

**Conduct Disorder in Female Offenders: Relationship of Callous-Unemotional Traits,  
Depression, and Risk Taking**

by

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## Abstract

Although male delinquency rates remain higher than those of females, female delinquency has been on the rise while the rates among males have been decreasing. The study of female adolescent offenders remains relatively neglected, entreatng more research to better understand this population of youth and, in turn, improve prevention and intervention efforts. The present study sought to investigate the relationship between levels of psychopathy (Callous-Unemotional traits), depression, and risk taking tendency on the severity of conduct problems among a sample of female juvenile offenders. Seventy-one female offenders from a boot camp style residential facility completed a computerized risk taking task and were evaluated for levels of self-reported psychopathy, depression, and conduct problems. A path analytic model was proposed to test both direct and indirect effects of the study variables on severity of conduct problems. Our model proposed that depression, CU traits, and risk taking would each predict level of conduct problems. Additionally, it was proposed that depression and CU traits would predict risk taking. The overall model accounted for 15.2% of the variability in conduct problems and major fit statistics indicated that the model fit the data reasonably well. Depression was the only variable found to have a significant effect on conduct disorder symptomatology. Although risk taking failed to have a significant effect on conduct problems, its removal from the overall model resulted in a slight worsening of the overall fit of the model. Clinical and future research implications are discussed.

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## Introduction

Juvenile delinquency incurs enormous costs across individual, social, and economic levels. Such costs include those incurred from detaining youth, law enforcement, victim needs, families of offenders, health and mental health care, as well as the emotional impact such behaviors have on the victims, the offending youth themselves, and society at large (Werry, 1997). The costs of juvenile delinquency have been estimated monetarily to be between \$1.3 and \$1.5 million over the lifetime of a chronic juvenile offender (Cohen, 1998).

Many juvenile offenders may meet diagnostic criteria for Conduct Disorder (CD). The DSM-IV-TR states that the diagnosis of Conduct Disorder is characterized by a “repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated” (American Psychiatric Association, 2000). Symptom categories include physical aggression, property destruction, deceitfulness or theft, and serious violation of rules. Three symptoms from these categories over at least a one-year period must be present for diagnostic criteria of CD to be met. Prevalence rates have varied, with estimates from community samples ranging from approximately 2 to 16 percent among males and approximately 1 to 9 percent among females (Loeber, Burke, Lahey, Winters, & Zera, 2000). CD among youth has been associated with significant problems in adulthood including illegal behavior, low educational attainment, low socio-economic status, substance dependence, and teenage parenthood (Bardone, Moffitt, Caspi, Dickson, & Silva, 1996; Olssen, Hansson &

Cederblad, 2006; Pajer, 1998).

Although male delinquency rates remain higher than those of females, female delinquency has been on the rise while the rates among males have been decreasing (Stahl, 2008). Nationwide, the number of female delinquents in custodial care rose 96% between 1991 and 2003 (Snyder & Sickmund, 2006). CD has been identified as the second most frequently diagnosed psychiatric disorder among female adolescents (Cohen, Cohen & Brook, 1993). Conduct Disorder in adolescent girls has been correlated with substance abuse/dependence, early and violent death, arrest, failure to graduate from high school, pregnancy (Zoccolillo, Tremblay, & Vitaro, 1996), early sexual debut, engaging in health risk behaviors such as unprotected sex (Pajer, Kazmi, Gardner, & Wang, 2007) and contraction of sexually transmitted diseases (Bardone et al., 1998). Females who develop CD appear to represent a particularly severe population in terms of dysfunction and outcome. Tiet, Wasserman, Loeber, McReynolds, and Miller (2001) noted that girls who exhibit conduct problems appeared to display a greater variety of conduct problems than males. Additionally, very high rates of psychopathology have been found among female juvenile offenders, often meeting criteria for two or more DSM-IV-TR (American Psychiatric Association, 2000) diagnoses in addition to CD (including substance abuse disorders, depression, posttraumatic stress disorder, and other anxiety disorders) (Dixon, Howie, & Starling, 2004; Odgers, Burnette, Chauhan, & Reppucci, 2005).

Female juvenile offenders appear to represent a vulnerable group of youth with substantial mental health needs. The development of assessment and intervention strategies for juvenile offenders has been largely based on the understanding of males



(Zahn, Hawkins, Chiancone, Whitworth, 2008) and little is known about the appropriateness of these strategies for female juvenile offenders. The study of psychopathy and psychopathic traits and its applicability to females is an area of increasing interest and concern. Additionally, many questions remain regarding the impact of the frequent comorbidity between CD and other disorders, particularly the strong relationship between depression and conduct disorder among female adolescents. This relationship appears to be an important one, but one that remains poorly understood (e.g. Obeidallah & Earls, 1999). Another promising avenue for the assessment of delinquency and conduct disorder is the recent increase in research on risk taking behavior. Risk taking and related constructs (e.g. impulsivity, sensation seeking) have long been recognized and investigated in terms of their relation to problematic behaviors (e.g. Daugherty & Quay, 1991; Gorenstein & Newman, 1980; Jessor & Jessor, 1977; Zuckerman, 1979). The current study seeks to explore psychopathy, depression, and risk-taking as they relate to levels of conduct problems among our sample of female adolescents.

## Literature Review

### *The Development of Conduct Disorder*

The traditional developmental models of CD describe two pathways: childhood or adolescent onset (Moffitt, 1993; Moffitt & Caspi, 2001). The childhood onset pathway predicts a poorer prognosis, with increased cognitive or neuropsychological disturbances, and a more severe, aggressive, and chronic pattern of antisocial behavior relative to the adolescent onset pathway. Silverthorn and Frick (1999) argued that this traditional conceptualization does not appear to fit the pattern of development of CD in females, who typically exhibit an onset of CD in adolescence, but show a pattern of dysfunction and behavior more similar to that of childhood onset CD males (more severe, chronic antisocial behavior, with increased cognitive or neuropsychological dysfunction) and proposed a delayed onset pathway as an alternative model for describing CD among females. Boys presenting with childhood onset CD and girls presenting with a delayed onset of CD both exhibit a similar personality style characterized by impulsivity and callousness (Silverthorn & Frick, 1999) and a long-standing pattern of antisocial behavior (Moffitt, Caspi, Dickson, Silva, & Stanton, 1996).

### *Psychopathy*

Psychopathy was initially defined by Cleckley (1941, 1976) as a personality disorder that presents itself through risk-taking, sensation seeking, and engagement in criminal activities and is characterized by egocentrism, grandiosity, forcefulness and cold-heartedness. Cleckley described these individuals as displaying shallow emotions, lacking empathy, anxiety and remorse, and being unable to maintain close relationships. Cleckley also acknowledged that psychopathy likely has its onset in childhood or

adolescence. More recently, Cooke and colleagues (Cooke & Michie, 2001; Cooke, Michie, Hart, & Clark, 2004) defined psychopathy as encompassing three important dimensions: 1) an arrogant and deceitful interpersonal style characterized by superficial charm, self centeredness, grandiosity, lying, manipulation, and conning; 2) an impulsive or irresponsible behavioral style that includes excitement-seeking, impulsiveness, lack of future goals, and a parasitic lifestyle; and 3) a deficient affective experience that is characterized by low guilt and remorse, low empathy, callousness, shallow affect, and a lack of acceptance of responsibility for one's actions. It is this final dimension that has drawn particular research interest in attempting to translate the construct of psychopathy to the child and adolescent population. Psychopathic adult offenders commit more crimes than other offenders, have a tendency to engage in more violent behavior than average offenders (Hare, 1981); recidivate more frequently than other offenders following release from prison (Hart, Kropp, & Hare, 1988) and tend to be less amenable to therapeutic rehabilitation efforts (Ogloff, Wong, & Greenwood, 1990). It is noteworthy that newer research has raised questions regarding the claim that psychopathy is untreatable, suggesting that treatment may be as effective for reducing violent behavior among psychopathic and non-psychopathic adult offenders alike (Skeem, Monahan, & Mulvey, 2002).

There is evidence that a small group of youthful offenders is responsible for a disproportionate amount of crime as adolescents and adults (Fergusson & Horwood, 2002; Loeber & Farrington, 2000; Moffitt, 1993; Moffitt & Caspi, 2001). This is true for both male and female juvenile offenders (Moffitt, Caspi, Rutter, & Silva, 2001). Consequently, there has been an increased demand by the juvenile court system to

identify future chronic offenders as a means of focusing intervention efforts (Petrila & Skeem, 2003). Relying on diagnostic classification of CD or Oppositional Defiant Disorder (ODD) has not been particularly effective in helping to identify this small group of very serious offenders within the heterogeneous group of youth with conduct problems (Cruise, Colwell, Lyons, & Baker, 2003). Similarly, it appears that the traditional severity distinction between child and adolescent onset CD does not appear to distinguish among females as effectively as it has been applied to males. As a result, researchers have begun to investigate other means of identifying these severe offenders. In particular, there has been increasing attention paid to the potential role of psychopathic traits as a means of identifying youth whose presentation may represent a more severe and long-standing form of CD. The assessment of psychopathy among youth has received increased attention, although there has been little focus on girls specifically. This interest in applying the construct of psychopathy to younger populations has arisen, in part, from its clinical utility among adult offenders as a means of predicting future violent and antisocial behavior (Edens, Skeem, Cruise, & Cauffman, 2001). There has been the hope that if psychopathy can be effectively applied to younger populations, early identification and intervention could substantially reduce the number of adult psychopathic offenders or decrease the amount of crime and violent behavior among such adults.

*Callous-Unemotional Traits as Markers of Psychopathy Among Youth.* Among youth with CD, a subgroup appears to exist that displays psychopathic traits, and in turn demonstrates a poorer prognosis, with greater longevity and severity of antisocial behavior (Frick, 1998; Marshall & Cooke, 1999). Frick and colleagues (Frick, 1998;

Frick et al., 2003b; Frick & Ellis, 1999) have proposed that youth who demonstrate a callous and unemotional personality style share characteristics that may represent the precursors to adult psychopathy. Callous-unemotional (CU) traits are considered to be the hallmark childhood precursors to adult psychopathy (Barry et al., 2000) and such traits are critical to most conceptualizations of adult psychopathy (Hare, Hart, & Harpur, 1991). CU traits include a lack of guilt, callous use of others for personal gain, and deficient empathy (Frick & White, 2008). It has been hypothesized that a childhood temperament characterized by low emotional reactivity when presented with aversive stimuli, poor responsiveness to punishment cues, and low levels of fearfulness, originally described by Kagan and Snidman (1991), sets the stage for the development of CU traits (Frick & Ellis, 1999; Frick, Cornell, Barry, Bodin, & Dane, 2003a). There has been support for the relationship between CU traits and psychopathy. Barry and colleagues (2000) found that within a group of children diagnosed with ADHD and either ODD or CD, those rated high on CU traits were found to display features similar to those associated with adult psychopathy, including low fearfulness, a reward-dominant response style, and a lack of distress related to their behavioral problems. Research has shown that CU traits have been associated with type of aggression and more serious offending in antisocial youth. For example, sexual offending youth have been shown to display higher CU traits than either violent (but non-sexual) or property and other nonviolent offenders (Caputo, Frick, & Brodsky, 1999). Among a sample of severe juvenile offenders, those scoring higher on a measure of CU traits exhibited a pattern of repeated, instrumental, and sadistic violence against others, whereas violence and offending history did not distinguish between these youth (Kruh, Frick, & Clements,

2005). CU traits have been associated with lower levels of trait anxiety (Andershed, Gustafson, Kerr, & Stattin, 2002; Frick, Lillienfeld, Ellis, Loney, & Silverthorn, 1999; Pardini, Lochman, & Powell, 2007), generally after controlling for level of conduct problems. Additionally, CU traits have been associated with higher scores on measures of sensation seeking, thrill-seeking, and lower sensitivity to punishment when primed for a reward-dominant response set (Essau, Sasagawa, & Frick, 2006; Fisher & Blair, 1998; Frick et al., 2003a; Pardini, 2006), consistent with the adult literature. Among youth high on CU traits, deficits have been found in their processing of negative emotional stimuli, including indications of distress and fear in others (Blair & Coles, 2000; Kimonis, Frick, Munoz, & Aucoin, 2007; Kimonis, Frick, Kazekas, & Loney, 2006; Loney, Frick, Clements, Ellis, & Kerlin, 2003). Loeber, Burke and Lahey (2002) found that youth with CD who developed antisocial personality disorder as adults were more likely to exhibit CU traits than youth who did not progress to antisocial personality disorder.

The literature regarding callous-unemotional (CU) traits has indicated that these function as valid and stable predictors of very severe and chronic antisocial behavior in youth. Christian, Frick, Hill, Tyler, and Frazer (1997) found that children rated high on symptoms of ODD and CD, who also exhibited high levels of CU traits, displayed a greater variety and number of conduct problems, greater parental history of antisocial personality disorder, a greater number of previous police contacts and higher intelligence than other children with conduct problems in the absence of CU traits. Frick and colleagues (2003b) examined the predictive validity of CU traits and found that children with both CU traits and conduct problems exhibited a greater variety and number of conduct problems at a one-year follow up than children with conduct problems alone.

Frick and colleagues (2003a) investigated the 4-year stability of psychopathic traits in youth and found that for parent ratings of CU traits, very high levels of stability were found. Among a large community sample, CU traits were shown to predict the number and severity of conduct problems at 12 and 24 month follow-up (Moran, Ford, Butler, & Goodman, 2008). The measurement of CU traits appears to be an effective means of identifying youth with particularly severe and chronic antisocial and aggressive behavior among youth who exhibit conduct problems (Frick & White, 2008).

*CU Traits Among Females.* Though well-studied in boys, the role of CU traits in females is less well understood. Very few studies have examined females specifically, although a number of investigations have used samples including both male and female participants. Findings to date suggest that boys tend to score higher on measures of CU traits than girls (Essau et al., 2006), consistent with adult literature showing higher levels of psychopathy among men than women, with the relationship between antisocial behavior and psychopathy being comparable for both genders (Nicholls, Ogloff, & Douglas, 2004; Vitale & Newman, 2001). In one study that included a small sample of girls, CU traits predicted delinquency one year later, with or without the presence of conduct problems at the time of the initial assessment (Frick et al., 2003a). Additionally, the investigators found that level of CU traits was a stronger predictor of later delinquency among females than males. Marsee, Silverthorn, and Frick (2005) found that CU traits, as reported by teachers, were positively correlated with self reported aggression for girls, but not boys. For boys in this sample, total levels of psychopathy, rather than CU traits specifically, were associated with aggression and self-reported delinquency, suggesting that CU traits may be particularly useful for the assessment of

girls. Among a sample of female juvenile offenders, CU traits were shown to relate to proactive physical aggression and, in particular, to proactive relational aggression (Marsee & Frick, 2007). Hipwell and colleagues (2007) investigated CU traits among a large community sample of 7 and 8 year-old girls and found that hyperactivity/impulsivity and negative emotionality were related to conduct problems, but were not related to CU behaviors after controlling for level of conduct problems. Dadds and colleagues (2009) investigated CU traits among children (3-13 years) and found that boys, but not girls, with CU traits demonstrated deficits in parent-reported affective empathy (i.e. experiencing congruent emotional reactions to the emotions and circumstances of others). Both boys and girls high on CU traits showed deficits in cognitive empathy (i.e. understanding of the emotions and circumstances of others). Overall, these findings suggest that the assessment of CU traits among female adolescents may be a valuable means of identifying girls with particularly severe conduct problems, but further investigation is needed to establish this relationship and further explore the correlates of CU traits among female adolescents. Moffitt and colleagues (2008) recently advocated for increased research on CU traits among girls to determine whether these can be equally beneficial in the assessment of both girls and boys.

*CU Traits and Internalizing Symptoms.* The relationship between CU traits and emotional problems among females has received little research attention and has remained unclear. Overall, girls with conduct problems tend to display high levels of negative emotionality and comorbid emotional disorders, including depression and anxiety (Keenan, Loeber, & Green, 1999; McGee & Stanton, 1992; Zoccolillo, 1993), but the relationship between CU traits and affective problems has largely been unexplored.



According to some models of female depression, girls are socialized from an early age to display greater levels of empathy and guilt than boys, to engage in more prosocial behavior, and to more frequently reflect on their own behavior (Zahn-Waxler, 2000). Additionally, gender differences exist in societal influences that discourage female self-expression and emphasize the importance of females' caring for the needs and feelings of others, possibly contributing to the higher risk of depression among females (Zahn-Waxler, Cole & Barrett, 1991). Zahn-Waxler and colleagues (1991) proposed that these socialization influences set the stage for girls to be more sensitive to the distress of others, but without being armed with effective coping skills for managing this emotional vulnerability. In possible support of this hypothesis, higher levels of emotional expressiveness among females, guilt, and concern about others have been associated with a higher risk of affective disorders (Hankin et al., 1998; Nolen-Hoeksema & Girgus, 1994; Zahn-Waxler, et al., 1991).

Stemming from this model of female depression, Hipwell and colleagues (2007) suggested that CU traits in females may actually serve a protective function in the development of mood and anxiety disorders, given that girls high in CU traits would be expected to be lower in the proposed risk factors for female depression as described by Zahn-Waxler and colleagues (1991). In Hipwell and colleagues' study of CU traits in young girls, parent and teacher reports of depressed mood were associated with both conduct problems and CU traits, although this relationship was stronger with regard to conduct problems. The authors hypothesized that the interpretation of depression items may have contributed to this finding (the unexpected association between depression and CU traits), stating that parents and teachers may have misperceived a lack of emotionality

consistent with CU traits to reflect dysphoric mood. Also in possible contrast to Hipwell's hypothesis, Arnett (2006) found the highest levels of CU traits to be among female juvenile offenders with a comorbid depressive disorder and conduct disorder as compared to those offenders with only a depressive disorder or only conduct disorder. In studies investigating anxiety, CU traits, and conduct problems, CU traits were found to be inversely correlated with trait anxiety and neuroticism, only after controlling for level of conduct problems (Frick, et al., 1999; Lynam, et al., 2005). Youth with conduct problems commonly display high levels of anxiety, (e.g. Fergusson & Horwood, 1993; Frick et al., 1999; Zoccolillo, 1992) with the highest levels of anxiety occurring with the highest level of conduct problems; however, given the same level of conduct problems, youth with CU traits exhibit lower levels of trait anxiety (Frick et al., 1999; Frick & White, 2008). It is possible that a similar relationship may exist with regard to conduct problems, symptoms of depression, and CU traits, wherein youth with CU traits may exhibit lower levels of depression, only after controlling for the level of conduct problems. No other published studies to date have focused on the relationship between depression and CU traits but a strong association between depression and conduct problems has been well-established, particularly among females (e.g. Capaldi, 1991; Loeber & Keenan, 1994; Obeidallah & Earls, 1999; Reinecke, 1995).

#### *Comorbidity Between Depression and Conduct Disorder*

Independent of the possible relationship between CU traits and depression, a strong relationship appears to exist between CD and depressive disorders. Youth with CD often exhibit high rates of comorbidity with other DSM-IV disorders (e.g. Capaldi, 1991; Drerup, Croysdale, & Hoffman, 2008; Reinecke, 1995). Comorbidity between

depressive disorders and conduct problems has been shown to be particularly common (Angold, Costello, & Erkanli, 1999; Capaldi, 1991, 1992; Capaldi & Stoolmiller, 1999). Specifically, CD and depression occur comorbidly more frequently than base rates would predict, with approximately one third of adolescents receiving both diagnoses (Capaldi, 1991). This is particularly the case for females, with girls displaying higher levels of comorbid CD and emotional disorders than boys (Loeber & Keenan, 1994; Zahn-Waxler, Shirtcliff, & Marceau, 2008). Dixon, Howie and Starling (2004) found that 55 percent of a sample of delinquent girls met criteria for depression. Additionally, comorbidity was very high, with 78 percent of those meeting criteria for one disorder also meeting criteria for two or more additional diagnoses.

Such comorbidity among youth appears to have a very negative impact on overall functioning and later outcomes. Investigations have revealed that comorbid cases of CD and major depressive disorder had more negative outcomes as adults, with higher rates of suicidality, criminal offenses, and more pervasive social dysfunction than those with major depressive disorder alone (Fombonne, Wostear, Cooper, Harrington, & Rutter, 2001). Ezpeleta, Domenech, and Angold (2006) found that youth with comorbid CD or ODD and a depressive disorder displayed more severe emotional symptoms and a greater level of functional impairment than non-comorbid cases. Addressing females in particular, Odgers and colleagues (2007) found that especially aggressive and delinquent female juvenile offenders were shown to display higher levels of psychopathology compared to non violent delinquent and low offending female juvenile offenders. These very aggressive and highly delinquent girls were particularly likely to be diagnosed with depression or generalized anxiety disorder.

The impact of this comorbidity between depressive disorders and behavioral disorders with regard to the severity of conduct problems remains unclear. Simic and Fombonne (2001) concluded that CD co-occurring with depression was less severe than in cases of CD alone, finding that these comorbid youth were less destructive, stole less, and were less aggressive. Other investigators have found comorbid cases to be more severe in terms of conduct problems (e.g. Obeidallah and Earls, 1999). Loeber and Keenan (1994) argued that disruptive behavior among females may be particularly severe, compared to males, due to the exacerbating effects of the frequent overlap with internalizing disorders. In a longitudinal study of males with CD, depression served as a significant predictor of progression to antisocial personality disorder, suggesting a more severe and longstanding pattern of conduct problems/antisocial behavior (Loeber, et al., 2002).

While research findings support a strong link between depression and conduct disorder or delinquency, the directionality or the mechanisms of this relationship remain largely unknown. Findings have been mixed with regard to whether CD and its associated consequences precipitate depression, whether symptoms of depression may lead to acting-out behavior of conduct disorder, or whether both disorders occur as a result of common underlying risk factors (Hinshaw & Lee, 2003). It is also possible that the development of comorbidity between depression and conduct problems may vary, with different subgroups displaying different developmental progressions of these disorders (Weisner & Kim, 2006). There has been some support for the hypothesis that delinquent behavior may represent the “acting out” of emotional distress, evidenced by symptoms of an emotional disturbance preceding and predicting involvement in

delinquent behavior (Overbeek, Vollebergh, Engels, & Meeus, 2005). Obeidallah and Earls (1999) similarly proposed that depression among adolescent girls contributes to a tendency to engage in delinquent behavior. They argued that one possible explanation is that depressive symptoms, including feelings of worthlessness, hopelessness, and loss of interest, may lead girls to be indifferent to the consequences of their behavior and increase the probability of their engagement in delinquent activity. In their longitudinal study of female adolescents, they found that mildly to moderately depressed girls engaged in higher rates of property crimes and crimes against others compared to girls without depression. While a causal relationship could not be established, they concluded that depression may function as a risk factor for delinquency among girls and emphasized the importance of the treatment of depression among female adolescents. Given the many questions that remain regarding the link between depression and externalizing behavior problems, there has been a call for future research to develop a better understanding of this relationship and associated gender differences (Hinshaw & Lee, 2003; Zahn-Waxler, Shirtcliff, & Marceau, 2008). Research on such comorbidity among females is particularly needed.

### *Risk Taking*

Another promising avenue for the assessment of delinquency and conduct disorder is the recent increase in research on risk taking behavior. Risk taking and related constructs (e.g. impulsivity, sensation seeking) have long been recognized and investigated in terms of their relation to problematic behaviors (e.g. Daugherty & Quay, 1991; Gorenstein & Newman, 1980; Jessor & Jessor, 1977; Zuckerman, 1979). Risk taking has been defined in a variety of ways, generally focusing on the tendency to

engage in behavior that may result in the attainment of some goal, but also has the potential for causing negative consequences. Leigh (1999) defined risk taking behavior as behavior involving simultaneous high opportunities for both reward and punishment. Risk taking has similarly been described as behavior that may result in positive consequences, but also has the potential for losses or negative consequences (Moore & Gullone, 1996). Risk taking behavior appears to be particularly relevant during adolescence due to the very negative, and possible long-term, consequences they may face as a result of such behavior, including risky driving, substance abuse, and engaging in risky sexual behavior (Reyna & Farley, 2006). Adolescent risk taking is also likely to be an important contributing factor in the development of antisocial behavior among youth (Spear, 2000).

Risk taking behavior has been observed to increase during adolescence (Casey, Getz, & Galvan, 2008; Spear, 2000), often leading to a variety of very negative consequences for youth. From a biological perspective, this increase in risky behavior during adolescence appears to be, in part, a function of changes in the brain that take place during this period of development, specifically in the prefrontal cortex (Spear, 2000; Steinberg, 2008; Yurgelun-Todd, 2007). These changes result in an abrupt increase in reward sensitivity during early adolescence that has been noted to contribute to a higher level of novelty and sensation seeking during this period of development (Steinberg, 2004; 2008). In contrast, the development of impulse or cognitive control is a slower process, continuing well into young adulthood (Casey, Galvan, & Hare, 2005), and contributing to an increased difficulty in interrupting or refraining from reward-seeking behavior among adolescents, even if such behavior may have the potential for

negative consequences. To illustrate these changes with an analogy, the teenage brain could be seen as driving a very high powered car, with extremely weak or faulty brakes. This incomplete development of self-regulation, combined with increases in reward-seeking, appears to contribute to adolescents' distinct vulnerability to engage in risk behavior compared to either children or adults (Casey et al, 2005; Steinberg, 2008). Research on adolescent decision making has suggested that adolescents are not deficient in their understanding of the possible negative outcomes of events, but they judge the benefits of risky behavior to outweigh the potential negative consequences (Reyna & Farley, 2006).

Risk taking has been described as distinct (though similar) to impulsivity and sensation-seeking. Impulsivity has been defined in a number of ways, but often refers to deficits in response inhibition or self-control leading to thoughtless or poorly planned behavior (Steinberg, 2008). Moeller, Barratt, Dougherty, Schmitz, and Swann (2001) attempted to combine key elements of previous definitions and described impulsivity as “a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to negative consequences of these reactions to the impulsive individual or to others.” In contrast, sensation seeking has been described as the tendency to pursue novel, stimulating, and varied experiences with a willingness to take risks in the pursuit of such experiences (Zuckerman, 1979). Zuckerman (1979) and Arnett (1992) argued that sensation-seeking is a physiological drive for intensely stimulating experiences, and that this drive, combined with cognitive reactions that elicit varying levels of anxiety, determine level of risk taking behavior. Sensation-seeking behavior may or may not be impulsive. Additionally, in contrast to risk taking and sensation-seeking behavior,

impulsive behavior does not always involve the pursuit of rewarding or stimulating experiences (Steinberg, 2008).

Research has also addressed another closely related construct, “reward dominance” or “reward sensitivity,” in relation to engagement in problematic behavior such as substance abuse or juvenile delinquency. Early research exploring reward dominance revealed that adult psychopaths exhibited deficits in learning from punishment in situations during which there were competing rewards and punishment (Newman, Patterson, & Kosson, 1987). This finding has similarly been shown among youth samples. An increased sensitivity to reward relative to punishment has been observed among youth with disruptive behavior problems or psychopathic traits (e.g., Blair, Colledge, & Mitchell, 2001; Frick et al., 2003a; Frick et al., 2003b, O’Brien & Frick, 1996; O’Brien, Frick, & Lyman, 1994; Shapiro, Quay, Hogan, & Schwartz, 1988). Even in the absence of significant conduct problems, children with CU traits have demonstrated this heightened sensitivity to reward (Frick et al., 2003a; Frick et al., 2003b; O’Brien & Frick, 1996).

Relevant to the discussion of risk taking among youth with disruptive behavior problems is the neuropsychological model of systems of arousal first proposed by Gray (1975, 1982, 1987). Gray’s model, based on the septo-hippocampal system, described a Behavioral Activation System (BAS) and a Behavioral Inhibition System (BIS). According to the model, the BAS is responsible for behavioral activation and is sensitive to reinforcing stimuli. In contrast, the BIS is responsible for interrupting behaviors in order to focus attention on potentially threatening environmental stimuli. Newman and colleagues (Newman & Kosson, 1986; Newman, Patterson, & Kosson, 1987; Newman,



Widom, & Nathan, 1985) investigated the roles of the theoretical BAS and BIS with psychopaths, extraverts and juvenile delinquents. Newman concluded, based on findings using a behavioral impulsivity task, that the deficits in passive avoidance (i.e. the ability to withhold a response) may not only reflect an oversensitivity to reward or an insensitivity to punishment, but that disinhibited individuals adopt a dominant response set for reward early in the task which leads to difficulty in focusing on later punishment cues. It appears that when both the BAS and BIS are activated in such individuals, the BAS dominates, leading to difficulty of the BIS in interrupting the activity of the BAS.

Quay (1988, 1997) developed an important model of ADHD and CD, extending the work of Gray and Newman regarding the roles of the BAS and BIS. Quay's theory proposed that ADHD and CD reflect different problems related to BAS and BIS functioning. This theory proposed that a persistently underactive BIS is largely responsible for deficits seen in ADHD, whereas a persistently overactive BAS accounts for the symptoms of CD. That is, a deficient inhibitory system results in impulsive behavior in individuals with ADHD regardless of the presence of reward cues. In CD, an overactive BAS results in heightened sensitivity to reward in situations involving both punishment and reward cues. Quay (1993) proposed that both CD and Antisocial Personality Disorder are characterized by BAS dominance. Daugherty and Quay (1991) found that children rated high in CD and both ADHD and CD may display a possible dominance of the BAS, as indicated by perseverative responding in the face of decreasing probability of reward.

There has been some empirical support for the relationship between risk taking propensity and delinquent behavior. Juvenile offenders have been shown to take more

risks than non-offenders (Arnett, 1992; Zuckerman, 1979) and this tendency has been hypothesized to be a key to the development of delinquency (Jessor & Jessor, 1977). Self-reported risk taking attitudes have been shown to predict involvement in delinquency (Leas & Mellor, 2000; Levine & Singer, 1988). Studies using behavioral measures of risk taking have also revealed this association between risk taking and delinquency. Lane and Cherek (2001) found that risk taking tendency, using a computerized risk task, differentiated between youth with and without a history of significant behavioral concerns, including conduct disorder and substance abuse. These authors proposed that their findings reflected either an undersensitivity to punishment or an oversensitivity to reward as accounting for differences in risky behavior. In a more recent study, youth with serious conduct problems and substance abuse histories showed greater levels of risky responding on a computerized measure of risk taking as compared to controls (Crowley, Raymond, Mikulich-Gilbertson, Thompson, & Lejuez, 2006).

*Emotion and Risk Taking.* Some attempts have been made to explore the relationship between risk taking behavior and emotion or mood. Negative emotions have often been proposed as contributing to engagement in risky behaviors, such as substance use or unsafe sexual behavior (Cooper, Wood, Orcutt, & Albino, 2003). For example, it has been theorized that individuals may drink alcohol or use drugs as a means of reducing tension caused by negative mood states (Conger, 1956; Cooper, Russell, Skinner, Frone, & Mudar, 1992; Frone, Cooper, & Russell, 1994). Baumeister and Scher (1988) similarly attempted to explain the relationship between negative affect and problematic behavior. The authors proposed that negative emotions yield attempts to escape and seek short-term relief from these unpleasant emotional experiences, leading to potentially

risky behavior. In pursuit of an immediate resolution, relatively less consideration may be given to possible adverse long-term consequences of the actions taken to counter such negative affective states. Leith and Baumeister (1996) conducted a series of studies to investigate this proposed link between unpleasant moods and risky behavior. Individuals induced to feel anger/frustration, embarrassment, or were under an unpleasant physical arousal condition were more likely to engage in risky behavior than when they were under a neutral mood condition. In contrast, this finding was not found when participants were induced to feel sadness. The authors concluded that the combination of unpleasant affective states and increased arousal contributed to a preference for risky behavior. Cooper, Agocha, and Sheldon (2000) proposed that risk taking behavior may serve different purposes for individuals, suggesting that risk behaviors may either serve to increase positive affective states or serve as a means of escaping negative affective states. They found that individuals high on traits of neuroticism used risk behavior to escape negative mood states and that individuals high in extraversion were more likely to engage in risk behavior to enhance positive moods. The authors described their findings in terms of Gray's motivational theory of the BIS/BAS, noting that high levels of extraversion are considered to be associated with high BAS sensitivity, whereas individuals high in neuroticism are viewed as being high in BIS sensitivity. Auerbach, Abela, and Ho (2007) similarly suggested that engagement in risk taking behaviors may represent an attempt to manage negative emotions. They argued that risk taking behavior becomes reinforced as it serves as a means of avoiding aversive emotional experiences, while potentially leading to significant negative consequences for the individual in terms of their risky behavior, and in turn contributing to more frequent and severe negative emotional reactions.

Deficits in emotional regulation have been proposed as a possible explanation for the link between unpleasant emotional experiences and risky behavior (e.g. Auerbach, et al., 2007; Magar, Phillips, & Hosie, 2008). Children and adolescents may engage in risky and problematic behavior as a means of attempting to avoid or modulate negative emotions. Although not specifically investigating risk taking behavior, there has been some evidence to support the role of depressed mood as potentially contributing to juvenile delinquency. Depressed mood has been previously shown to precede delinquent acts and to relate to the frequency of minor delinquent behaviors (Kandel & Davies, 1982). Similarly, Leas and Mellor (2000) found that symptoms of depression predicted level of self-reported delinquency. Beyers and Loeber (2003) also found that depressed mood and level of delinquency (more frequent and varied delinquent activity) each predicted the other, with a more robust effect of depression on delinquency. More recently, a significant positive relationship between violent delinquent behavior and depression was found among female adolescents (Daigle, Cullen, & Wright, 2007).

#### *Purpose of the Study*

Female juvenile delinquency has been a largely neglected area of research and many questions remain regarding this population. The increasing proportion of females involved in the juvenile justice system (Snyder & Sickmund, 2006; Stahl, 2008) implores the need for greater research attention among these youth, consistent with calls from researchers (e.g. Cernkovich, Lanctot, & Giordano, 2008; Hipwell et al., 2007). The development of assessment and intervention strategies for juvenile offenders has been largely based on the understanding of males (Zahn, Hawkins, Chiancone, Whitworth, 2008) and it is important to investigate the appropriateness of these strategies for female

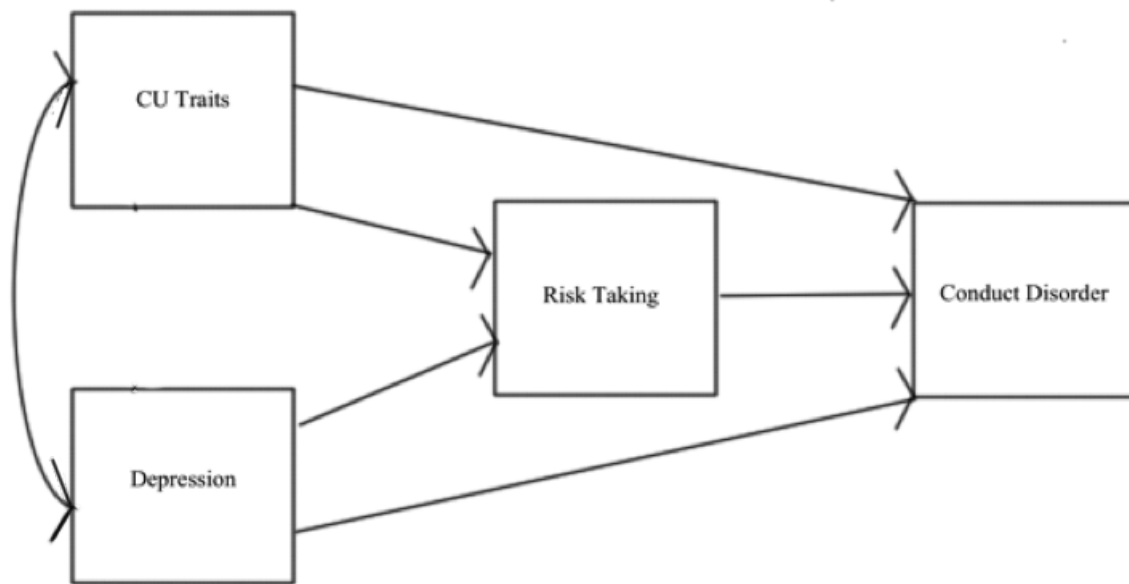
juvenile offenders. In particular, the study of psychopathy and psychopathic traits has been largely conducted with male populations, and its applicability to females is an area of increasing interest and concern. Additionally, the relationship between depression and conduct disorder among female adolescents appears to be an important one, but one that remains poorly understood (e.g. Obeidallah & Earls, 1999). No published investigations to date have examined the combination of CU traits, depression, and risk taking tendency among a group of all female juvenile delinquents. The current study seeks to explore the aforementioned factors as they relate to levels of conduct problems among the current sample of female adolescents.

Informed by the existing literature, a path analytic model was proposed to test both direct and indirect effects of the study variables on severity of conduct disorder symptomatology. Figure 1 illustrates the proposed model with the hypothesized relationships between depression, CU traits, risk taking, and conduct disorder symptomatology. Direct paths are proposed between depression and conduct disorder, and CU traits and conduct disorder. It was also hypothesized that depression and CU traits would indirectly relate to conduct disorder through direct paths between CU traits to risk taking and then to conduct disorder, as well as from depression to risk taking to conduct disorder. It was further proposed that risk taking may serve as a mediator between both level of depression and conduct disorder as well as CU traits and conduct disorder.

Consistent with the hypothesis presented by Hipwell and colleagues (2007), proposing that CU traits in females may serve a protective function in the development of mood and anxiety disorders, we expect that CU traits and level of depression will be

inversely correlated after controlling for level of conduct problems. The current study has assessed depression by the use of self-report, rather than by parent or teacher report as utilized in the Hipwell and colleagues study. Although Hipwell and colleagues did not find support for this hypothesis, it was suggested that this was a function of reliance on the reports of parents and teachers to evaluate symptoms of depression, who may have incorrectly perceived a lack of emotionality associated with CU traits to indicate depression.

*Figure 1. Proposed Path Model.*



## Method

### *Participants*

Participants consisted of seventy-one consecutive admissions to a boot-camp style facility in the Southeastern United States housing female juvenile offenders (ranging in age from 12 to 18 years-old). The mean age of our sample was 15 years-old. Sixty-three percent of the sample was African-American, thirty-three percent was Caucasian, and the remaining sample was evenly split between Hispanic, Biracial, and “Other” categorical descriptors. The youth who participate in this behavior modification program typically have not had such placements in the past, and often have never received any mental health treatment prior to this placement. However, 46.5 percent of the participants reported previously receiving a psychiatric diagnosis. Approximately 49 percent of the sample described a family history of psychiatric symptoms. Regarding academic history, 22.5 percent of participants reported that they had received special education services in school, approximately 59 percent reported that they had been retained at least one grade level in school, and 88.7 percent described a history of behavioral problems within the school setting. Data collection typically took place within the first two weeks of the youth’s placement in the program and occurred as part of the program’s intake assessment process.

### *Measures*

Participants were administered a battery of assessment measures to evaluate level of psychopathology, CU traits, and risk taking propensity. Self-report measures were

used to determine level of conduct disorder symptomatology, CU traits, and depressive symptoms. A computerized behavioral task was used to assess risk taking tendency. Given that much of the data utilized in this study is self-report in nature, common method variance is a potential concern that should be considered when interpreting the results of the present study. However, the self report measures utilized in the study are considered to have acceptable levels of validity and reliability, as will be discussed further throughout the current section. The inclusion of a behaviorally based measure of risk taking will serve to reduce this common method variance.

The means of measuring conduct problems have varied greatly across studies. In support of our approach to measuring conduct problems is literature supporting the dimensional nature of CD. Empirical support for a dimensional approach to CD has been accumulated over the years (e.g. Achenbach, 1985; Moffitt, Caspi, Rutter, & Silva, 2001; Robins, 1978). Recently, the dimensional measurement of CD has been offered as one of the possible changes to consider for the upcoming DSM-V (Moffitt et al., 2008). As one example of support for the dimensional approach, a longitudinal study comparing a dimensional CD variable to the categorical CD diagnosis showed that the dimensional approach had greater predictive validity, with greater number of CD symptoms predicting an increased risk for offending and risk for dropping out of school (Fergusson & Horwood, 1995). More recently, Moffitt and colleagues (2001) reported similar findings from their longitudinal study. The authors found that the number of CD symptoms predicted later outcomes across a number of areas, including involvement in crime, substance abuse, mental health, employment, and education. Gelhorn and colleagues (2007) similarly found that number of CD symptoms predicted the severity and



persistence of later antisocial behavior, including progression to antisocial personality disorder. Within the criminology literature, a similar approach is often taken in the assessment of the severity of delinquent behavior. Often, a delinquency variety score is used as a means of comparing levels of severity. The variety of delinquent behavior has been shown to strongly predict later outcomes with regard to antisocial behavior (Robins, 1978) and has been promoted as the preferred means of measuring level of delinquency (Hindelang, Hirschi, & Weis, 1981; Hirschi & Gottfredson, 1995).

*Adolescent Psychopathology Scale-Short Form* (APS-SF; Reynolds, 2000). The APS-SF is a self-report measure designed to assess psychopathology and personality characteristics among youth from 12 to 19 years old. The APS-SF was derived from the original 346-item Adolescent Psychopathology Scale (Reynolds, 1998) to provide an abbreviated alternative for assessing general psychopathology. Items on the APS-SF follow very closely the DSM-IV criteria for each diagnostic scale, although Reynolds (2000) aptly points out that scores do not establish diagnostic status. The APS-SF clinical scales yield scores that fall within the mild, moderate, or severe range of symptoms falling within that diagnostic category. The mean T-score is 50 with a standard deviation of 10. Scores on the APS-SF Depression and Conduct Disorder scales will be used in our analyses as a means of measuring the level of depressive symptoms and conduct disorder symptomatology.

The APS-SF has been shown to be a reliable and valid measure of adolescent psychopathology (Carlson, 2003; Reynolds, 2000). In his review of the APS and APS-SF, Merrell (2008) noted that these measures appeared to be developed quite carefully and to have impressive technical properties. Sattler and Hoge (2006) described the APS-

SF as demonstrating satisfactory reliability and validity and to be a useful alternative to the full form APS when time is limited. The APS-SF manual (Reynolds, 2000) provides details regarding the standardization process and evidence for its reliability and validity. The standardization sample included 1,827 adolescents, with approximately equal numbers of males and females. The manual reports internal consistency alpha coefficients largely in the .80's for the clinical scales, with .91 for the Depression scale and .83 for the Conduct Disorder scale. Test-retest reliability is also good, with coefficients largely .80 (ranging from .76 to .91) or higher when the APS-SF was re-administered at a two-week interval.

With regard to criterion-related validity, the authors compared the APS-SF to the original APS, the Minnesota Multiphasic Personality Inventory-Second Edition (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989) and other well-validated measures of psychopathology. High correlations were found between the APS-SF and APS ( $r = .97$  for the Depression scale;  $r = .93$  for the Conduct Disorder scale), and there were moderately high correlations between the APS and MMPI (specifically,  $r = .73$  between depression scales;  $r = .45$  between the Conduct Disorder scale and its closest scale in similarity, the Psychopathic Deviate scale on the MMPI).

The authors reported good construct and discriminant validity, supporting that the APS-SF appears to measure distinct areas of psychopathology rather than general psychological distress. The authors described factor analysis they conducted which supported the construct validity of the Conduct Disorder scale as related to DSM-IV symptom categorization. Similar to the grouping of conduct disorder symptoms found in the DSM-IV, Factor 1 corresponded to aggression to people or animals, Factor 2 reflected

lying and stealing, and Factor 3 represented truancy, rule-breaking, and other behavior problems at home and at school. Highly significant differences in mean T-scores between a general standardization sample and a clinical sample were found for all of the clinical scales ( $F$  ranging from 53.07 to 449.02;  $p < .0001$ ), with an  $F$  value of 449.02 for the Conduct Disorder scale. The APS-SF authors also reported comparisons between clinical groups who carried particular diagnoses with scores on those respective APS-SF scales. Adolescents diagnosed with Conduct Disorder scored significantly higher on the APS-SF CD scale relative to the general standardization sample ( $F = 295.50$ ,  $p < .0001$ ). Similarly, adolescents diagnosed with Major Depressive Disorder scored significantly higher on the Major Depression scale of the APSF-SF ( $F = 124.26$ ,  $p .0001$ ) when compared to the general standardization group.

*Antisocial Process Screening Device* (APSD; Frick & Hare, 2001; Munoz & Frick, 2007). The APSD (Munoz & Frick, 2007) is a self-report scale adapted from the original version of the APSD (Frick & Hare, 2001) that relied on parent and staff reports of adolescent behavior and personality. Items from the original version were altered slightly to make them appropriate as a self-report tool, but the content and number of items remained the same. This behavior rating scale contains 20 items that yield three subscale scores: a CU scale, a Narcissism scale, and an Impulsivity-Conduct Problem scale. The CU scale consists of 6 items and each item is scored either 0 (not at all), 1 (sometimes true) or 2 (definitely true). These subscales are consistent with the three-factor structure (Cooke & Michie, 2001) of the Psychopathy Checklist-Revised (PCL-R; Hare, 1991; Hare, 2003), a measure considered to be the “gold standard” in assessment of psychopathy among adults. Scores from the APSD self-report form has been shown to

identify more severe and violent youth among groups of juvenile offenders (Caputo, Frick, & Brodsky, 1999; Kruh et al., 2005). APSD scores have also been associated with an early onset of juvenile offending (Silverthorn, Frick & Reynolds, 2001) and have been shown to predict aggressive behavior, rule-breaking behavior, and poor progress in treatment among juvenile offenders in institutional settings (Spain, Douglas, Poythress & Epstein, 2004). Douglas, Epstein, and Poythress (2008) reported that APSD scores predicted violent and weapons-related recidivism among a sample of male juvenile offenders. Munoz and Frick (2007) found that, among an adolescent community sample, APSD self-report scores were moderately correlated with parent reports on the APSD, predicted conduct problems two years later, and were fairly stable across one to two years. APSD scores were also concurrently associated with other measures of conduct problems and antisocial behavior, including other well-established self-report forms as well as number of police contacts. The authors reported that the Narcissism scale produced the strongest correlations with antisocial behavior, followed by the Impulsivity scale and the CU scale. Munoz and Frick reported adequate internal consistency for the Total APSD scale (0.78-0.81), but internal consistency for the subscales was more moderate (.50-.68), with internal consistency of .50-.61 for the CU scale specifically.

The APSD has been the most widely researched assessment tool for investigating psychopathic traits among youth and has exhibited good validity for the callous-unemotional (CU) scale (Johnstone & Cooke, 2004). As previously discussed, CU traits have been shown to predict more severe conduct problems, lower sensitivity to cues for punishment in the presence of reward, and higher scores on measures of sensation seeking (Frick et al., 2003b). Additionally, CU traits have been associated with lower

levels of distress over the consequences of their behavior on others (Blair, 1997), less reactivity to emotionally distressing stimuli, deficits in moral reasoning, and empathy toward others (Blair, 1999), and impaired recognition of facial expressions reflecting fear or sadness (Blair, Colledge, Murray, & Mitchell, 2001). There is evidence that CU traits are especially valuable for identifying severe cases within the group of youth who display antisocial behavior, rather than distinguishing between youth with or without conduct problems (Frick & White, 2008). For the purpose of the current study, only the CU scale was used.

*Balloon Analogue Risk Task (BART; Lejuez et al., 2002).* The BART is a computerized task designed to measure risk-taking tendencies. The task involves participants pressing a button that inflates a series of balloons, with accumulating points as each balloon grows in size. The balloons have an undisclosed point at which they will explode, which would lead to a loss of the accumulated points for that balloon. Participants may choose to stop pumping each balloon at any time and can save their accumulated points, moving on to the next balloon. Alternatively, they may continue pumping up each balloon as a means of trying to earn a greater number of points prior to the balloon's explosion. Ideally, participants balance the potential for gaining points on each balloon with the risks of losing points associated with that balloon should it explode. Every participant is presented with 90 balloons, regardless of points or explosions. The balloons come in three colors, each with their own average probability of explosion. Participants are not provided with any specific information regarding the probability of explosion, only that each balloon will eventually explode, some when they are very small, and others only after the balloon had reached the maximum size of the computer

screen. The current study will employ the adjusted score as a means of analyzing participant performance, consistent with the approach suggested by Lejuez and colleagues (2002). The adjusted score is the mean number of balloon pumps on balloon trials that do not result in an explosion.

The BART offers a behaviorally based approach to assessment and appears to measure a distinct aspect of behavioral disinhibition (Reynolds, Ortengren, Richards, & de Wit, 2006). The BART is the most widely investigated task of sequential risk-taking and has received a great deal of support for its relation to real-world risk-taking behavior among both adult and youth populations, including substance use, gambling, and risky sexual behavior (Aklin, Lejuez, Zvolensky, Kahler, & Gwadz, 2005; Bornovalova, Gwadz, Kahler, Aklin, & Lejuez, 2008; Crowley, Raymond, Mikulich-Gilbertson, Thompson, & Lejuez, 2006; Lejuez et al., 2002, 2003a, 2007; Lejuez, Aklin, Bornovalova, & Moolchan, 2005; Lejuez, Aklin, Zvolensky, & Pedulla, 2003b; Lejuez, Simmons, Aklin, Daughters, & Dvir, 2004). Scores on the BART have also shown to correlate with measures of impulsivity, sensation seeking, psychopathy, and self-reported antisocial behavior (Lejuez et al., 2002; Hunt, Hopko, Bare, Lejuez, & Robinson, 2005). Risk taking has been described as distinct (though similar) to impulsivity and sensation-seeking. Supporting the distinctive nature of the construct measured by the BART, scores from this instrument have been found to relate to risk behaviors (including substance use, sexual behavior, delinquency, and health behaviors) above and beyond self-reported sensation seeking and impulsivity (Lejuez et al., 2007). White, Lejuez, and de Wit (2008) reported good stability of scores and test-retest reliability (.77) over a period of approximately two weeks.

Participants in the current study were advised that their performance (number of points earned) would help them earn a reward upon completion of the assessment. The number of points earned corresponded to one of three levels of possible reward. A selection of similarly valued prizes for each of the three levels of reward was available for each participant to choose from following the completion of the task, depending upon the number of points earned. Prizes included candy, pencils, small stuffed animals, and other items that were chosen as potentially desirable rewards. Prior to the beginning of the present study, residents of the boot camp program were surveyed regarding what items would serve as attractive prizes for them to earn, and the prize options were selected based on the highest ratings given by the residents. All prizes were approved by program administrators.

#### *Procedure*

Approval from the University IRB and facility administrators was secured before study initiation. Consent/assent focused on seeking approval to use data for research purposes, since the test battery was required as part of the participants involvement in the boot camp program. Parental or guardian consent was obtained for each participant in the present study. Additionally, the investigators obtained adolescent assent from each participant prior to their inclusion in the study. Each participant was administered the APSD, the BART, and the APS-SF.

The present study seeks to investigate aspects of adolescent psychopathology that will require some reliance on self-report data. While concerns are commonly raised regarding self-report data to draw conclusions about psychopathology and delinquent behavior, it is felt that, in this case, self-reports are likely to be the most useful source of information available. The participants in this study are placed in a short-term facility

where staff had little knowledge of these youth and it was not feasible to contact caregivers or other informants for our purposes. Additionally, other informants may have little opportunity to observe covert delinquent behavior or internalizing symptoms, making the youth themselves potentially the most useful informant. Self-report data is particularly valuable when assessing for symptoms of internalizing disorders that may not be readily apparent to parents, teachers, or other providers of such information.

Chan (2009) argued that the use of self-report data in psychological research in general has been undervalued and that concerns regarding the validity of such data have been overstated. He argued that while problems such as socially desirable responding, common method variance, and poor construct validity are important to consider as possible confounds to research, these concerns should not be assumed to be present in all cases. He further argued that there are some cases in which self-report data would be preferred to information collected from outside observers, who may not be able to accurately reflect a participant's own perceptions. Similarly, Frick, Barry, and Bodin (2000) stated that self report data "becomes more reliable and valid as a child enters adolescence, especially for assessing antisocial tendencies and attitudes that may not be observable to parents and other significant adults" (p.13). Junger-Tas and Haen-Marshall (1999) also argued that self-reported delinquency is a valid means of assessment that provides more accurate information regarding offending than reliance on police or court records of criminal behavior. A number of studies have documented that self-reports of offending behavior predicted later court involvement (e.g. Farrington, 1989; Farrington, Loeber, Stouthamer-Loeber, van Kammen & Schmidt, 1996; Joliffe et al., 2003). In an evaluation of the validity and reliability of adolescent reports of juvenile delinquency,



Cashel (2003) found that adolescents reported greater involvement in delinquent behavior than either their parents or their probation records documented, supporting the use of self-report as an important tool in investigating juvenile delinquency. Other research has similarly shown that self-reports of offending revealed higher prevalence rates of offending than arrest records indicated (Loeber, Farrington, & Joliffe, 2008; Farrington, Joliffe, Loeber, & Homish, 2007). When comparing parent and self-reports of disruptive behavior disorders, youth provided more consistent and valid reports of conduct disorder than their parents, according to a study by Hartung, McCarthy, Milich, and Martin (2005). Kenny and Grant (2007) investigated self-reporting of juvenile offenders and found that their reports of abuse history and self-harm or suicidality were reliable, although the investigators did not evaluate self-reports of conduct problems. The above described literature provides support that adolescent self-reports can be a reliable and valid means of assessment.

Consistent with the reviewed literature, a path analytic model was proposed to test both direct and indirect effects of the study variables on severity of conduct disorder symptomatology. Direct paths were proposed between depression and conduct disorder, and CU traits and conduct disorder. It was also hypothesized that Depression and CU traits would indirectly relate to conduct disorder through direct paths between CU traits to risk taking and then to conduct disorder, as well as from depression to risk taking to conduct disorder. It was further proposed that risk taking may serve as a mediator between both level of depression and conduct disorder as well as CU traits and conduct disorder.

Stemming from the hypothesis presented by Hipwell and colleagues (2007),

proposing that CU traits in females may serve a protective function in the development of mood and anxiety disorders, we expect that CU traits and level of depression will be inversely correlated after controlling for level of conduct problems. The current study will assess depression by the use of self-report, rather than by parent or teacher report as utilized in the Hipwell and colleagues study. Although Hipwell and colleagues did not find support for this hypothesis, it was suggested that this was a function of reliance on the reports of parents and teachers to evaluate symptoms of depression, who may have incorrectly perceived a lack of emotionality associated with CU traits to indicate depression.

## Results

Pearson correlation coefficients and path analysis techniques were utilized to evaluate the hypotheses. Path analysis is a model-testing approach that serves as an extension of multiple regression, but allows for the evaluation of more complex models (Steiner, 2005). Path analysis can be used to evaluate the degree to which the data fit a proposed model that includes multiple variables or factors, and can compare the fit of two or more proposed models. Study-specific internal consistency reliability was calculated and found to be adequate for the APS-Conduct Disorder and APS-Depression scales, resulting in Cronbach's alpha of .740 and .913, respectively. Internal consistency reliability in this study was found to be much lower for the six-item CU scale of the APSD, yielding a Cronbach's alpha of .451.

Sample size was adequate and multi-collinearity was not found to be problematic. Four cases with missing data were deleted listwise, yielding a final sample of 67 participants. Bootstrapping procedures were utilized due to concerns regarding non-normality of the data. It is not uncommon for there to be concerns regarding non-normality of data in path analysis (e.g. Byrne, 2001). Rather than relying on the assumption of normality, bootstrapping procedures estimate standard error, confidence intervals, and significance by using empirical samples derived through a resampling procedure. Many subsamples are drawn randomly, with replacement, to provide the data to evaluate parameter estimates and indexes of fit (Byrne, 2001). Bootstrapped

confidence intervals and p-values for the path model parameters were found to be similar to the ones obtained under the assumption of normality. Therefore, only the latter ones are reported. Table 1 shows the descriptive statistics for the study variables. Bivariate correlations between the variables are displayed in Table 2.

*Table 1. Descriptive Statistics For Major Study Variables*

Variable	Mean	Standard Deviation	Range
APS-SF Conduct Disorder	65.81	14.79	43-102
APS-SF Depression	56.33	11.89	36-84
APSD-CU	4.16	1.94	0-8
BART	29.42	11.54	12.77-63.23

N = 67

*Table 2. Correlations Between Major Study Variables*

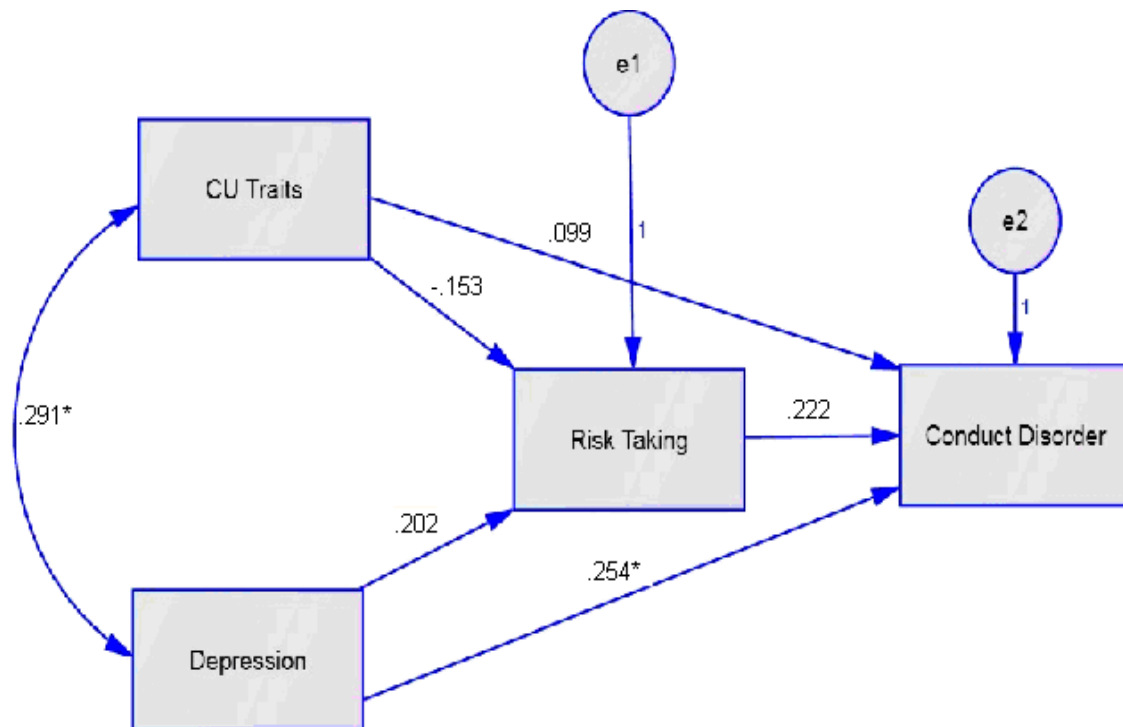
Variable	APS-SF CD	APS-SF Dep	APSD-CU	BART
APS-SF CD	--	--	--	--
APS-SF Dep	.318**	--	--	--
APSD-CU	.152	.291*	--	--
BART	.252*	.157	-.094	--

\*  $p < .05$

\*\*  $p < .01$

Path Analyses were conducted using AMOS software (Arbuckle & Wothke, 1999) and maximum likelihood estimation in order to test the proposed model. As presented before, Figure 1 shows the hypothesized model by which depression, CU traits, and risk-taking tendency may predict level of conduct disorder symptomatology. Single headed arrows represent direct effects of one variable on another. Double headed curved arrows represent a correlation between the variables. Figure 2 shows the fully proposed model with resulting standardized regression weight coefficients calculated through path analysis. Table 3 also shows the standardized path coefficients and their respective  $p$  values.

Figure 2. Full Path Model with Standardized Regression Coefficients Calculated Through Path Analysis



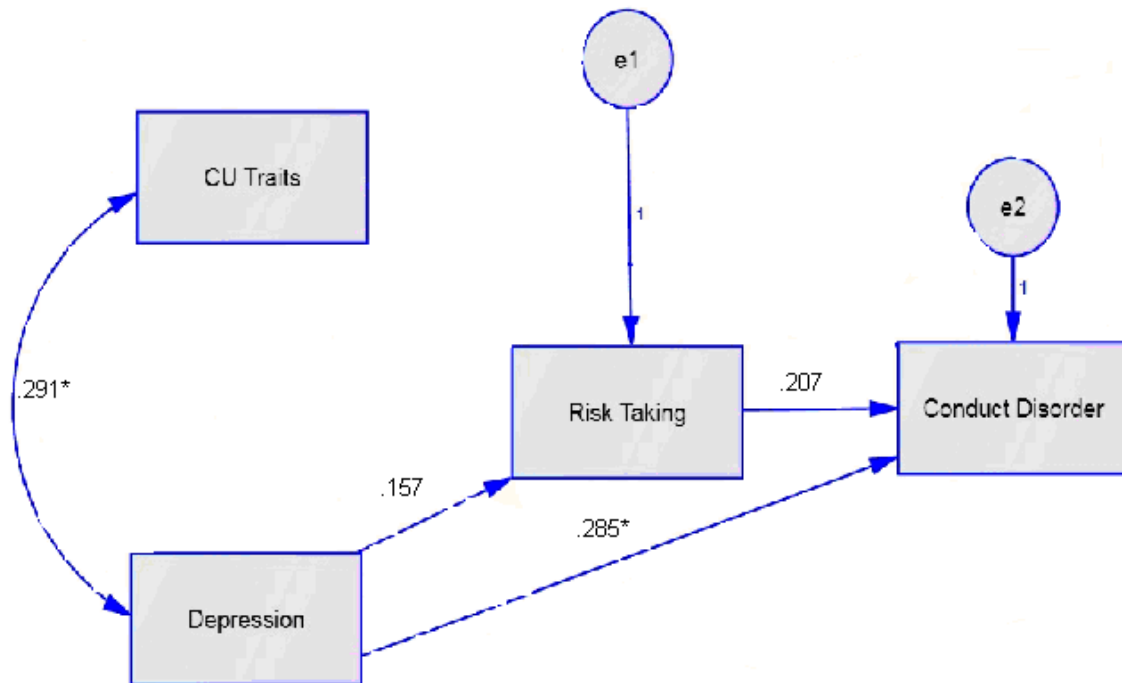
\*  $p < .05$

Table 3. Standardized Path Coefficients and *p* Values For Hypothesized Model

Path	Estimate	<i>p</i> value
Depression to Risk Taking	.202	.109
CU Traits to Risk Taking	-.153	.223
Depression to Conduct Disorder	.254	.035*
CU Traits to Conduct Disorder	.099	.409
Risk Taking to Conduct Disorder	.222	.056

To evaluate overall model fit,  $R^2$  for the model was calculated and revealed that the hypothesized model accounted for 15.2% of the variability in conduct problems. Given the lack of significance for the CU → Conduct Disorder and the CU → Risk Taking paths, these were removed and the model was reanalyzed. Although the Risk Taking to Conduct Disorder path fell short of significance ( $p = .056$ ), this path was initially retained to evaluate overall model fit with Risk Taking included. After the removal of these paths, the reduced model (Figure 3) yielded an  $R^2$  of .143, suggesting a slightly poorer fit than the full model. Several major fit statistics were considered and indicated that the data fit the model reasonably well [ $\chi^2(2) = 2.144$ ,  $p = .342$ ; CFI = .990; RMSEA = .033]. Good model fit is determined when the Chi squared statistic is nonsignificant, the CFI (comparative fit index) is greater than .95 and RMSEA (root mean square error of approximation) is below .05 (Byrne, 2001)

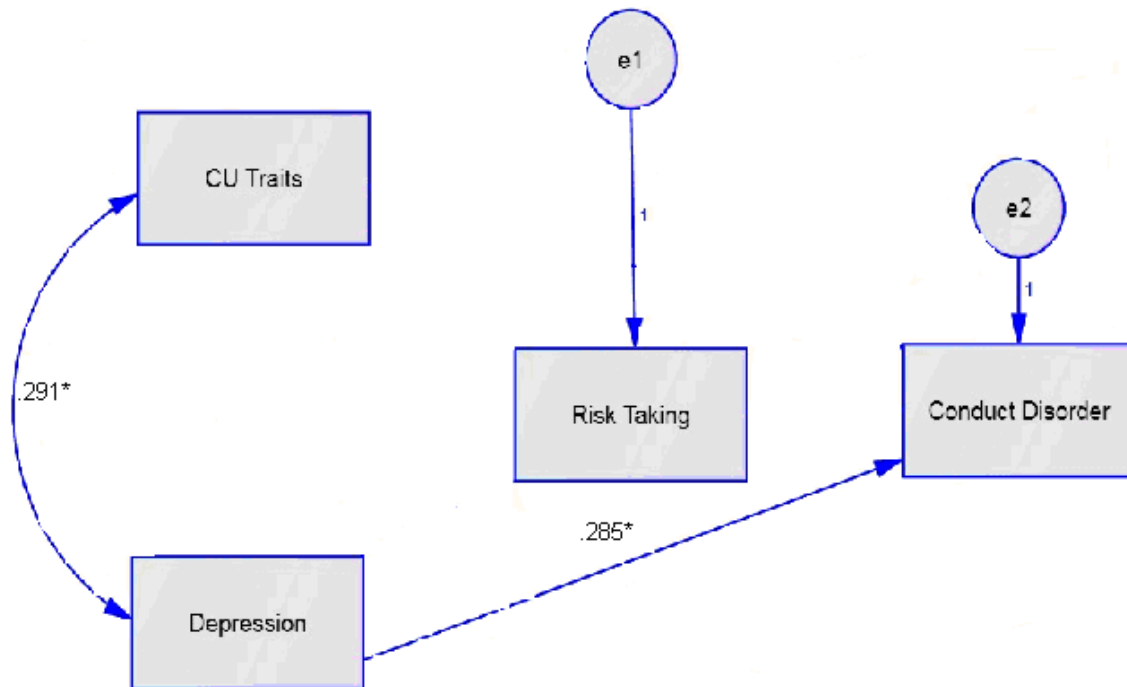
Figure 3. Reduced Path Model 1



\*  $p < .05$

After removing the Risk Taking  $\rightarrow$  Conduct Disorder path given its falling just short of significance, there was a substantial worsening of the fit of the model (Figure 4). After removing Risk Taking from the model,  $R^2$  for the model dropped from .143 to .101. Major fit statistics also reflected a poorer fit of the model [ $\chi^2(4) = 1.737, p = .139$ ; CFI = .786; RMSEA = .106].

Figure 4. Reduced Path Model 2



\*  $p < .05$

It was hypothesized that CU traits, risk taking tendency, and level of depression would each have a direct effect on severity of conduct disorder symptomatology. Standardized regression coefficients for the paths revealed that depression had a significant direct effect on conduct problems ( $\beta = .254, p < .05$ ). The effect of risk taking on conduct problems approached statistical significance ( $\beta = .222, p = .056$ ). In contrast to our expectations, no significant direct effect of CU traits was found on conduct problems ( $\beta = .099, p = .409$ ). Depression failed to have a significant effect on risk taking ( $\beta = .202, p = .109$ ), as did CU traits on risk taking ( $\beta = -.153, p = .223$ ).



Pearson correlation coefficients were calculated for the major study variables to evaluate the hypothesized relationships between them and to determine if there was any evidence to support the hypothesized mediational relationships. It was hypothesized that risk taking may serve as a mediator between level of depression and conduct disorder symptoms. Additionally, it was proposed that risk taking would serve as a mediator between level of CU traits and conduct disorder. Pearson correlation analyses (see Table 2) revealed significant correlations between level of depression and conduct disorder ( $r = .318, p < .01$ ), risk taking and conduct disorder ( $r = .252, p < .05$ ), and CU traits and depression ( $r = .291, p < .05$ ). However, correlation analyses were not significant for depression and risk taking ( $r = .157, p = .204$ ), CU traits and risk taking ( $r = -.094, p = .447$ ), or CU traits and conduct disorder ( $r = .152, p = .220$ ). Given the lack of significant correlations between depression and risk taking and CU traits and risk taking, mediational relationships as hypothesized are not supported.

It was also hypothesized that CU traits and level of depression would be inversely correlated, after controlling for level of conduct disorder. The results of our path analysis did not support this hypothesis. In fact, CU traits were significantly positively correlated with level of depression both prior to and after controlling for level of conduct problems. Without controlling for level of conduct problems, there was a significant positive correlation between level of depression and CU traits ( $r = .291, p < .05$ ). After controlling for conduct problems, a significant positive correlation between the variables remained ( $r = .265, p < .05$ ).

## Discussion

The present study explored the relationship between depression, CU traits, risk taking, and level of conduct disorder symptomatology among a sample of female juvenile offenders. Although female juvenile offenders remain an understudied population, the literature regarding these variables suggests they may be important for the assessment and treatment of juvenile delinquency, particularly among a female population. No published studies to date have explored the relationships between depression, CU traits, and risk taking among female juvenile offenders. Informed by the reviewed literature, a path analytic model was proposed to test both direct and indirect effects of the study variables on severity of conduct disorder symptomatology.

A model of conduct disorder symptomatology was proposed in which depression and CU traits would predict level of risk taking. Additionally, our model proposed that depression, CU traits, and risk taking would each predict level of conduct problem severity. The overall model accounted for 15.2% of the variability in conduct problems. Major fit statistics revealed the data fit the full model reasonably well, with no improvement seen after trimming nonsignificant paths from the overall model. However, positive indications for any path analytic model cannot determine whether it is the only model that would fit the data, only that this is one possibility (Streiner, 2005). Although our model was informed by previous research and theory, it was somewhat exploratory in that these variables have not been previously investigated in combination, or within an all-female sample. Given that our model accounted for only 15.2% of the variability

in conduct problems, it appears there is much room for improvement in the prediction of conduct disorder severity, using individual difference variables.

Our first hypothesis was partially supported in that depression did have a significant direct effect on level of conduct disorder symptomatology. Although the magnitude of the effect was somewhat modest (standardized coefficient in .20 range), the current findings suggest that depression may be an important factor in the prediction of conduct disorder severity among females. This offers some additional support for previous research that has indicated depression and conduct problems are often found in combination among girls (Keenan, Loeber, & Green, 1999; McGee & Stanton, 1992; Zoccolillo, 1993) and that depressive symptoms may be an important risk factor for the development of or exacerbation of conduct problems and delinquency among females (e.g. Obedeidallah & Earls, 1999). Our findings suggest it is important to recognize and treat symptoms of depression among females with conduct problems, given that such symptoms may complicate the course of their conduct problems or contribute to increased severity of delinquent behavior.

Contrary to our expectations, level of CU traits (as measured by the APSD) did not have a significant effect on conduct disorder symptomatology. This finding was surprising given the research literature supporting a strong relationship between these variables. In fact, previous research has provided compelling support for the role of CU traits in conduct disorder such that a proposal is currently being considered for the inclusion of a CU traits specifier for the diagnosis of Conduct Disorder in the upcoming DSM-V (Frick & Moffitt, 2010; [www.dsm5.org/ProposedRevision/Pages/proposedrevision.aspx?rid=424#](http://www.dsm5.org/ProposedRevision/Pages/proposedrevision.aspx?rid=424#)). However, it

remains that the majority of prior research related to CU traits and conduct problems has been conducted on all-male samples, with relatively fewer studies including mixed gender samples and far fewer focusing on CU traits among females specifically. Additionally, there has been relatively less research conducted on CU traits within ethnic minority samples. The current sample was comprised of roughly two-thirds of ethnic minority youth. In recent years there have been calls for more research to explore the role of CU traits among females and ethnic minority children (Moffitt et al., 2008). One recent large (and ethnically diverse) longitudinal investigation of an all-female sample (ages 7-13) revealed that parent and teacher reported CU traits (utilizing four selected items from the APSD CU scale) were related to chronically high levels of ODD and CD behaviors (Kroneman, Hipwell, Loeber, Koot, & Pardini, 2011).

It is possible that the nature of our sample and its small size contributed to the unexpected lack of effect of CU traits on conduct disorder. The participants in our sample were drawn from a boot-camp type facility for lower level offenders with the goal of preventing further penetration into the juvenile justice system. Results from the APSD indicate the girls in our sample did not endorse a very high level of CU traits. Out of a possible high score of 12, none of the participants in our sample scored above an 8 on the CU subscale. The mean score on this subscale for our participants was lower and evidenced less variability than some other researchers have previously found using the APSD CU scale (e.g. Loney, Frick, Clements, Ellis & Kerlin, 2003). Previous findings have shown that boys tend to score higher on measures of CU traits than girls (Essau et al., 2006), consistent with adult literature showing higher levels of psychopathy among men than women ((Nicholls, Ogloff, & Douglas, 2004; Vitale & Newman, 2001).

Although the APSD has received support for its reliability and validity (both self-report and parent/teacher report versions), there have been concerns raised regarding its modest level of internal consistency reliability, particularly for the CU scale and the self-report version (Roose, Bijttebier, Decoene, Claes & Frick, 2010). Among our own sample, internal consistency reliability for the CU scale of the APSD was lower than the modest estimates (.50-.61) previously reported by Munoz and Frick (2007) for the CU scale. In response to such concerns, the instrument has been improved for the assessment of CU traits specifically through the development of the Inventory of Callous Unemotional Traits (Frick, 2003). Whereas the APSD contains three scales to measure aspects of psychopathy (Callous Unemotional, Narcissism, and Impulsivity), the ICU was developed specifically for the assessment of CU traits. The ICU was developed from the CU scale of the APSD and expanded to include 24 items to assess for CU traits, rather than the 6 items that comprise the CU scale of the APSD, to help improve its internal consistency reliability. Additionally, response options were expanded to a 4-point likert scale for the ICU rather than the 3-point scale utilized on the APSD. Items on the APSD CU scale are worded in the positive direction, except for one item; the ICU made adjustments to vary the direction of items to help reduce possible response bias (Essau, et al., 2006). The ICU can be used to assess CU traits using youth, parent, or teacher reports.

Another potential explanation for our lack of significant findings for CU traits relates to informant issues. In the current study we relied exclusively on self-reported CU traits, whereas previous research has sometimes combined self-reports and teacher or parent reports of CU traits, or relied exclusively on these other informants. Although

youth may have better knowledge of their callous-unemotional tendencies or inclinations than outside observers, they may be less willing to disclose these traits than other reporters who have observed them behave in callous and unemotional ways.

Additionally, given that callous-unemotional behavior may be viewed as even more deviant among females than males, given strong socialization influences on females to be emotional and caring (e.g. Zahn-Waxler, 2000) females may be particularly unwilling to disclose these tendencies. Of the handful of studies to date of which we are aware and that have focused on CU traits among females specifically, only one used self report data regarding CU traits (Marsee & Frick, 2007; assessed with the ICU), whereas the others relied on parent and/or teacher reports regarding CU traits.

Our findings may also be an indication of what some other researchers have found showing CU traits strongly predict conduct problems, but many youth with conduct problems or delinquency do not exhibit CU traits. This is consistent with the theoretical basis for CU traits which suggests that they may be useful in identifying a small, particularly severe subgroup of youth with conduct problems (e.g. Frick, 1998; Frick & White, 2008; Marshall & Cooke, 1999). A recent longitudinal investigation of youth ages 7-12 (mixed gender) revealed that high CU traits were strongly related to conduct problems, but that youth with high levels of conduct problems were only moderately likely to exhibit high levels of CU traits (Fontaine, McCrory, Boivin, Moffitt, & Viding, 2011). It may be that CU traits are particularly beneficial in the prediction of later delinquency and conduct problems, rather than consistently indicating the concurrent presence of conduct problems. For example, Frick and colleagues (2003a) found that CU traits predicted conduct problems a year later among a small sample of girls, even in the

absence of conduct problems at the time of the initial assessment.

Although risk taking also failed to have a significant effect on conduct disorder, this path approached the .05 level of significance and its removal from the overall model resulted in a slight worsening of the overall fit of the model. During preliminary analyses, risk taking and conduct disorder symptoms were found to be significantly positively correlated, though the magnitude of the correlation was fairly small ( $r = .252$ ). It is possible that our small sample size may have contributed to the lack of significant findings regarding the effect of risk taking on conduct disorder in our path model. Previous research has indicated that variability in the tendency to engage in risk taking behaviors may be an important factor in the development of conduct problems and delinquency. For example, juvenile offenders have been shown to take more risks than non-offenders (Arnett, 1992; Zuckerman, 1979) and self-reported risk taking attitudes have been shown to predict involvement in delinquency (Leas & Mellor, 2000; Levine & Singer, 1988). Risk taking as assessed by the BART has been shown to be positively correlated with delinquent and other risky behaviors in adolescents (Aklin et al., 2005) and has been found to be higher among youth with serious conduct problems and substance abuse histories than controls (Crowley, Raymond, Mikulich-Gilbertson, Thompson, & Lejuez, 2006). Our results suggest that further research is warranted regarding the role of risk taking in conduct disorder among female offenders.

In contrast to our hypotheses, depression and CU traits were not found to have a significant effect on risk taking. It was further hypothesized that risk taking may serve as a mediator between level of depression and conduct disorder symptoms and between levels of CU traits and conduct disorder. However, support was not found for either of

these mediational relationships. Although previous literature offers theoretical support for these proposed relationships (e.g. Cleckley, 1941, 1976), little empirical work has been conducted to address these questions specifically. Psychopathy was defined by Cleckley as a disorder characterized by risk-taking, sensation seeking, and engagement in criminal behavior, that presents with egocentrism and cold-heartedness. As such, it was expected that CU traits would contribute to risk taking tendency in our model and risk taking would mediate the relationship between CU traits and conduct disorder symptoms; however, this was not supported by our data. There has been limited empirical support for the association between psychopathy/CU traits and risk taking as assessed by the BART. Hunt and colleagues (2005) found a positive correlation between psychopathy and BART performance among a sample of college students. In contrast, a study conducted using an all-male adult incarcerated sample found BART scores to be unrelated to level of psychopathy (Swogger, Walsh, Lejuez, & Kosson, 2010). It appears that further research is necessary in order to clarify the relationship between CU traits and risk taking.

The lack of a significant relationship found in our study between risk taking and depression may be, in part, explained by our choice of the BART as a measure of risk taking. It is possible that the computerized nature of the BART limited the results of this measure in the current study due to its possible disconnect with real-life risk taking behaviors. Future research may wish to explore using a more ecologically valid approach to the assessment of risk taking. Furthermore, it may be more likely that one's depressed or distressed mood or emotional state would contribute to increased engagement in risky behavior, rather than depressive symptoms overall which include anhedonia and social



withdrawal. Speculatively, more vegetative symptoms of depression may be more likely to reduce activity in general and risky behavior specifically. In contrast, feelings of hopelessness and low self esteem may contribute to engagement in risky behavior due to a perception that one has little to lose. Some prior research has explored the role of mood states on risk taking behavior. Leith and Baumeister (1996) found that individuals induced to feel anger/frustration, embarrassment, were more likely to engage in risky behavior than when they were under a neutral mood condition. In contrast, this finding was not found when participants were induced to feel sadness. It may also be that personality variables play a role in the relationship between mood and risk taking. For example, Cooper, Agocha, and Sheldon (2000) found that individuals high on traits of neuroticism used risk behavior to escape negative mood states and that individuals high in extraversion were more likely to engage in risk behavior to enhance positive moods. Perhaps inducing a distressed state or determining if the participants were experiencing depressed mood during the administration of the BART may help to clarify the role of mood and risk taking. Additionally, analysis of the role of specific depressive symptoms (e.g. feelings of hopelessness) as they relate to risk taking may be beneficial.

Contrary to our hypotheses, CU traits and level of depression were found to be significantly positively correlated, rather than the proposed inverse relationship. This positive relationship between CU traits and depression was found both with and without controlling for level of conduct problems. This finding is in contrast to theory suggesting that psychopathy/CU traits would serve a protective function against emotional disorders such as depression, given that girls high in CU traits would be expected to be lower in proposed risk factors for depression (Hipwell et al., 2007). According to some female

models of depression, girls are socialized from an early age to display greater levels of empathy and guilt than boys, to engage in more prosocial behavior, to more frequently reflect on their own behavior, and to place greater importance on caring for the needs of others than their own, rendering them more susceptible to emotional problems such as depression (Zahn-Waxler, 2000; Zahn-Waxler, Cole & Barrett, 1991). Conceptualizations of psychopathy have traditionally proposed an inverse relationship between psychopathic traits and anxiety or depression as part of a general low level of emotionality (e.g. Cleckley 1941, 1976). However, our findings suggest that CU traits and depression should not be considered to be mutually exclusive.

It is also possible that our results related to CU traits and depression reflect a measurement artifact. As previously suggested by Hipwell and colleagues (2007), it may be that the items used to assess for CU traits may have some overlap with those used to assess for symptoms of depression. For example, flattened affect due to depression may be mistaken for unemotionality associated with CU traits. Also, symptoms of hopelessness, decreased motivation, social withdrawal, and lack of interest or involvement in activities could be mistaken for CU traits. It appears that items on the APSD CU scale such as “You care about how well you do at school/work,” “You keep the same friends,” and “You hide your feelings and emotions” may pull for both CU traits and symptoms of depression, explaining the positive correlation between these constructs found in our study, as well as the Hipwell and colleagues study. However, no research to date has specifically addressed this question.

There are a number of limitations to consider when interpreting the current results. The rather small sample size may have obfuscated some results that may have

been more evident with a larger sample size. Our small sample size and the nature of our sample also limit the generalizability of the current results. Our focus on an all-female juvenile justice sample may be considered both an asset, given that this is an understudied population, as well as a limitation due to a lack of generalizability to other populations. Given this unique sample, no “normal” control group was available to provide further comparison of our results. Furthermore, given that the current study utilized a cross-sectional approach, no causal inferences can be made from our findings. However, the current study was intended to be descriptive in nature and to provide some exploration of areas worthy of further investigation, given the paucity of research on this population.

Another potential limitation of the current study is our reliance on self-report data for several of the study variables, given concerns regarding common method variance. Confidence in our results would have been strengthened by using more than one measure of the study constructs and by including other informants; however, this was not feasible given the study sample and the limited access to other informants who were very familiar with the participants. As previously discussed, the use of the APSD CU scale may serve as a limitation to the current study, given concerns related to low internal consistency and possible overlap with symptoms of depression. Additionally, our assessment of risk taking may have suffered from a lack of ecological validity as a result of our use of a computerized risk taking task.

The current study contributes to the existing literature by the use of a unique sample (female juvenile offenders) and by exploring a set of variables that has not been previously evaluated in combination. Overall, females with conduct problems have

remained an understudied population relative to behavior disordered boys and many questions remain regarding the development of female conduct disorder and factors which may relate to the severity of their delinquent behavior. Our results provide further support that depression is important to consider as a factor in the development of or exacerbation of conduct disorder in females. The current results suggest that further research is warranted regarding the role of risk taking and conduct disorder and the value of its assessment among female juvenile offenders, as this remains unclear. Additionally, the relationship between CU traits and depression should receive further exploration. In particular, attention should be paid to whether the assessment of CU traits may inadvertently measure symptoms of depression, particularly in light of the proposal to include a CU specifier in the upcoming DSM-V.

Our findings suggest that more research is necessary in order to better understand the variables which may contribute to conduct disorder and affect its course. Future research could continue to explore the current variables of interest in a longitudinal design which would better determine the developmental impact of these variables on the course of conduct disorder. Future research should continue to explore the relationship between CU traits and depressive symptoms, within both male and female samples, given that this relationship remains unclear. The current study did not evaluate abuse or other trauma history among our sample, which has been shown to be particularly relevant among female juvenile offenders (Cernkovich et al., 2008). Future research should examine whether symptoms of emotional numbing associated with a trauma response may also possibly be mistaken for or misidentified as callous-unemotional behavior. The literature regarding conduct problems and delinquency has established that many

different variables affect the development and course of such difficulties, and any conceptualization of conduct problems should consider the complex biopsychosocial context for the development of such behavior (e.g. Dodge & Pettit, 2003). Ideally, future research should work toward more integrative approaches for the understanding of youth conduct problems and delinquency.

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## Appendix

### Balloon Analogue Risk Task (BART)

#### Standardized instructions provided to participants

“This task will give you the opportunity to blow up this balloon (*point*) by clicking this button on the mouse (*show left button*). Now you’re going to see 30 balloons, one after another, on the screen. For each balloon, you will use the mouse to click on the box that will pump up the balloon. The bigger you pump the balloon, the more ‘points’ you will build up. But, if a balloon pops, then you lose the money built up on that balloon. If you stop pumping a balloon before it pops, and you click on the box labeled ‘Get \$\$\$,’ your ‘points’ will be saved into the prize meter on the left. The bigger you make the balloon before you press ‘Get \$\$\$,’ the more ‘points’ you will save in your prize meter. You can earn up to 20 points on this task. Do you have any questions?”

Standardized instructions are read aloud to participants. In addition, prior to the beginning of the task, a summary of the instructions is presented on the computer screen.