variables in the model were held constant.

For females, the model accounted for approximately 12% of the variance ($R^2 = 0.124$). However, CD symptoms and CU traits did not significantly predict the likelihood of engaging in sexual intercourse for females (ps = 0.33-0.67).

3.4.10. Exploratory Sex Analyses: Condom Use

Exploratory analyses were conducted to investigate sex differences in the relationship between CD symptoms, CU traits, and their interaction on condom use. Table 23 presents the results of these analyses.

Table 23. Multiple Linear Regression Models Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Condom Use, Separately by Sex

Variable	Males			Females		
	B	*SE*	β	*B*	*SE*	β
Race	1.138*	0.579	0.134	0.724	0.791	0.079
Site1	-0.805	0.901	-0.074	-1.765	1.033	-0.134
Site2	-1.457	1.025	-0.146	0.467	1.014	0.045
Site3	-1.473	1.170	-0.158	-0.328	1.064	-0.030
Age	-0.076	0.756	-0.007	0.553	0.821	0.049
SES	0.004	0.029	0.011	0.012	0.035	0.025
ADHD–C	-0.082	0.136	-0.048	-0.274	0.212	-0.116
Substance use	-0.142	0.740	-0.028	-0.614	0.558	-0.111
CD symptoms	1.059	0.776	-0.287	-3.601**	1.259	-0.364**
CU traits	-0.897	0.967	-0.077	-1.260	1.167	-0.096
CD symptoms x CU traits	-2.194*	1.045	-0.482*	2.637	1.483	0.190

Note: * = p < 0.05; ** = p < 0.01

The male model accounted for approximately 13% of the variance (R^2 = .130). The interaction between CD symptoms and CU traits significantly predicted condom use ($p < 0.05$) among males. CD symptoms and CU traits did not uniquely significantly

predict condom use among males (*p*s = 0.17-0.35). As the interaction between CD symptoms and CU traits was significant, the model was split by those with low versus high CU traits, to examine differences in the predictive quality of CD symptoms depending on the level of CU traits. A median split of CU scores was used to determine membership to the low or high CU traits categories. Table 24 presents the results of these analyses.

Table 24. Binary Logistic Regression Model Estimating the Effects of CD Symptoms on Condom Use Among Males, by Low and High CU Traits

Variable	Low CU Traits			High CU Traits		
	B	*SE*	β	*B*	*SE*	β
Race	1.560*	0.743	0.207*	1.327	0.881	0.144
Site1	-1.377	1.079	-0.150	-0.487	1.433	-0.041
Site2	-0.890	1.611	-0.097	-1.563	1.470	-0.153
Site3	-0.875	1.180	-0.240	-0.934	1.588	-0.093
Age	-0.982	0.940	-0.097	0.160	1.030	0.014
SES	0.005	0.044	0.017	0.030	0.167	0.070
ADHD–C	-0.268	0.268	-0.139	-0.033	0.167	-0.021
Substance use	0.242	0.548	0.055	-0.316	1.116	-0.061
CD symptoms	-0.162	0.542	-0.036	-0.715*	0.328	-0.212**

Note: OR = Odds ratio; * = p < 0.05; ** = p < 0.01

The low CU traits model accounted for approximately 12% of the variance (R^2 = 0.120). CD symptoms did not significantly predict condom use among males low on CU traits (p = 0.77). The high CU traits model accounted for approximately 10% of the variance (R^2 = 0.098). CD symptoms significantly predicted risky sexual behaviour among males high on CU traits ($p < 0.05$).

The female model accounted for approximately 15% of the variance (R^2 = .146). Only CD symptoms significantly predicted condom use among females in adolescence and early adulthood ($p < 0.01$). For every one standard deviation increase in CD symptoms, condom use scores decreased 3.601 standard deviations. As the interaction between CD symptoms and CU traits was not significant for females, the model was trimmed to examine the main effects of CD symptoms and CU traits on condom use among females. Table 25 presents the results of those analyses.

Table 25. Multiple Linear Regression Models Estimating the Effects of CD Symptoms and CU Traits on Condom Use Among Females

Variable	Females		
	B	*SE*	β
Race	0.790	0.794	0.086
Site1	-1.807	1.028	-0.138
Site2	0.429	1.014	0.041
Site3	-0.358	1.078	-0.033
Age	0.478	0.833	0.042
SES	0.011	0.036	0.023
ADHD–C	-0.282	0.219	-0.120
Substance use	-0.581	0.567	-0.105
CD symptoms	-2.077**	0.711	-0.212*
CU traits	-0.790	1.099	-0.060

Note: * = p < 0.05; ** = p < 0.01

The female model accounted for approximately 14% of the variance (R^2 = .138). Only CD symptoms significantly predicted condom use in adolescence and early

adulthood. For every one standard deviation increase in CD symptoms, condom use scores decreased 2.077 standard deviations ($p < 0.01$).

3.4.11. Exploratory Sex Analyses: Pregnancy

Exploratory analyses were conducted to investigate sex differences in the relationship between CD symptoms, CU traits, and their interaction on pregnancy. Table 26 presents the results of these analyses.

Table 26. Binary Logistic Regression Models Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Pregnancy, Separately by Sex

Variable	Males			Females		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Race	1.599***	0.392	4.949	1.330**	0.416	3.782
Site1	0.852	0.500	2.343	0.481	0.613	1.618
Site2	0.243	0.538	1.275	0.685	0.510	1.984
Site3	0.036	0.589	1.036	0.016	0.529	1.016
Age	-0.011	0.394	0.989	-0.073	0.457	0.929
SES	-0.005	0.016	0.995	0.009	0.020	1.009
ADHD–C	-0.008	0.084	0.992	0.259*	0.127	1.296
Substance use	-0.764**	0.276	0.466	0.292	0.284	1.339
CD symptoms	-0.220	0.532	0.803	-1.419	0.879	0.242
CU traits	1.113	0.698	3.104	0.384	0.678	1.469
CD symptoms x CU traits	0.269	0.619	1.309	2.060	0.089	7.849

Note: OR = Odds ratio; * = p < 0.05; ** = p < 0.01; *** = p < 0.001

The male and female models indicated that CD symptoms, CU traits, and their interaction did not significantly predict pregnancy. The male and female models accounted for approximately 31% ($R^2 = 0.314$) and 27% ($R^2 = 0.267$) of the variance, respectively. As the interaction between CD symptoms and CU traits was not significant for either sex, the models were trimmed to examine the main effects of CD symptoms and CU traits on pregnancy, separately by sex. Table 27 presents the results of these analyses.

Table 27. Binary Logistic Regression Models Estimating the Effects of CD Symptoms and CU Traits on Pregnancy, Separately by Sex

Variable	Males			Females		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Race	1.573***	0.382	4.819	1.320**	0.407	3.743
Site1	0.854	0.503	2.349	0.455	0.602	1.576
Site2	0.231	0.544	1.260	0.670	0.516	1.954
Site3	0.025	0.596	1.025	0.053	0.518	1.055
Age	-0.010	0.395	0.990	-0.054	0.442	0.947
SES	-0.009	0.016	0.991	0.006	0.021	1.006
ADHD–C	-0.009	0.085	0.991	0.249*	0.114	1.283
Substance use	-0.764**	0.270	0.466	0.293	0.275	1.341
CD symptoms	-0.016	0.150	0.984	-0.177	0.342	0.838
CU traits	1.324*	0.634	3.757	0.708	0.634	2.029

Note: OR = Odds ratio; * = p < 0.05; ** = p < 0.01; *** = p < 0.001

The male and female models accounted for approximately 32% ($R^2 = 0.317$) and 24% ($R^2 = 0.241$) of the variance, respectively. CU traits and CD symptoms differentially predicted pregnancy for males and females. For males, for every one-unit increase in CU

traits the odds of pregnancy in high school were 3.757 times greater given that all of the other variables in the model were held constant ($p < 0.05$). By contrast, for females neither CD symptoms nor CU traits significantly predicted the likelihood of pregnancy (ps = 0.27-0.61).

3.4.12. Exploratory Sex Analyses: Lifetime Contraction of STI(s)

Exploratory analyses were conducted to investigate sex differences in the relationship between CD symptoms, CU traits, and their interaction on contracting an STI. Table 28 presents the results of those analyses.

Table 28. Binary Logistic Regression Models Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Contracting an STI, Separately by Sex

Variable	Males			Females		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Race	0.893	0.671	2.233	1.691**	0.519	5.427
Site1	-1.209	0.664	0.229	0.022	0.644	1.022
Site2	-0.222	0.637	0.801	-0.144	0.573	0.865
Site3	-0.073	0.641	0.930	0.217	0.614	1.243
Age	0.365	0.659	1.441	-0.439	0.462	0.645
SES	0.001	0.023	1.001	0.002	0.026	1.002
ADHD–C	-0.029	0.087	0.972	0.031	0.097	1.032
Substance	0.004	0.322	1.004	-0.400	0.316	0.671
CD symptoms	0.259	0.679	1.296	-0.633	0.723	0.531
CU traits	1.203	1.052	3.330	0.540	0.702	1.715
CD symptoms x CU traits	-0.344	0.812	0.709	0.702	0.919	2.019

Note: OR = Odds ratio; ** = $p < 0.01$

The male and female models accounted for approximately 16% ($R^2 = 0.162$) and 25% ($R^2 = 0.251$) of the variance, respectively. However, CD symptoms, CU traits, and their interaction did not significantly predict contracting an STI for either males or

females. As the interaction between CD symptoms and CU traits was not significant for either sex, the models were trimmed to examine the main effects of CD symptoms and CU traits on contracting an STI, separately by sex. Table 29 presents results of these analyses.

Table 29. Binary Logistic Regression Model Estimating the Effects of CD Symptoms and CU Traits on Contracting an STI, Separately by Sex

Variable	Males			Females		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Race	0.843	0.644	2.323	1.702**	0.519	5.486
Site1	-1.206	0.661	0.299	0.002	0.643	1.002
Site2	-0.218	0.642	0.804	-0.165	0.576	0.847
Site3	-0.068	0.645	0.934	0.222	0.609	1.248
Age	0.367	0.645	1.443	-0.435	0.464	0.647
SES	0.002	0.022	1.002	0.000	0.027	1.000
ADHD–C	-0.028	0.087	0.973	0.026	0.097	1.026
Substance	0.021	0.314	1.022	-0.393	0.310	0.675
CD symptoms	-0.004	0.219	0.996	-0.147	0.363	0.863
CU traits	1.043	0.882	2.839	0.639	0.690	1.895

Note: OR = Odds ratio; ** = $p < 0.01$

The male and female models accounted for approximately 16% ($R^2 = 0.159$) and 25% ($R^2 = 0.247$) of the variance, respectively. CU traits and CD symptoms did not predict contracting an STI(s) for either males or females.

3.4.13. Exploratory Sex Analyses: Sexual Solicitation

Exploratory analyses were conducted to investigate sex differences in the relationship between CD symptoms, CU traits, and their interaction on engagement in sexual solicitation. Table 30 presents the results of these analyses.

Table 30. Binary Logistic Regression Models Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Sexual Solicitation, Separately by Sex

Variable	Males			Females		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Race	0.550	0.587	1.732	1.765	0.980	5.839
Site1	1.056	0.778	2.873	2.522	1.662	12.454
Site2	1.153	0.798	3.169	2.718	1.733	15.152
Site3	0.983	0.900	2.674	1.933	1.586	6.913
Age	-0.119	1.134	0.888	-0.256	0.902	0.774
SES	-0.027	0.028	0.974	-0.021	0.037	0.979
ADHD–C	-0.166	0.157	0.847	0.143	0.105	1.154
Substance use	-0.607	0.438	0.545	-1.756	1.021	0.173
CD symptoms	0.829*	0.404	2.290	0.751	0.591	2.120
CU traits	0.875	0.918	2.400	1.687	1.169	5.403
CD symptoms x CU traits	0.063	0.480	1.065	0.351	0.805	1.420

Note: OR = Odds ratio; * = $p < 0.05$

The male and female models accounted for approximately 38% ($R^2 = 0.377$) and 68% ($R^2 = 0.682$) of the variance, respectively. CD symptoms differentially predicted engaging in sexual solicitation for both males and females. For males, for every one-unit

increase in CD symptoms the odds of pregnancy in high school were 2.290 times greater, given that all of the other variables in the model were held constant ($p < 0.05$). However, CD symptoms did not predict engagement in sexual solicitation for females ($p = 0.20$). Neither CU traits nor the interaction between CD symptoms and CU traits predicted engagement in sexual solicitation in the male and female models. As the interaction between CD symptoms and CU traits was not significant for either sex, the models were trimmed to examine the main effects of CD symptoms and CU traits on sexual solicitation, separately by sex. Table 31 presents the results of these analyses.

Table 31. Binary Logistic Regression Model Estimating the Effects of CD Symptoms and CU Traits on Sexual Solicitation, Separately by Sex

Variable	Males			Females		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Race	0.538	0.583	1.712	1.850*	0.916	6.363
Site1	1.052	0.765	2.863	2.598	1.843	13.440
Site2	1.168	0.799	3.215	2.800	1.843	16.445
Site3	1.000	0.905	2.718	2.141	1.732	8.511
Age	-0.113	1.139	0.893	-0.215	0.943	0.807
SES	-0.027	0.029	0.973	-0.022	0.036	0.978
ADHD–C	-0.176	0.156	0.839	0.106	0.100	1.112
Substance use	-0.543	0.389	0.581	-1.535	0.836	0.216
CD symptoms	0.883***	0.209	2.419	0.977*	0.461	2.655
CU traits	0.969	0.982	2.635	1.473	0.912	4.364

Note: OR = Odds ratio; * = p < 0.05; *** = p < 0.001

The male and female models accounted for approximately 38% ($R^2 = 0.379$) and 66% ($R^2 = 0.663$) of the variance, respectively. The models indicated that CD symptoms

predicted sexual solicitation for both males and females. The model for males indicated that, controlling for the effects of race, site, age, SES, ADHD–C symptoms, and substance use at grade 7, for every one-unit increase in CD symptoms the odds of sexual solicitation were 2.419 times greater given that all of the other variables in the model were held constant ($p < 0.001$). The model for females revealed that, after controlling for all covariates, for every one-unit increase in CD symptoms the odds of sexual solicitation were 2.655 times greater given that all of the other variables in the model were held constant ($p < 0.05$).

3.4.14. Exploratory Sex Analyses: Risky Sexual Behaviour Composite

Exploratory analyses were conducted to investigate sex differences in the relationship between CD symptoms, CU traits, and their interaction on risky sexual behaviour. Table 32 presents the results of these analyses.

Table 32. Binary Logistic Regression Models Estimating the Effects of CD Symptoms, CU Traits, and Their Interaction on Risky Sexual Behaviour, Separately by Sex

Variable	Males			Females		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Race	0.474	0.380	1.606	0.285	0.423	1.330
Site1	1.616**	0.478	5.031	0.092	0.655	1.097
Site2	0.732	0.527	2.079	-0.659	0.536	0.517
Site3	-0.821	0.468	0.440	-0.719	0.515	0.487
Age	-0.291	0.440	0.748	0.549	0.440	1.732
SES	0.015	0.018	1.015	-0.012	0.015	0.988
ADHD–C	0.072	0.081	1.075	-0.105	0.083	0.900
Substance use	-0.047	0.242	0.954	0.063	0.280	1.065
CD symptoms	-0.517	0.557	0.596	-0.821	0.697	0.440
CU traits	-0.490	0.661	0.613	-0.902	0.604	0.406
CD symptoms x CU traits	1.049	0.739	2.854	0.727	0.796	2.068

Note: OR = Odds ratio; ** = $p < 0.01$

The male and female models accounted for approximately 27% ($R^2 = 0.265$) and 11% ($R^2 = 0.113$) of the variance, respectively. CD symptoms, CU traits, and their interaction did not significantly predict risky sexual behaviour in either model. As the

interaction between CD symptoms and CU traits did not significantly predict risky sexual behaviour in the male or female model, the models were trimmed to examine the main effects of CD symptoms and CU traits on risky sexual behaviour, separately by sex. Table 33 presents the results of these analyses.

Table 33. Binary Logistic Regression Model Estimating the Effects of CD Symptoms and CU Traits on Risky Sexual Behaviour, Separately by Sex

Variable	Males			Females		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Race	0.421	0.381	1.524	0.292	0.422	1.339
Site1	1.582**	0.470	4.864	0.061	0.644	1.063
Site2	0.729	0.523	2.073	-0.670	0.538	0.512
Site3	-0.798	0.461	0.450	-0.751	0.509	0.472
Age	-0.290	0.420	0.748	0.511	0.438	1.668
SES	0.012	0.017	1.012	-0.013	0.016	0.987
ADHD–C	0.078	0.082	1.081	-0.108	0.086	0.897
Substance use	-0.088	0.231	0.916	0.080	0.278	1.083
CD symptoms	0.164	0.183	1.179	-0.367	0.393	0.693
CU traits	-0.136	0.586	0.873	-0.763	0.559	0.466

Note: OR = Odds ratio; ** = $p < 0.01$

The male and female models accounted for approximately 11% ($R^2 = 0.106$) and 24% ($R^2 = 0.241$) of the variance, respectively. Neither CU traits nor CD symptoms differentially predicted risky sexual behaviour for either males or females.

Chapter 4.

Discussion

The present study aimed to investigate the role of CD symptoms, CU traits, and their interaction in predicting risky sexual behavior in a sample of 683 males and females, oversampled for high rates of externalizing behavior problems at school entry, from four geographical locations in the United States. Given the limited research focusing on the unique role of CU traits in accounting for incremental variance in risky sexual behavior over and above CD symptoms, this was investigated in the current study. Further, little research has examined whether CD symptoms and CU traits interact to predict risky sexual behaviour. Of further interest was the investigation of sex as a potential moderator in the relationship between CD symptoms, CU traits, and their interaction in predicting risky sexual behaviour.

This study was conducted as a replication and extension of Wymbs et al.'s (2013) recent study. These researchers explored how CD symptoms, CU traits, and their interaction predicted sexual intercourse by age 13, unprotected sex in grade 12, and pregnancy by grade 12. The authors operationalized sexual intercourse as sexual activity including oral, anal, and vaginal sex. However, this is more reflective of sexual activity overall, as opposed to sexual intercourse per se. Given this, in the current study sexual intercourse was specified as vaginal intercourse only (i.e., "when I say intercourse, I mean when a male inserts his penis into a female's vagina"). Further, Wymbs et al. operationalized unprotected sex as lack of birth control use; in the current study, unprotected sex was operationalized by measures of condom use.

Due to the limited nature of previous research, the current study did not propose specific hypotheses for the relationships between CD symptoms, CU traits, and their interaction on risky sexual behaviour outcome variables. A series of regression analyses were conducted to determine these relationships, controlling for relevant psychopathology covariates (i.e., ADHD–C and substance use at grade 7) and

demographic variables (i.e., sex, race, site, age, and SES). Additionally, exploratory analyses were conducted to investigate the potential moderating nature of sex on the relationships between CD symptoms, CU traits, and their interaction on risky sexual behaviour outcome variables.

Age of First Sexual Intercourse. CD symptoms and CU traits uniquely significantly predicted age of first sexual intercourse. Controlling for the effects of sex, race, site, age, SES, ADHD–C symptoms, and substance use at grade 7, for every one-unit increase in CD symptoms, the odds of first engagement in sexual intercourse by age 14 versus first engagement in sexual intercourse at age 15-16 or at age 17 or older were 1.848 times greater when all of the other variables in the model were held constant. Further, for every one-unit increase in CU traits, the odds of first engagement in sexual intercourse by age 14 versus first engagement in sexual intercourse at age 15-16 or at age 17 or older were 3.642 times greater when all of the other variables in the model were held constant. These findings are consistent with research conducted by both CPPRG (2014) and Schofield (2008); they found that aggressive-disruptive behaviour was significantly related to early engagement in sexual intercourse. Similarly, this research aligns with multiple studies citing the relationship between CD symptoms, CD, or childhood antisocial behaviour, and subsequent early engagement in sexual intercourse (Bardone et al., 1998; Monuteaux et al., 2007; Paul et al., 2000; Ramrakha et al., 2007).

In contrast to the findings in the current study, Wymbs et al. (2013) found that CU traits and CD symptoms interacted to predict early engagement in sexual intercourse, with those high in both conduct problems and CU traits being significantly more likely than youth with high levels of conduct problems and low CU traits to engage in early sexual intercourse. In the current study, this interaction was not found. However, differences in the way sexual intercourse was operationalized may account for the different findings. Wymbs et al. defined sexual intercourse as vaginal, anal, or oral sex; however, in the current study, sexual intercourse was strictly defined as vaginal intercourse. The inclusion of multiple forms of sexual activity possibly resulted in more individuals endorsing engagement in sexual intercourse at an earlier age. The inclusion of

oral and anal sex may also speak to different risk behaviours and be related to very different trajectories of risky, or safe, sexual behaviour when engaged in at different developmental stages.

Exploratory analyses of sex as a potential moderator showed that both CD symptoms and CU traits predicted age of first sexual intercourse among males, but not females. For every one-unit increase in CD symptoms and CU traits, the odds of first engagement in sexual intercourse for males by age 14 versus first engagement in sexual intercourse at age 15-16 or at age 17 or older, were 1.949 and 9.273 times greater, respectively. Similarly, Capaldi, Crosby, and Stoolmiller (1996), found that childhood antisocial behaviour significantly predicted age of first sexual intercourse in males, with those with more antisocial behaviour being more likely to engage in sexual intercourse at a younger age. However, in contrast with the current study, Pajer et al. (2007) found a significant relationship between CD and early engagement in sexual intercourse among females. However, these results may be explained by Pajer et al.'s operationalization of early sexual intercourse; the authors defined early sexual intercourse as occurring by age 17, overlapping with the least-risky category of sexual intercourse in the present study.

Given previous research attesting to heightened sensation seeking (Essau, Sagagawa, & Frick, 2006) and fearless (Pardini, 2006) qualities among those with elevated CU traits, the significant relationship between CU traits and age of first sexual intercourse among males but not females in the current study may be explained by sex-specific concerns regarding sexuality. While females may be more wary of negative consequences regarding early engagement in sexual intercourse (e.g., pregnancy), males bear fewer consequences for engaging in risky sexual practices.

Condom Use. A similar pattern of results was found for condom use. CD symptoms and CU traits each significantly predicted condom use, with those scoring higher on CD symptoms and CU traits being more likely to engage in infrequent condom use. However, as with age of first sexual intercourse, the interaction between CD symptoms and CU traits did not significantly predict condom use. The finding that CD

symptoms significantly predicts condom use is congruent with previous research by Ramrakha et al. (2007) and Wu et al. (2010) showing that antisocial behaviour and adolescent conduct problems, respectively, predict less frequent condom use in adolescence. Previous research had not explored how CU traits may predict condom use, and therefore the current findings are novel.

When exploratory analyses were conducted to investigate the potential moderating qualities of sex, the interaction between CD symptoms and CU traits was found to be significant among males. Among males with low CU traits, CD symptoms did not significantly predict condom use; however, CD symptoms significantly predicted condom use among males with elevated CU traits, such that for every one standard deviation increase in CU traits among males, condom use scores decreased 0.715 standard deviations. Among females, only CD symptoms significantly predicted condom use. For every one standard deviation increase in CD symptoms among females, condom use scores decreased 2.077 standard deviations.

Similarly to the results regarding age of first sexual intercourse, these results may point to sex-specific sexual practices such that males may feel less responsibility to practice safe sex (i.e., use condoms) than females (e.g., to prevent becoming pregnant). In the current study, both CU traits and CD symptoms played a role in condom use among males. CD symptoms and CU traits interacted to predict condom use, such that males with both elevated CD symptoms and CU traits were more likely to engage in infrequent condom use than males with elevated CD symptoms and low CU traits. Among females, CD symptoms predicted less frequent condom use, while CU traits did not significantly account for this relationship. These results may be partially understood by the tendency of individuals with elevated CD symptoms to violate age-appropriate societal rules. While these youth may be aware of safe sexual practices, such as using condoms, they may choose to disregard them. However, among males, both rule-violation and features such as callousness and lack of empathy may play a role in decisions regarding condom use.

Pregnancy. CU traits, but not CD symptoms or their interaction with CU traits, significantly predicted pregnancy**,** such that for every one-unit increase in CU traits, the odds of pregnancy (experiencing or causing) during high school were 2.806 times greater. In contrast, Wymbs et al. (2013) found that CD symptoms significantly predicted pregnancy, with those high in CD symptoms more likely to experience or cause a teen pregnancy than those low on CD symptoms, regardless of level of CU traits. The present study employed a more racially and geographically diverse sample than Wymbs et al., which may explain the observed differences in results. Similarly, CPPRG (2014) found that aggressive-disruptive symptoms, measured in kindergarten, were highly significantly positively related with adolescent pregnancy. However, CPPRG employed a larger sample ($N = 1091$), and measured aggressive-disruptive symptoms as opposed to CD symptoms, which may explain the difference in results.

Exploratory analyses of sex as a potential moderator suggested a single sex-specific relationship between CU traits and pregnancy, such that CU traits significantly predicted pregnancy among males but not females. The model for males indicated that for every one-unit increase in CU traits, the odds of pregnancy in high school were 3.757 times greater. Neither CD symptoms nor their interaction with CU traits predicted pregnancy among males or females. These results are consistent with research by Frick et al. (2003b) showing that individuals with elevated CU traits prefer novel, exciting, and dangerous activities. It may be that males with elevated CU traits are less concerned about the consequences of pregnancy and of the wishes of others in regards to causing a pregnancy, and are thus more likely to cause them. In contrast to the present study, research by Woodward and Fergusson (1999) and Fergusson and Woodward (2000) indicated that childhood conduct problems significantly predicted pregnancy among females by age 18.

Contracting an STI(s). Neither CU traits, CD symptoms, nor their interaction predicted contracting an STI during adolescence or young adulthood. Research by CPPRG (2014) and Wu et al. (2010) found that aggressive-disruptive behaviours and conduct problems, respectively, predicted a greater likelihood of contracting an STI

during adolescence or early adulthood. The sample employed by CPPRG was similar to the sample employed in the current study (i.e., the current study used the high-risk control and normative samples; CPPRG used the high-risk control and intervention groups, as well as the normative sample). Wu et al. used a sample comprised of approximately half of the sample employed in the current sample (i.e., they used the high-risk control sample only). Further, both CPPRG and Wu et al. explored the relationship between childhood aggressive-disruptive behaviours and conduct problems, respectively, and contracting an STI. In contrast, the current study measured CD symptoms. Therefore, the differences in type and size of sample, as well as the different measures of disruptive behaviour problems, may account for the differences in findings. The current study employed a weighting variable to ensure the sample was relatively normally-distributed, and did not include participants who participated in the Fast-Track intervention.

The investigation of the relationship between CU traits and contracting an STI was novel and, therefore, so was the finding that CU traits and contracting an STI are not significantly related. Given this, the present study has established a precedent in regards to research findings in this area. Similarly to the total sample analyses, CD symptoms, CU traits, and their interaction did not predict contracting an STI among either males or females in the split sample.

Sexual Solicitation. CD symptoms significantly predicted engaging in sexual solicitation during adolescence or adulthood, such that the odds of engaging in sexual solicitation during adolescence or young adulthood increased by a factor of 2.413 for every one-unit increase in CD symptoms. Wu et al. (2010) found that children with elevated conduct problems were five times more likely to receive money for sexual services during high school than those with low conduct problems. However, no research had investigated how CU traits, and the interaction between CD symptoms and CU traits might be associated with sexual solicitation. The current study found that neither CU traits nor the interaction between CD symptoms and CU traits predicted engagement in

sexual solicitation. Similar to findings within the total sample, CD symptoms predicted sexual solicitation among both males and females.

Risky Sexual Behaviour Composite. When exploring the relationship between CD symptoms, CU traits, their interaction and the risky sexual behaviour variable, it was found that the interaction between CD symptoms and CU traits was significant and the main effects of CD symptoms and CU traits approached significance. Among those with low CU traits, CD symptoms did not significantly predict risky sexual behaviour. CD symptoms approached significance among those with elevated CU traits, such that for every unit increase in CD symptoms, the odds of an individual with high CU traits engaging in risky sexual behaviour increased by a factor of 1.376. Exploratory analyses of sex as a potential moderator were not significant.

4.1. Summary of Findings

Table 34 summarizes the significance of regression analyses in the current study, using the total sample. Both CU traits and CD symptoms were independent predictors of age of first sexual intercourse and condom use. CU traits also significantly predicted pregnancy and CD symptoms also significantly predicted engaging in sexual solicitation. The interaction of CU traits and CD symptoms only significantly predicted the risky sexual behaviour composite.

Table 34. Summary of Significance of Regression Analyses (Total Sample)

Outcome Variable	Predictor Variable		
	CU traits	CD symptoms	CU traits x CD symptoms
Onset of sexual intercourse	**	**	NS
Condom Use	*	*	NS
Pregnancy	*	NS	NS
Contraction of STI(s)	NS	NS	NS
Sexual Solicitation	NS	***	NS
Risky Sexual Behaviour Composite	NS	NS	*

Note: * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$; NS = not significant

Table 35 summarizes the results of the exploratory regression analysis that were conducted separately for males and females. Both CU traits and CD symptoms were independent predictors of age of first sexual intercourse among males, but not females. CU traits and CD symptoms interacted to predict condom use among males; however, only CD symptoms predicted condom use among females. CU traits, but not CD symptoms, independently predicted pregnancy among males only. CD symptoms, but not CU traits, independently predicted sexual solicitation among both males and females. CU traits, CD symptoms, and their interaction did not differentially predict either the contraction of STIs or the risky sexual behaviour composite among males or females.

Table 35. Summary of Significance of Regression Analyses (Split by Sex)

	Predictor Variable					
	Males			Females		
Outcome Variable	CU traits	CD symptoms	CU traits x CD symptoms	CU traits	CD symptoms	CU traits x CD symptoms
Onset of Sexual Intercourse	***	**	NS	NS	NS	NS
Condom Use	NS	NS	*	NS	**	NS
Pregnancy	*	NS	NS	NS	NS	NS
Contraction of STI(s)	NS	NS	NS	NS	NS	NS
Sexual Solicitation	NS	***	NS	NS	*	NS
Risky Sexual Behaviour Composite	NS	NS	NS	NS	NS	NS

Note: * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$; NS = not significant

4.2. Strengths and Limitations

This study has multiple strengths. This was one of two initial studies to establish that CU traits and the interaction between CU traits and CD symptoms provide incremental variance, over and above CD symptoms alone, to understanding risky sexual health outcomes in adolescence and early adulthood. Further, this study made use of a large, diverse, longitudinal sample as well as prediction of sexual activity from early adolescence to early adulthood.

However, several limitations are present in this study that restrict generalizability. First, the measure of CU traits used in this study, the APSD, is not the gold-standard tool for measuring CU traits due to its limited assessment of CU traits and poor reliability (Pardini et al., 2003). Recently, Frick (2004) developed the Inventory of Callous-Unemotional Traits (ICU), which was designed to measure multiple facets of CU traits.

This self-report rating scale contains 24 items that are founded upon items from the CU subscale of the APSD, but further explore the affective features of psychopathy (i.e., callousness, uncaring, and unemotional characteristics). Future studies may explore these research questions of the current study while measuring CU traits using the ICU.

Another limitation of the current study is important to address on the basis of research investigating the validity of youth self-report measures, particularly that examining risky behaviours. Although some studies have found high test-retest reliability when exploring sexual behaviours (Davoli, Perucci, & Sangalli, 1992; kappa values around 60-70%), others have observed the test-retest validity of these behaviours to be highly variable (Brener et al., 2002; kappa values ranging from 40-90%). Further research has found gender and race differences among response inconsistencies, such that Caucasian females had the lowest levels of inconsistencies in their reports of lifetime sexual intercourse, and African American males had the highest (Alexander, Somerfield, Ensminger, Johnson, & Kim, 1993). In the current study, sexual behaviour was explored at a number of different time points across adolescence, which likely assisted in accounting for variant responses across time. Many researchers have argued that the best way to ensure valid measurement of sexual behaviour is to use biochemical or biological confirmation (e.g., medical test records; physical evaluations). Albeit valid, this method of measurement has many drawbacks, such as invasiveness, costliness, and lack of feasibility. Further, previous research has compared the validity of different modes of questionnaire administration, exploring frequency of responses for different health-risking behaviours. Computer-assisted self-interviewing, as used in the current study, has shown to yield higher rates of youth-reported risky sexual behaviours, such as intercourse with a prostitute and number of sexual partners, among males than a self-administered interview (Turner et al., 1998). However, for other sexual behaviours that are often considered less sensitive, such as frequency of heterosexual intercourse among males, sexual intercourse among both sexes, and condom use among both sexes, no difference was found between computer-assisted and self-administered interviewing (Turner et al., 1998; Webb, Zimet, Fortenberry, & Blythe, 1999). Given these results, computer-assisted

self-interviewing may be the best, and most feasible, current option to collect data regarding risky sexual behaviour.

Another limitation of the current study concerns one of the risky sexual behaviours investigated, sexual solicitation. This variable had extremely low base rates (n = 35; 5.1%) and may also be a more serious and detrimental risky sexual behaviour than the other variables examined in this study. For example, two participants, one who engaged in sexual solicitation and one who engaged in sexual intercourse at age 14, would both score a 1 (i.e., risky) on the risky sexual behaviour composite.

The current study focused solely on risky sexual behaviour in the context of heterosexual relationships. Namely, sexual intercourse was defined as sexual intercourse engaged in by a male and a female, excluding information regarding sexual intercourse between same-sex couples. Future research may address this limitation by exploring the relationship between CU traits, CD symptoms, and their interaction, with risky sexual behaviour in groups of adolescents and young adults from diverse sexual and gender orientations. In these populations, different sexual behaviours may be reflective of risky sexual behaviour than in a predominantly heterosexual sample (e.g., causing or experiencing a pregnancy would be irrelevant among a gay or lesbian sample).

4.3. Implications

This research is meaningful for several reasons. First, it is important that risky sexual behaviours are better understood in order to limit these health-risking behaviours. The current findings may provide a foundation for developing and implementing interventions to address these behaviours.

Previous researchers have measured the treatment efficacy of interventions targeting risky sexual behaviour, and have found positive results (e.g., Good Behaviour Game, Kellam et al., 2014; Seattle Social Development Project, Hill et al., 2014; Fast Track, Dodge et al., 2015). For example, the recent study by Dodge et al. found that the

Fast Track preventive intervention significantly decreased number of lifetime sexual partners and risky sexual behaviour in the past 12 months (measured by the sum of two scales capturing new-partner condom nonuse and regular-partner condom nonuse), among participants at age 25 (i.e., 8 years after the end of the intervention). However, to the best of the author's knowledge, no interventions have been created or implemented to target risky sexual behaviour among those with elevated CU traits. Therefore, it is of paramount importance that this area of research is better understood in order to create preventions or interventions to target risky sexual behaviour among this particular population.

4.4. Future Directions

Taken together, this study underscores late childhood CD symptoms, CU traits, and their interaction as important risk factors for risky sexual behaviour during adolescence and early adulthood. In light of the addition of "limited prosocial emotions" as a CD diagnostic criteria specifier in the DSM–5 (APA, 2013), further research is needed to determine the degree to which CU traits and the interaction between CD symptoms and CU traits increase risk of other risk behaviours, as has been conducted by others (e.g., Frick et al., 2003a [delinquency]; Wymbs et al., 2012 [substance use]). Research is needed to explore how CU traits, CD symptoms, and their interaction predict triad risk behaviours (i.e., risky sexual behaviour, delinquency, and substance use), in a comprehensive study employing a normally-distributed sample of high-risk and normative adolescents and young adults.

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