

PREDICTION OF ADOLESCENT SUICIDALITY: RELATIVE CONTRIBUTION
OF DIAGNOSIS, PSYCHOPATHY, AND IMPULSIVITY

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DISSERTATION ABSTRACT

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Suicide is a leading cause of death among American youth, and specific subgroups among the general population have been identified as being at particularly high risk for suicidality. The present study sought to assess diagnostic, personality, and behavioral characteristics relevant to the prediction of suicidality in a sample of adjudicated females, one group exhibiting relatively high rates of suicidal ideation, gestures, and attempts. Fifty-four girls residing in a bootcamp-style residential program completed a diagnostic interview, a self-report measure of impulsivity and callous-unemotional traits, and a series of computerized behavioral tasks designed to assess impulsivity and behavioral inhibition. Over 24% of the current sample endorsed experiencing suicidal ideation and making at least one serious suicide attempt during their lives. Diagnostic status was found to be related to the presence of suicidal ideation and attempts, with those with comorbid symptoms of depression and conduct problems

reporting the highest rates of suicidality. An association was expected between callous-unemotional traits (CU), a hallmark of psychopathy, and suicidality, but no significant group differences were found in CU across levels of suicidality. Using hierarchical regression analyses, only self-reported impulsivity predicted suicidality above and beyond diagnostic status. These results highlight the need to assess both diagnostic status and impulsivity as potential risk factors for suicidality in both research and clinical endeavors.

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Introduction

Suicide among adolescents is widely considered to be a serious public health problem. At present, it is the third leading cause of death among Americans aged 10-24 years (Centers for Disease Control and Prevention, 2004). Over 11% of the young people who died in the United States during 2004 did so as a result of suicide. Many more youth are seriously injured each year by nonfatal suicidal gestures, resulting in lasting damage to their health and emotional well-being, and placing them at high risk for future and more severe suicidal behavior. Previous suicidal ideation is reported by 88% of suicide attempters; 40% of those who successfully commit suicide made a prior nonfatal attempt (Horesh, 2001; Lewinsohn, Rohde, & Seeley, 1996). A past history of a suicide attempt is considered to be the strongest predictor of future suicide attempts, but given the potential for lethality inherent in every attempt, it is important to study the entire continuum of suicidal behavior (Mazza & Reynolds, 2001).

Certain subgroups among the general population of adolescents have been identified as being at high risk for suicidal ideation and attempts (Esposito & Clum, 2003; Esposito, Spirito, Boergers, & Donaldson, 2003; Horesh, Orbach, Gothelf, Efrati, & Apter, 2003; Rohde, Seeley, & Mace, 1997). First, estimates suggest that up to 1 in 10 teen girls will make a suicide attempt during adolescence, compared to 1 in 25 teen boys (Lewinsohn et al., 1996). There is a need to study adolescent girls specifically in order to enhance our understanding of this phenomenon (Borst & Noam, 1993; Rohde et al.,

1997). Second, 80% to 90% of adolescents with a history of a suicide attempt have a psychiatric diagnosis (Esposito & Clum, 2003). Among this group, diagnoses of mood disorders (e.g., major depressive disorder; MDD) or disruptive behavior disorders (e.g., conduct disorder; CD) have been associated with suicidality (Esposito & Clum, 2003; Lewinsohn et al., 1996; Wannan & Fombonne, 1998). Although the relationship between mood disorders and suicidality is well-studied, there is a need for further research into the personality and behavioral characteristics of suicidal individuals with disruptive behavior disorders or comorbid depression and conduct problems, as the links between these phenomena are poorly understood.

The present study sought to clarify the predictors of suicidality in a sample of adjudicated female adolescents. This adjudicated sample was selected because a high percentage of the population has a diagnosable psychiatric disorder, particularly depression and conduct problems, and the rates of suicidal behavior in these settings are comparable to those in inpatient psychiatric facilities (Rohde et al., 1997). However, adjudicated girls are a historically understudied population, and they often fail to receive the psychiatric care they warrant. This investigation builds upon the existing knowledge base surrounding suicidality in adolescents, and attempt to identify specific personality and behavioral characteristics that serve as predictors of suicidality in this population.

Literature Review

Suicide

Suicidal behaviors, such as ideation, gestures, and attempts, have been conceptualized as falling along a continuum (Brent et al., 1988). In this conceptualization, those who experience suicidal ideation or exhibit suicidal gestures or attempts are viewed as individuals who are predisposed to suicide; thus, they are at high risk for completing it. Mazza and Reynolds (2001) asserted that it is important to assess the entire continuum, as maladaptive phenomena such as self-injurious behavior may be followed by intentional suicide attempts. Research has also shown that a past history of a suicide attempt is the best predictor of future attempts and completed suicides (Esposito et al., 2003), yet the field's understanding of the link between less "severe" suicidal gestures and future attempts or completions is less clear. There is a definite need for further study regarding the nature of suicidality, including all elements of the continuum, particularly among those adolescents who are most vulnerable to suicidal thoughts and behaviors.

Epidemiology. Numerous investigations have been conducted regarding the rates of suicidal ideation and attempts in adolescents (e.g., Kessler, Borges, & Walters, 1999; McKeown et al., 1998). A review of those studies conducted during the past 10 years reported the consistent finding that nearly 20% of American high school students gave serious consideration to attempting suicide within 1 year of assessment (Gould,

Greenberg, Velting, & Shaffer, 2003). These results are similar to those obtained in a large national study conducted by the CDC (Grunbaum et al., 2001). This study found that within 1 year prior to assessment, 15% of American youth made a specific plan to attempt suicide, and 8.8% made an actual attempt, many severe enough to warrant medical attention.

Suicidal ideation and attempts are more common among female adolescents (Lewinsohn et al., 1996; McKeown et al., 1998), although completed suicide is more common among males. Grunbaum et al. (2003) reported that 23.6% of high school girls reported a history of suicidal ideation within the year prior to assessment, compared to only 14.2% of boys. The gender difference in number of suicide attempts was also striking, with 11.2% of girls making nonfatal attempts, compared with only 6.2% of boys. The frequency of suicide attempts by girls increases throughout adolescence, typically peaking between 16 and 18 years of age before making a marked decline (Kessler, Borges, & Walters, 1999).

Ethnicity has also been identified as a factor impacting suicidality in adolescents (Grunbaum et al., 2003). Within the United States, white adolescents have a relatively high rate of suicidal ideation (19.7%) when compared to African American youth (13.3%). Latino youth display a similarly high rate of ideation (19.4%), and the highest rate of suicide attempts (12.1% when compared to 8.8% of African-American teens and 7.9% of white teens). Gould et al.'s review suggested that the results in this area are unclear, because past studies have shown Latino adolescents to have a lower rate of ideation than other ethnic groups (2003). Overall, there is controversy regarding the role

of ethnic status in suicide risk (Roberts, 2000), which highlights the need for further study of differences in suicidal ideation and attempts among ethnic groups.

Diagnostic risk factors for suicide. Many personal characteristics have been identified as risk factors for suicidal ideation and attempts (Gould et al., 2003). One risk factor that has been widely studied is the presence of psychopathology (e.g., Esposito et al., 2003; Horesh et al., 2003; Mazza & Reynolds, 2001; Rohde et al., 1997; Shaffer et al., 1996). Sixty to 90% of adolescents who complete suicide have been shown to have at least one major psychiatric disorder (Gould et al., 2003). Over half of these individuals had suffered from a psychiatric disorder for at least 2 years. Mazza and Reynolds (2001) suggested that those who have experienced suicidal ideation or made a nonfatal suicide attempt show a greater level of severity with regard to psychopathology when compared to non-suicidal peers.

One of the most prevalent types of psychopathology among victims of suicide is depression, with 49% to 64% meeting criteria for a depressive disorder diagnosis prior to their deaths (Gould et al., 2003). In a psychological autopsy study of risk factors for adolescent suicide, Brent et al. (1993) found that 89.6% of suicide victims met “definite” or “probable” criteria for a psychiatric diagnosis, with major depression serving as the most prominent diagnostic risk factor for completed suicide. This finding is particularly true for adolescent females, who show high rates of “internalizing” psychopathology, such as depression (Shaffer et al., 1996).

Rates of disruptive behavior disorders, such as CD, are also high among adolescent suicide completers (Brent et al., 1993). These disorders are among the most potentially devastating mental disorders affecting children and adolescents (Frick & Ellis,

1999). The problem behaviors exhibited by children and adolescents with these disorders range from noncompliance and tantrums to aggression, stealing, and other serious forms of antisocial behavior (McMahon & Estes, 1997). The impact of the problem behavior exhibited by children with disruptive behavior disorders can be seen across the lifespan, and for some the antisocial behavior continues into adulthood (Moffitt, 1993).

In their psychological autopsy study, Brent et al. (1993) found that CD was a significant risk factor for suicide, and that it was of greatest impact in the absence of an internalizing symptom presentation, such as depression. These authors hypothesized that the link between CD and suicide completion was impulsivity, a construct to be discussed at length in a later section of this document. Feldman and Wilson (1997) also noted the frequent coexistence of suicidality and conduct problems, particularly among incarcerated adolescents, and suggested that many suicidal adolescents present with complex symptom patterns that include both symptoms of CD (e.g., aggression) and more classic characteristics of depression (e.g., hopelessness). They confirmed that depression alone does not explain all suicidal behavior and asserted a need for research on suicidality in the context of conduct disorder. Early studies in this vein have shown that the aggression and impulsivity often found in youth with disruptive behavior disorders can predispose young people, particularly adolescent girls, to depression and suicide (Loeber & Keenan, 1994; Wannan & Fombonne, 1998). The evidence for a link between CD and suicidality is not unequivocal, however. For example, Esposito and Clum's (2003) study of the contribution of diagnostic factors to suicidality did not find a link between externalizing disorders and suicidal ideation, when controlling for the presence of an internalizing disorder. Therefore, there is a need to study suicidality among those with independent

internalizing and externalizing disorders, as well as those with comorbid diagnoses from both dimensions of psychopathology.

The body of research on comorbidity reveals that young people with both depressive and disruptive behavior disorders experience severe behavioral, emotional and psychosocial problems, are at increased risk for other behavior disorders and problems in adjustment, and display symptom patterns that pose greater resistance to treatment (Bardone, Moffitt, Caspi, Dickson, & Silva, 1996; Beyers & Loeber, 2003; Goldstein et al., 2003; Meller & Borchardt, 1996). Historically, however, insufficient emphasis has been placed on understanding the full impact of comorbid diagnoses, particularly on the manifestation of conduct disorders (Loeber & Keenan, 1994). Recently, Hinshaw and Lee (2003) advocated for continued investigation of comorbid disorders, asserting that research on conduct problems should include information on comorbidity with both other externalizing disorders (conduct disturbances) and internalizing disorders (emotional disturbances).

Capaldi (1991) also observed a specific need for investigating comorbid conduct disorders and depression, and noted that these two disorders occur together more frequently than their population base rates would lead one to predict. One-third of children diagnosed with either syndrome may also be given the other diagnosis (Capaldi, 1991). Research cited by Reinecke (1995) revealed that 25% of depressed adolescents exhibit mild conduct problems while 11% show severe conduct problems. Gender differences have been found with regard to patterns of comorbidity, with adolescent girls experiencing higher levels of comorbid emotional disorders and CD than boys (Loeber & Keenan, 1994). Both CD and depression independently lead to significant impairment in

functioning for adolescents. When present simultaneously, the impact of symptoms on emotional, behavioral, and social functioning can be even more detrimental.

When CD and depression occur comorbidly, youth are considered at increased risk of suicidal behavior (Reinecke, 1995). A long-term follow up of adolescents who received psychiatric services in the 1970s and 1980s found that individuals with comorbid diagnoses of MDD and CD exhibited significantly more suicidal behavior throughout their lifetimes than those with a diagnosis of MDD alone (Fombonne, Wostear, Cooper, Harrington, & Rutter, 2001). Adolescents who attempt suicide represent a heterogeneous group, with many experiencing varying levels of depression, antisocial behavior, or both (Borst & Noam, 1993).

Suicide among adjudicated adolescents. Adolescents in detention facilities subsequent to antisocial behavior often experience elevated rates of depression, impulsivity, aggression, and other characteristics that increase their risk of suicide (Sanislow, Grilo, Fehon, Axelrod, & McGlashan, 2003). These authors suggested that adolescents in a juvenile detention facility experienced levels of psychopathology similar to a comparison group of acutely ill psychiatric inpatients, but found some differences in suicide risk. The authors controlled for depression, and subsequently found that impulsivity and substance abuse were strong predictors of suicide risk among the adjudicated juveniles, but not the psychiatric inpatients. Sanislow et al. also indicated that 21.8% of detained juvenile delinquents had seriously considered suicide, and 15.5% had made at least one serious attempt. Given that the rate of completed suicide for incarcerated adolescents is up to 4.6 times greater than the rate for the general adolescent

population (Battle, Batde, & Tolley, 1993; Harris & Lennings, 1993), there is clearly a need for further assessment of suicidality within this subgroup of youth.

Feldman and Wilson (1997) noted the frequent coexistence of suicidality and conduct problems, particularly among incarcerated adolescents, and suggested that many suicidal adolescents present with complex symptom patterns that include both symptoms of CD (e.g., aggression) and more classic characteristics of depression (e.g., hopelessness). They reported that depression alone does not explain all suicidal behavior and advocated research on suicidality in the context of conduct disorder. Early studies in this vein have shown that the aggression and impulsivity often found in youth with disruptive behavior disorders can predispose young people to depression and suicide (Loeber & Keenan, 1994).

Gender differences. Borst and Noam (1993) cited the common finding that girls attempt suicide more often than boys do, and called for more research into gender-specific aspects of suicidality among adolescents in general. Among adolescents with conduct problems, females appear to be at higher risk for suicide than males (Loeber & Keenan, 1994), based on findings from the Ontario Health Study in which the relative odds of suicidal ideation and behavior was 8.6 for girls with CD, compared to 5.6 for boys. Such findings suggest a paradoxical relationship: Disruptive behavior disorders are more common in male adolescents than females, but girls who have conduct problems are at increased risk for both comorbid depression and suicidal ideation and behavior relative to boys. Among detained adolescents, females have been found to have elevated rates of suicidal behavior, with 50% reporting a lifetime occurrence of suicidal ideation and 40% reporting a past suicide attempt (Rohde et al., 1997). Suicidal behavior in female

delinquents is strongly associated with impulsivity and instability, whereas in boys it is associated with depression and decreased social connection, suggesting fundamental gender differences in suicidality and a need to study genders separately. Thus, there is a specific need for further study of suicidality among female delinquents, given their increased risk of suicide and the disparity in characteristics associated with suicidal behavior for youth of different genders.

Psychopathy

Equivocal findings regarding the link between CD and suicidality have prompted investigations of the relative influence of specific personality variables exhibited by some conduct disordered individuals on suicidal ideation and attempts (Esposito & Clum, 2003; Verona, Patrick, & Joiner, 2001). Chief among these are the traits characteristic of psychopathy. Psychopathy is a construct consisting of a group of affective, self-referential, and behavioral traits that have a dramatic impact on an individual's view of the world (Frick & Marsee, 2006). In the seminal works on psychopathy, Cleckly (1976) and Hare (1970) described psychopathic individuals as charming, yet superficial, egocentric, callous, and lacking in guilt or anxiety regarding their behavior and the possibility of punishment. Cleckly (1976) even maintained that psychopaths were, in essence, immune to suicide, given their shallow emotions and cold and calculating manner.

Much of the published research on psychopathy has been conducted with adults, but the leading researchers in the field have identified a need for further investigations of these traits as they develop in youth (Frick & Marsee, 2006; Frick, O'Brien, Wootten, & McBurnett, 1994; Pardini, Lochman, & Frick, 2003; Vitacco, Neuman, Robertson, &

Durrant, 2002). Among all youth with a CD symptom presentation, a subgroup shows early manifestations of psychopathic traits, which is often associated with a poorer prognosis and greater likelihood that antisocial behavior will persist into adulthood (Frick, 1998; Marshall & Cooke, 1999). By studying this subgroup, greater understanding of their personality features may be acquired, and then translated into more effective early interventions (Frick & Marsee, 2006).

The development of conduct disorder in youth. The process by which a CD symptom presentation develops is a key factor in understanding the relationship between psychopathy and CD. Recent research has shown that the traditional models of conceptualizing CD may not apply as readily to girls as to boys (Silverthorn & Frick, 1999); thus, a thorough discussion of the development of the disorder is warranted. The most influential theoretical model of the development of antisocial behavior posits that the behavior displayed by many individuals with conduct problems develops through one of two possible pathways, beginning in either childhood or adolescence (Moffitt, 1993). The first pathway involves the onset of antisocial behavior in childhood and is associated with higher levels of aggression and increased cognitive and/or neuropsychological dysfunction (i.e., low IQ). The second pathway is characterized by the onset of antisocial behavior in adolescence. Adolescent-onset problems are typically not associated with the deficits in cognitive functioning seen among those with childhood-onset behavioral problems, and have been viewed as less debilitating over the course of the lifespan.

Frick and colleagues have elaborated on the early work in this area, and have identified characteristics of individuals with conduct problems who have developed through each pathway (e.g., Frick, Cornell, Barry, Bodin, & Dane, 2003; Frick & Ellis,

1999; Silverthorn & Frick, 1999). The available research has led many developmental theorists to suggest that the childhood-onset type of conduct problems is associated with more of a fundamental character disturbance than the adolescent-onset subtype. However, Silverthorn and Frick (1999) recognized differences in the developmental progression of conduct problems among boys and girls and set forth an extension of the two-trajectory model in an effort to explain the development of conduct problems in girls.

The delayed-onset pathway to conduct disorder. A delayed-onset pathway is the optimal way to describe the manifestation of CD in females (Silverthorn & Frick, 1999). Most girls with antisocial tendencies first display conduct problems in adolescence. However, despite the later onset of problems, the backgrounds and prognoses of many antisocial girls are similar to those of boys with *childhood*-onset conduct problems. The high rates of family dysfunction and cognitive and neuropsychological deficits reported among many adolescents with conduct problems are now believed to be experienced primarily by boys with childhood-onset symptoms and girls who have a delayed onset of symptoms.

Silverthorn and Frick (1999) identified specific characteristics in many boys with childhood-onset conduct problems and girls with delayed-onset conduct problems arising in adolescence. Their review of the relevant research pointed to the presence of a callous emotional style and impulsive behavior among many boys and girls whose symptoms have followed each of these respective two courses. Adolescents whose personalities are characterized by an impulsive and callous style often exhibit “persistent” antisocial behavior (Moffitt, Caspi, Dickson, Silva, & Stanton, 1996). Impulsivity and callousness are linked to deficits in the ability to process emotional stimuli and a lack of fearful

inhibitions (Frick & Ellis, 1999; Frick & Hare, 2001). Children with these characteristics are also often more sensitive to rewards than punishments, which leads them to persist in certain behavior despite negative consequences (Frick et al., 2003). These specific deficits and sensitivities are not found in children who have conduct problems or high levels of impulsivity but *lack* the callous-unemotional (CU) trait.

Impulsivity and lack of inhibition in conduct disorder. Disinhibition is a central concept in developmental psychopathology, and is believed to play a role in a range of pathological conditions, including CD (Nigg, 2000). Children with disruptive behavior disorders often display impulsivity and deficits in behavioral inhibition, difficulties that are associated with delinquent behavior and academic problems (White et al., 1994). In their review of the literature on impulsivity and psychopathy, Hart and Dempster (1997) described the term “impulsivity” as (a) a symptom, referring specifically to a lack of forethought and planning; (b) a kind of aggression that is automatic and immediate in nature; and (c) a personality trait that has cognitive and behavioral manifestations. Multiple measurement strategies are available in the study of impulsivity, including the personality approach, the cognitive approach, and the behavioral control approach (White et al., 1994). White and colleagues suggested that impulsivity in children is a two-dimensional construct best assessed using both the cognitive approach and the behavioral control approach.

The cognitive approach involves the study of impulsivity and its opposite, self-control, through investigations of frontal lobe functioning. The frontal lobes are responsible for abstract reasoning, decision making, and self-monitoring (Aron et al., 2003; Luria, 1973), areas of functioning with which delinquent youth often have

difficulty (Moffitt & Henry, 1989). Such research, computer tasks, such as the Delay of Gratification Task, the Stroop Color and Word Association Test, and the Card Playing Task have been used to assess mental control and the ability to monitor behavior (White et al., 1994), with significant relations found between cognitive impulsivity and delinquency. Individuals with a stable pattern of serious delinquent activity show the greatest level of impulsivity, suggesting a connection between their impulsive performance on these laboratory tasks and their real-world activities.

The behavioral control approach also shows particular promise in research with conduct disordered youth. This approach is based on the underlying theory developed by Gray and colleagues (Gray, Owen, Davis, & Tsaltas, 1983) in which two competing behavioral systems were proposed. The first of these systems, the Behavioral Inhibition System (BIS) is believed to cause an individual to pause and contemplate cues of punishment, novelty, and non-reward. In contrast, the Behavioral Activation System (BAS) activates behavior in the face of cues of reward or escape from punishment. For optimal functioning, these two systems must be in balance (Quay, 1988; 1993). Quay proposed that individuals with attention problems have an *underactive* BIS while those with anxiety disorders have an *overactive* BIS. For those individuals who exhibit the aggressive and impulsive behavior characteristic of CD, the BIS is underactive, and the BAS is overactive (Quay, 1988; 1993). Researchers have suggested that individuals with a dominant BAS often have “psychopathic” personalities, characterized by impulsivity and poor behavioral self-control, particularly in situations in which cues for both reward and punishment are present (e.g., Gray et al., 1983; White et al., 1994.)

Assessment of impulsivity and behavioral inhibition. Many measures have been developed for use in research on impulsivity and inhibition as conceptualized from the cognitive and the behavioral control perspectives (White et al., 1994). These measures are geared toward the assessment of behavioral responses in compliance with changing context cues and requirements. One such measure of inhibitory self-control that has been used with impulsive individuals is the stop signal task (Logan, Schachar, & Tannock, 1997). This paradigm involves two tasks: a *go* task, in which the subject must discriminate between two stimuli and perform a target response, and a *stop* task, in which subjects must inhibit their response to the go task following the presentation of a tone (the stop signal). Logan et al. have used a race model to explain the task, suggesting that if a subject “finishes” the stop task before the go task, the response is inhibited. Conversely, however, if the go task is finished before the stop task, responding will occur on the go task.

The stop signal paradigm is a model of inhibitory control, with failure to inhibit the go response reflecting poor impulse control. Nigg (2000) suggested that this paradigm pertains to the cessation of both thought and action in response to external cues; thus, it includes both a cognitive and a behavioral component. To succeed at the task, one must change course in response to new information (tone), by stopping the current thought or action. The cued response must be suppressed when it is followed by the tone, a process that is believed to mimic the regulation of day-to-day behavior (Logan, 1994). Measures of impulsivity such as the stop signal task are linked to measures of delinquency, and children with CD diagnoses and aggression have been found to have slower stop reaction times than controls (Oosterlaan, Logan, & Sergeant, 1998;

Oosterlaan & Sergeant, 1996). The stop signal paradigm is a promising measure of inhibition (Nigg, 2000), but there is a need for further research with this measure, particularly as it is used to assess the characteristics of CD youth (White et al., 1994).

In addition to the types of inhibition measured by the stop signal task, which are primarily related to executive inhibitory control, a second class of processes has been proposed that is related to personality and motivation (Nigg, 2000). Tasks that have been designed for use in this paradigm assess the motivated inhibition of behavior or thought. Newman, Patterson, and Kosson (1987) used a go/no-go task with reward and punishment conditions to assess disinhibition in adult psychopaths. Their computerized card-playing task first creates a dominant response set which is associated with a high rate of reward (money). The response is then paired with punishment (loss of money), with the primary outcomes of interest being the amount of money lost and duration of persistence with the game. Findings using this measure suggest that in the presence of both rewards and punishments, psychopathic adults are more likely to respond to rewards than to punishment.

This line of study has been extended to children and adolescents, and Newman et al.'s work (1987) has been replicated with younger populations showing patterns of antisocial behavior and psychopathic traits (e.g., Frick et al., 2003; O'Brien & Frick, 1996; O'Brien, Frick, & Lyman, 1994; Shapiro, Quay, Hogan, & Schwartz, 1988). Young participants high in CU traits play more trials on the reward dominance computer task than youth with low levels of CU traits, despite the "punishment" of losing money as they persist (Frick et al., 2003; O'Brien & Frick, 1996). Using this computer task, O'Brien and Frick (1996) identified a subset of conduct disordered children who are

nonanxious and high in CU traits, and established that this subset exhibits a reward-dominant response style. The features of this subgroup most closely approximate the concept of psychopathy as it has been described in the adult literature. More recently, Frick et al. (2003) have assessed differences in sensitivity to punishment cues among nonreferred children. Children with high levels of CU traits played significantly more trials of this game than children with low levels, even without the presence of antisocial behavior or a diagnosable conduct disorder. The authors suggest that this line of research is a promising means of understanding childhood psychopathy.

Assessment of emotional reactivity. In addition to research on impulsivity in children with CD, recent studies have also focused on other characteristics that distinguish conduct disordered children who have high levels of the CU trait from those children whose conduct problems are not associated with high levels of the CU trait. Antisocial children with lower levels of CU traits tend to display high levels of emotional reactivity, which is hypothesized to be responsible for the problems in behavioral and emotional regulation evident in their presentations (Frick et al., 2003; Loney, Frick, Clements, Ellis, & Kerlin, 2003). These children are hypervigilant in very emotional situations, and are unable to control their behavior, acting out in an impulsive manner. They feel remorse for their actions, but are nonetheless unable to stop themselves from behaving inappropriately, due to behavioral dysregulation. Pardini et al. (2003) have shown, however, that children who are high in CU are less distressed by the negative consequences that their behavior causes. High levels of CU are associated with weaknesses in cognitive and emotional empathy, an emotional processing deficit that buffers the distress experienced by youth with high levels of the CU trait. Thus, conduct

problems may arise through two different pathways, subtyped based upon the child's level of the CU trait. Those with high levels of impulsivity but low CU are hyper-responsive to emotional situations, whereas those with high CU are under-responsive to emotional situations. Frick et al. (2003) suggested that this line of research might be of use in diagnostically subtyping antisocial children and in developing specific interventions for children who have different patterns of emotional reactivity.

Research on emotional reactivity has been conducted (Loney et al., 2003) using a variation of the lexical decision task developed by Williamson, Harpur, and Hare (1991). On this task, participants view strings of letters on a computer screen and must determine if the letters form a word. Words embedded in this task may be either neutral or emotionally-laden (positive or negative emotional valence). This task provides a measure of reactivity to negative stimuli, and serves as a means for further assessing behavioral inhibition. As outlined above, one would predict that individuals with high levels of CU traits would have deficits in responsivity to aversive or negative cues, and empirical findings have been consistent with this expectation (Frick et al., 2003; Loney et al., 2003). The CU dimension is associated with slower reaction times for negative words (e.g., mad, pain, gun). In contrast, children who are impulsive, but who do not have high levels of CU traits, often are highly reactive to emotional stimuli (Frick & Hare, 2001; Loney et al., 2003). For example, Loney et al. found that impulsive subjects showed faster recognition times for negative emotional words. Those youth who are impulsive and antisocial but who are lacking high levels of the CU trait are very sensitive to perceived cues of threat and are more prone to emotional distress than other youth.

Loney et al. (2003) suggested a need for additional research efforts on emotional reactivity among antisocial youth. Impulsivity-conduct problems (I-CP) and CU traits have been found to be positively correlated, yet each of these dimensions is correlated in the opposite direction with measures of emotional reactivity. The presence of high levels of CU traits also appears to outweigh the effects of impulsivity on emotional reactivity, rendering those otherwise expected to be hyper-reactive to emotional distress *less* reactive than expected. This phenomenon has implications for behaviors such as suicidal gestures, as emotional reactivity may play a role in the established relationship between impulsivity and suicide (Ruddell & Curwen, 2002; Sanislow et al., 2003; Verona, Patrick, & Joiner, 2001). An extension of this effect may be that impulsive children who also have high CU traits do not over-respond to negative emotional stimuli, and may be less likely to engage in problematic responses such as suicidal ideation or gestures. Consistent with this hypothesis, research with populations of adult offenders has shown that suicidal behavior is linked to the impulsivity and aggressive tendencies of antisocial individuals, but not predicted by the core affective-interpersonal features that are distinct to psychopathy (i.e., CU traits; Verona et al., 2001).

Purpose of the Study

Questions abound regarding the rates of suicidality found among certain subgroups of adolescents. Investigating predictors of suicidality, such as CU traits and impulsivity, is considered important for researchers, clinicians, and society as a whole. Research on CU traits has thus far been conducted primarily on children and adolescents with a single diagnosis of CD or with conduct problems alone. An adjudicated sample was selected for the current study because it provides the opportunity to investigate the

traits of a group of female adolescents with a high incidence of conduct problems while ensuring the presence of a range of behavior and personality characteristics.

Thus, the presence of a disorder involving depressive symptoms and of a disorder involving conduct problems was assessed, along with the participants' levels of CU traits and impulsivity. In addition, the characteristics previously found to be related to high levels of CU traits, namely low levels of reactivity to emotional stimuli and sensitivity to punishment, were assessed. These factors were then evaluated as possible predictors of suicidality within this group of adolescents.

First, the results were analyzed in terms of diagnostic status, with group differences expected on level of suicidality (Hypothesis 1). Those meeting criteria for a psychiatric diagnosis were expected to have higher levels of suicidality than those who did not. Based on the existing literature (e.g., Brent et al., 1993; Esposito & Clum, 2003; Lewinsohn et al., 1996; Verona et al., 2001), relatively high levels of suicidality were expected for those with significant depressive symptoms in the present study. Individuals with a diagnosis of ODD or CD were expected to have higher levels of suicidality relative to those with no diagnosis, but lower levels than those with depressive symptoms. Given the high level of suicidality reported among individuals with severe psychopathology (Fombonne et al., 2001; Reinecke, 1995), it was expected that those with comorbid depressive symptoms and conduct problems would experience a level of suicidality in excess of that found among those with either depressive disorders or disruptive behavior disorders alone.

The results were then evaluated with regard to level of CU traits. Group differences were expected in level of CU traits as measured on the APSD for those with

differing diagnoses, with those with conduct problems or comorbid diagnoses displaying higher scores on the CU subscale (Hypothesis 2) relative to those with no diagnosis or depressive symptoms alone. Consistent with the effects described in the literature (e.g., Loney et al., 2003), level of CU traits was expected to be correlated with level of suicidality and performance on the reward dominance and lexical decision tasks. Specifically, it was hypothesized that high levels of CU traits would be associated with relatively low levels of suicidality, decreased sensitivity to cues of punishment and deficits in emotional reactivity.

With regard to impulsivity, diagnostic group differences were expected as well. Individuals with conduct problems, occurring either alone or with comorbid depressive symptoms, were expected to report higher levels of impulsivity on the APSD and display greater deficits in response inhibition on the stop signal task than those with no diagnosis or a diagnosis of a depressive disorder alone (Hypothesis 3). Impulsivity was expected to be correlated with the rates of suicidality reported by the adolescents, with high levels of impulsivity associated with higher rates of suicidality. Correlations between level of impulsivity and performance on the lexical decision task and reward dominance task were expected. Highly impulsive individuals were expected to be more reactive to emotional stimuli than less impulsive individuals, as well as less sensitive to punishment cues.

Given the above hypothesized relationships, hierarchical multiple regression and logistic regression were undertaken in order to explore the prediction of suicidality among adjudicated adolescent girls. Consistent with the literature (Esposito & Clum, 2003; Lewinsohn et al., 1996), it was hypothesized that diagnostic status would predict

suicidality within this sample. However, it was expected that level of CU traits would have a strong influence on suicidality, after controlling for diagnostic status. In essence, CU will mediate the relation between diagnostic status and suicidality, such that those with high levels of CU, regardless of diagnosis, will be “immune” to suicidality, as Cleckly (1976) suggested decades ago.

Method

Participants

Fifty-four consecutive admissions to a girls' bootcamp-style residential behavior modification program in the southeastern United States were selected for inclusion in the present study. The bootcamp program from which all subjects were drawn serves adolescent girls (ages 12-18) at low to moderate risk and is designed to prevent further involvement in the juvenile court system. This program is the first such placement for most of the residents, and many have never received inpatient or outpatient treatment for the psychological problems they have experienced. The data used in the present study were collected as part of the facility's intake process, and data collection is ongoing. Efforts were made to conduct the intake within the first 2 weeks of each adolescent's stay in the program, although this was not always possible (Range = 2-42 days of stay prior to assessment, $M = 14.98$ days, $SD = 8.82$).

The participants ranged in age from 12-18 years old ($M = 15.4$; $SD = 1.37$) and were predominantly African American ($n = 33$; 61%). Thirty-three percent of the participants ($n = 18$) were identified as White or Caucasian, with the remaining 6% self-identifying as Biracial or other ($n = 3$). Of note, 46% of the sample were aware of a previous psychiatric diagnosis, whereas the remaining 54% had (a) never received a psychiatric diagnosis ($n = 21$) or (b) were uncertain of the presence of a prior diagnosis ($n = 8$). This finding is noteworthy given the high rates of psychiatric diagnoses found in the

current study. Almost 52% of the sample acknowledged a family history of psychiatric symptoms. Additional demographic data are reported in Table 1.

Table 1. Demographic Characteristics of the Sample

Characteristic	Frequency	% of Sample
Racial minority	35	64.9
Non-relative placement prior to admission	11	20.4
Previous psychiatric diagnosis	25	46.3
Family history of psychiatric symptoms	28	51.9
History of behavior problems at school	48	88.9

Note: N = 54. All data obtained from participant's self report during the intake interview.

Measures

During the facility's intake process, a battery of measures was administered to the residents to ascertain diagnostic status (i.e., conduct problems and/or depression), levels of CU traits and impulsivity, past and current suicidal ideation, and history of suicide attempts and self-injurious behavior. A structured clinical interview and self-report measures were used to determine each resident's diagnostic status, suicidality, CU traits, and impulsivity. Impulsivity was assessed through behavioral measures as well as self report measures, and emotional reactivity was evaluated via a separate behavioral task.

Schedule for Affective Disorders and Schizophrenia, School-Age Present and Lifetime Version (K-SADS-PL; Kaufman et al., 1997). The K-SADS-PL, a recently developed version of the interview originally created by Chambers et al. (1985), was used

to assess symptomatology based on DSM-IV criteria. The K-SADS-PL includes questions related to thoughts of death and suicidal ideation, as well as questions specific to psychiatric diagnoses. The K-SADS-PL is a semistructured interview designed for use with children ages 6-18. It assesses current psychiatric diagnoses as well as lifetime diagnoses through a diagnostic Screen Interview, in which 82 symptoms in 20 different diagnostic areas are rated according to current severity and most severe levels in the past. In depth supplemental ratings of various disorders may also be administered, depending upon the level of symptoms reported during the screening. The use of the Screen Interview provides a diagnostic overview of each participant, whereas the Diagnostic Supplements provide a more thorough assessment of specific disorders for those with a positive screening. For the purposes of this study, only the Affective and Behavior Disorders sections of the Screen Interview and supplements were administered, as these are two types of disorders strongly linked to adolescent suicidality (Esposito & Clum, 2003). Empirical support has been found for the reliability and validity of the K-SADS overall (Ambrosini, 2000), and initial studies on the psychometric properties of the K-SADS-PL indicated that the measure generates reliable and valid diagnoses (Kaufman et al., 1997). In fact, Ambrosini (2000) highlights how the diagnostic reliability of the K-SADS has improved as newer versions (such as the KSADS-PL) have been developed, with perfect diagnostic agreement ($\kappa = 1.0$) achieved by some raters. With regard to validity, Kaufman et al. (1997) reported criterion validity for externalizing disorders using the appropriate subscales of the Child Behavior Checklist (Achenbach & Edelbrock, 1983), and for internalizing disorders using the Children's Depression

Inventory (Kovacs, 1982) and the Beck Depression Inventory (Beck & Steer, 1987), all commonly used, reliable and valid measures of psychopathology in children.

In this study, the K-SADS-PL was administered by advanced doctoral students in clinical psychology trained in the administration of diagnostic interviews by licensed clinical psychologists. The interviewers received additional specific training in the administration of the K-SADS-PL by experienced interviewers. Each interview protocol was reviewed by the principal investigator for accuracy in transcribing scores to the summary sheets and in using this information to generate a diagnosis. In addition, the lead investigator reviewed and coded audiotapes of 20% of the interviews ($n = 10$), from which interrater reliability coefficients (Kappas) were calculated. Within the sample of interviews coded for reliability, no participants were judged by either rater to meet criteria for depressive disorder not otherwise specified (past or current) or adjustment disorder (past). Interrater agreement for diagnoses of MDD (past) and CD (past) was correlated perfectly ($K = 1$), as was the agreement between raters with regard to the one participant diagnosed with dysthymia (past and current). Kappas for the reliability of a current diagnosis of MDD, adjustment disorder, CD, or ODD were .85, .79, .85, and .68, respectively. The reliability of the ODD (past) diagnosis was also sufficient ($K = .78$). These coefficients were assessed as adequate and are consistent with those reported in the literature (Ambrosini, 2000; Esposito & Clum, 2003). The reliability of the data available from the interview regarding suicidal behavior was also assessed, revealing an acceptable level of reliability ($K = .73$). In the present study, definite (all criteria necessary for diagnosis met) and probable ($\geq 75\%$ of criteria for diagnosis met) diagnoses of depressive

or behavioral disorders were considered in the analyses, consistent with Kaufman et al., 1997).

Children's Depression Rating Scale – Revised (CDRS-R; Poznanski & Mokros, 1999). The CDRS-R is a semi-structured clinician-rated scale that can be used as a screening measure of depression in children and adolescents. One item from this measure was completed by the clinician following each participant's interview, providing a numerical rating regarding suicidal ideation and attempts. Responses for this item are rated on a continuum from 1 (*Understands the word suicide but does not apply the term to himself/herself*) to 7 (*Has made a suicide attempt within the last month or is actively suicidal*). The obtained score served as an overall index of suicidality in the present study. The suicide item of the CDRS-R has shown predictive validity when used with the Children's Depression Inventory and Youth Self-Report scale, accurately predicting suicide scores at one-year follow-up (Poznanski & Mokros, 1999). The interrater reliability of the CDRS-R overall summary score is high, at $r = .92$. In the present study, interrater reliability for the suicide index was assessed through the use of audiotaped interviews, and was found to be acceptable ($K = .74$). This score is higher than the kappa coefficient reported in the CDRS-R manual for the Suicidal Ideation scale of the measure ($K = .65$ in both clinical and nonclinical samples), and is attributed to the fact that ratings in the present study were made immediately after the administration of a semi-structured clinical interview, which included a number of detailed questions regarding suicidality.

Antisocial Process Screening Device (APSD; Frick & Hare, 2001; Munoz & Frick, 2005; Munoz, Frick, & Kimonis, 2004). The APSD (Munoz & Frick, 2005), a recently developed self-report scale that has been found valid for use with conduct-

disordered adolescents in preliminary studies, was used to assess for CU traits and impulsivity. This self-report scale was adapted from the original parent and staff report form of the APSD developed by Frick and Hare (2001). The use of the self-report version of the APSD is valuable in work with the population under study, because reliable informants from within participants' families are not readily available. In this setting the staff is not sufficiently familiar with the participants at the time of testing to provide valuable data on their functioning.

This 20-item behavior rating scale provides three subscale scores: a CU scale, which assesses affective and interpersonal dimensions of an adolescents' developing personality; a Narcissism scale, which assesses self-referential dimensions; and an Impulsivity-Conduct Problems scale (I-CP), which assesses self-referential and behavioral dimensions. The self-report APSD showed positive evidence for the reliability and validity of its scores, and was associated both concurrently and predictively with other measures of antisocial behavior (Munoz & Frick, 2005). The internal consistency for the self-report APSD Total score is high (.78-.81), and was found to be relatively stable at one-year follow-up. The results for the individual subscales are more moderate (ranging from .50-.68 in a standardization sample), and the authors have called for additional data on institutionalized youth to clarify this finding. In one early study, the measure was able to designate severe, chronic, and violent juvenile offenders from those with less severe or chronic problems (Kruh, Frick, & Clements, 2005). Self-report ratings on this measure were also found to be stable over a period of one to two years, and were moderately correlated with parent reports of functioning.

Stop Signal Task. In addition to the measure of impulsivity available through the ASPD, the residents engaged in a version of Logan and Cowan's (1984) stop-signal task (SST), a test of response inhibition. This task requires participants to engage in a forced-choice letter discrimination task. On a percentage of trials, a stop-signal stimulus (tone) is presented, which indicates to the participant that the response on the letter discrimination task should be inhibited (Schachar & Logan, 1990). Continuous performance tasks such as this one are a useful means of studying relationships between impulsivity and conduct disorder (Schachar & Logan, 1990) and suicidality (Horesh, 2001). Utilizing self-report measures alone is a less than ideal means of assessing a youth's impulsivity and objective means of assessment such as computerized tasks provide a more thorough evaluation of functioning (Horesh, 2001).

The version of the SST used in this study is similar to the version reported in Logan, Schachar, and Tannock's (1997) study of impulsivity and inhibitory control. The SST consisted of two practice blocks and four experimental blocks of 24 trials each, and required approximately 20 minutes to complete. The forced-choice letter discrimination task, or "go-task" using the terminology of the race model, presented a single letter (either X or O) in the center of the screen. Each uppercase letter was presented onscreen for 1000 ms, and the participants were instructed to press a corresponding button on the gamepad device for either X or O. Each letter was presented an equal number of times within each block, and in random order. The stop signal, a tone played through the computer's internal speaker, was presented on 1/3 of the trials within each of the experimental blocks. This tone was the cue for the participant to refrain from responding to the go stimulus (letter X or O) in that trial. The stop signal delay was set at 250 ms

initially; thus, 250 ms passed between the presentation of the letter and the onset of the tone. Thereafter, the stop signal delay was adjusted by the computer program, depending on the subject's responses. The delay increased by 50 ms if the subject was able to inhibit the planned response successfully, making it more difficult to do so on the next trial. The delay decreased by 50 ms if the subject failed to inhibit their response, making it easier for them to do so on the following trial. This dynamic procedure enables the program to generate the stop signal delay that allows an individual to inhibit their responding 50% of the time (Osman, Kornblum, & Meyer, 1986). The dependent variable is the stop signal reaction time (SSRT), or the latency of the stopping process. The SSRT is calculated by subtracting the mean delay at which the participant is capable of inhibiting responding 50% of the time from the mean go reaction time on trials that do not contain a stop signal.

The SSRT generated through this procedure is useful for assessing impulsivity (behavioral disinhibition), because highly impulsive individuals have been found to have longer SSRTs than those with lower levels of impulsivity (Logan et al., 1997; Schachar, Mota, Logan, Tannock, & Klim, 2000). That is, their stopping skills, or inhibitory processes, are slower than those of less impulsive individuals.

Reward Dominance Computer Task. The reward dominance computer task (O'Brien and Frick, 1996) was used to assess participants' sensitivity to punishment cues once a reward-oriented response set has been established. The task is composed of four games in which a stimulus (e.g., card, door, box, or person with a fishing pole) is presented on a computer screen and the participant is given the opportunity to choose whether to view the other side of the card (or what is behind the door, under the box, or on the pole) or stop the game. The participants' choice is recorded by pressing one of two

response keys. If the choice is made to see the other side of the stimulus (continue the game), one of two outcomes occurs: either a second stimulus is present on the other side (successful outcome) or is not present (unsuccessful outcome). Each participant begins with fifty points, and points are either added or taken away from the total depending upon the “success” of the decision to view the subsequent stimulus. During the first ten trials, the success rate, or rate of presentation of a subsequent stimulus, is 90%, but this rate decreases to 0% over the course of 100 trials. The conditions under which the games are played is varied within subjects by the presence or absence of a cue regarding the number of points earned, and the presence or absence of a forced 5-second pause between the presentation of each new trial. The dependent variable of the reward dominance task is the total number of trials played, and the resulting data can be analyzed in terms of four different within subjects conditions related to the cue and pause conditions. Children who are less sensitive to punishment tend to persist longer at the game despite the reduced frequency of reward as it progresses (Frick et al., 2003; O’Brien & Frick, 1996). This measure has been used with forensic, clinical, and non-referred samples, and findings suggest that this measure is useful for distinguishing among individuals with varying levels of CU traits, as those with high CU are less sensitive to punishment on such measures (Frick, 1998; Frick et al., 2003; O’Brien & Frick, 1996). In the present study, it was hypothesized that high levels of CU would be associated with playing a higher number of trials on the task, despite the presence of punishment. Likewise, those who are highly impulsive were expected to be less sensitive to punishment than those lower in impulsivity.

Lexical Decision Task. The participants also engaged in the lexical decision task used by Loney et al. (2003) in their investigation of CU traits, impulsivity, and emotional processing. This task involves the presentation of a series of letter strings, which include emotionally-laden and neutral words and nonwords. The emotionally-laden words have either positive or negative emotional content (e.g., *glad* = positive; *pain* = negative). In the lexical decision task, participants are instructed to depress a “yes” key if the letter string displayed on the screen spells a real word or to depress the “no” key if the letters do not spell a real word. The letter strings are displayed in the center of the computer screen until the participant responds. Based on participants’ performance, difference scores are calculated to assess the amount of recognition time required for neutral stimuli as compared either to emotionally positive or negative stimuli. A negative response facilitation score is computed by subtracting each participant’s average response time to negative words from his or her mean response time to neutral words. Likewise, a positive response facilitation score is computed by subtracting the average response time for positive words from the mean response time to neutral words. These two difference scores may be conceptualized as measures of response time facilitation, which assesses the relative amount of attentional resources given to emotionally laden-words (Loney et al., 2003). This measure has been used with incarcerated adults, adjudicated juveniles, and non-referred children and adolescents, revealing a consistent finding regarding CU traits. Those individuals who have high levels of CU traits tend to show little difference in their recognition time for neutral versus emotional words, suggesting deficits in emotional processing relative to those with low CU (Frick et al., 2003; Loney et al., 2003). Consistent findings were expected with regard to CU in the present study, and it

was also expected that highly impulsive individuals would be more reactive to emotional stimuli than less impulsive individuals.

Apparatus

The computerized tests used in this study were run on IBM-compatible desktop and laptop computers. Presentation software, available through Neurobehavioral Systems (<http://nbs.neuro-bs.com/>) was used to run the stop signal task, and provided precise presentation of stimuli and measurement of reaction time. A digital gamepad device was used as the response device for the SST. The remaining two computer tasks, the reward dominance task and the lexical decision task, were run on the same computers, using the keyboard as the response device.

Procedure

Consent for the use of intake data in research was obtained from every participant's parents or guardian, and each participant gave her assent for inclusion in the study during the intake. Participants underwent the screening interview (K-SADS-PL) to ascertain current and past symptomatology during the first phase of the assessment process. Those reporting symptoms of depression or conduct problems during the screening interview were also administered the corresponding supplemental portions of the K-SADS-PL in an effort to clarify diagnostic status. Suicidality was assessed using self report data from the interview, because adolescents have been found to be reliable reporters of suicidal behavior when compared to parental or clinician reports (Borst & Noam, 1993). Participants completed the APSD and the behavioral measures of

impulsivity and emotional processing during a second testing session, typically held within 30 minutes to one week of the initial interview. The order of administration of tasks and self-report measures was structured to alternate between computerized tasks and paper self-report measures. In addition to the “points” earned during the reward dominance task, the participants were also given opportunities to earn bonus points by completing the lexical decision task. These points were tallied at the completion of the test battery, and each participant was allowed to select a prize from one of three boxes, dependent upon the number of points earned.

Results

Preliminary Analyses

Diagnostic status. The K-SADS-PL interview was used to obtain diagnostic information for each participant, and participants were assigned to groups based upon the K-SADS-PL diagnoses given. Although past and current diagnoses were obtained, only current diagnostic status was used for group assignment. Current diagnoses of major depression, dysthymia, depressive disorder not otherwise specified, adjustment disorder with depressed mood, oppositional defiant disorder, and conduct disorder were given to those individuals who met at least the “probable” criterion (75% of criteria for diagnosis met) at the time of the interview. Eighty-five percent ($n = 46$) of the participants received at least one current diagnosis on the K-SADS-PL, with many receiving more than one. To increase power for analyses and identify those with comorbid versus pure disorders, adolescents were combined into one of four diagnostic categories, representing no diagnosis, depressive symptoms only, conduct problems only, or comorbid depressive and conduct symptoms. Eight adolescents (14.8%) in the study did not meet criteria for any current diagnosis. Adolescents who met criteria for at least one current depressive disorder, but who did not obtain a diagnosis of a disruptive behavior disorder such as ODD or CD were coded as “depressive symptoms only” ($n = 10$; 18.5%). Of these, 30% met criteria for a diagnosis of major depression and 70% met criteria for adjustment disorder with depressed mood. Likewise, those who met criteria for either ODD or CD,

but not a depressive disorder, were coded “conduct problems only” ($n = 8$; 14.8%). Some participants met diagnostic criteria for both ODD and CD. Because of this diagnostic overlap, 63% of those in the conduct problems only group met criteria for a diagnosis of ODD, and 63% met criteria for CD. Finally, those who met criteria for both a depressive disorder and a type of conduct disorder were coded as “comorbid” ($n = 28$; 51.9%). Within this group, 64% were diagnosed as having major depression, 14% given a diagnosis of dysthymia, and 21% as having adjustment disorder with depressed mood. Again, there was considerable diagnostic overlap between ODD and CD. Seventy-one percent of the comorbid group received a diagnosis of ODD, while 68% were diagnosed with CD.

Suicidality. Participants were also categorized based upon level of suicidality. During the K-SADS-PL interview, 48% of the total sample ($n = 26$) denied a history of suicidal ideation or attempts. Many ($n = 10$; 18.5%) acknowledged experiencing ideation at some point in their lives, but denied ever having made an attempt. An additional 9.3% ($n = 5$) endorsed ideation as well as suicidal gestures such as superficial cutting. Importantly, 24.1% ($n = 13$) of the present sample admitted a history of ideation and at least one serious suicide attempt.

Data from the K-SADS-PL were used to assign a rating of current suicidality on a seven point CDRS-R suicide index (Poznanski & Mokros, 1999), as well as to assign diagnoses. In the present study, no participants were identified as actively suicidal, and none had made a suicide attempt within the past month. Thus, the requirements for a score of seven were not met by any participants, and scores on the measure ranged from one to six. Two simplifications of this seven-point scale were used during data analysis.

The first of these created a dichotomy regarding the experience of suicidality (0 = *none*, 1 = *present*). In this dichotomy, a score of “0” represents a CDRS-R rating of one (“*Understands the word suicide but does not apply the word to herself*”) or two (“*Sharp denial of suicidal thoughts*”). A score of “1” represents a score of three to seven, which indicates that the participant has acknowledged experiencing suicidal thoughts on at least one occasion. The second simplification created a 3-point scale based upon the CDRS-R suicidality rating (0 = *none*, 1 = *mild*, 2 = *moderate/severe*). In this simplification, “0” again represents a rating of one or two on the CDRS-R. However, a score of “1” represents a rating of three (“*Has thoughts about suicide or of hurting herself, usually when angry*”), and a score of “2” represents a rating of four to six. The latter indicates that the individual endorsed recurrent suicidal thoughts. These scales were correlated with the participants’ report of suicidal ideation and attempts on the K-SADS-PL (Appendix B).

Chi-square and one-way ANOVA procedures were used to assess differences in demographic variables across diagnostic groups and across cohorts of individuals with differing levels of suicidality. Chi-square revealed no differences with regard to race across the diagnostic groups, $\chi^2(6) = 2.67, p = .850$. Likewise, ANOVA revealed that the diagnostic groups did not differ with regard to age, $F(3, 50) = .727, p = .541$, or length of stay at assessment, $F(3, 50) = .885, p = .455$. Groups differing in level of suicidality were formed using the 3-point scale described above. These three groups did not differ with regard to race, $\chi^2(4) = 2.88, p = .578$, age, $F(2, 51) = 2.09, p = .134$, or length of stay at assessment, $F(2, 51) = .496, p = .612$.

In addition to these group difference analyses, correlations among demographic and other study variables were obtained using Pearson r , Spearman rho, and Chi-square procedures (Table 2). No significant correlations were found between age and performance on any other variables, with the exception of performance on the SST. Response time on the SST was negatively correlated with age, such that older participants earned slower SSRTs. The correlation between length of stay and score on the I/CP scale of the APSD approached significance, indicating that those with relatively longer length of stay at assessment scored somewhat higher on the impulsivity domain of this measure.

Main Analyses

To assess the relations among the primary study variables, diagnostic group differences were assessed with regard to suicidality, CU traits, and impulsivity. Correlations also were obtained between the main study variables in an effort to understand the nuanced relations among them more completely. Finally, hierarchical regression analysis and logistic regression analysis were used to assess the ability of the study variables to predict suicidality accurately. The results of these primary analyses are presented below according to the constructs of interest in each analysis.

Diagnosis. With regard to the other study variables, diagnostic status was found to be correlated with suicidality as measured by the CDRS-R, the positive response facilitation index of the lexical decision task, and with scores on the I/CP and CU subscales of the APSD (Table 3). These relations are discussed more thoroughly below, presented along with the results of analyses related to suicidality, the APSD, and the lexical decision task.

Table 2. Correlations among Demographic and Study Variables

Variable	Age	LOS
Age	-	
LOS	-.074	-
Suicide	-.055	-.063
CU	-.063	-.104
I/CP	-.018	.246
SSRT	-.398**	.016
RDT	.151	-.175
POS	.088	.266
NEG	.204	-.135

Note: LOS = Length of stay at assessment, Suicide = 1-7 scale based upon CDRS-R ratings, CU = APSD callous unemotional subscale, I/CP = APSD impulsivity/conduct problems subscale, SSRT = stop signal reaction time, RDT = No pause condition of reward dominance task, POS = Positive response facilitation on lexical decision task, NEG = Negative response facilitation on lexical decision task.

Bold numbers represent Spearman rho values.

All others represent Pearson r values.

** $p < .01$.

Suicidality. As shown in Table 3, the 7-point CDRS-R rating of suicide was found to be correlated with diagnostic status, $\tau = .334$. One-way ANOVA revealed significant differences among diagnostic groups with regard to level of suicidality, $F(3, 50) = 3.23$, $p = .03$ (Table 4). Post-hoc analyses (Dunnett's C test) indicated that the presence of comorbidity was associated with significantly higher rates of suicidal ideation and attempts ($M = 3.5$, $SD = 1.8$) than no diagnosis ($M = 1.9$, $SD = .64$), but not a diagnosis of depression alone ($M = 2.2$, $SD = 1.9$), or conduct problems alone ($M = 2.4$, $SD = 1.1$).

Table 3. Correlations among Predictor and Criterion Variables

Variable	1	2	3	4	5	6	7	8
1. Suicide	-							
2. DX	.334**	-						
3. CU	.284*	<i>.402**</i>	-					
4. I/CP	.303*	<i>.350*</i>	.300*	-				
5. SSRT	.040	<i>.239</i>	.020	.007	-			
6. RDT	-.072	.282	-.044	-	-	-		
				.050	.267			
7. POS	-.257	<i>.385**</i>	-.071	-	.010	.117	-	
				.182				
8. NEG	-.107	<i>.123</i>	.062	-	-	.266	<i>.376**</i>	-
				.235	.460			
					**			

Note: Suicide = 1-7 scale based upon CDRS-R ratings, DX = current diagnostic status, CU = APSD callous unemotional subscale, I/CP = APSD impulsivity/conduct problems subscale, SSRT = stop signal reaction time, RDT = No pause condition of reward dominance task, POS = Positive response facilitation on lexical decision task, NEG = Negative response facilitation on lexical decision task.

Numbers in bold represent Kendall τ coefficients; italicized numbers represent eta statistics; all other statistics represent Pearson r .

* $p < .05$.

** $p < .01$.

Antisocial Process Screening Device. Diagnostic status was found to be significantly associated with performance on the CU scale, $\eta = .402$, and the I/CP scale, $\eta = .350$. Group differences in APSD responding were also assessed across diagnostic groups, and the performance of those with differing diagnoses on the APSD is presented in Table 4. With regard to diagnostic status and performance on the APSD, one-way

ANOVA revealed that response on the Callous-Unemotional (CU) scale of the APSD was significantly different among the different diagnostic groups, $F(3,49) = 3.14, p = .033$. Dunnett's C analyses revealed that participants with comorbid symptoms showed significantly higher scores relative only to those of the no diagnosis group.

The APSD was also compared with ratings on the simplified 3-point index of suicidality using one-way ANOVA. These analyses revealed a significant difference between the means on the I/CP subscale for those with differing levels of suicidality, $F(2, 50) = 4.8, p = .013$ (Table 5). Those who have experienced moderate to severe suicidality obtained higher scores on the I/CP subscale than those with no experience of suicidality or only mild ideation. No significant difference with regard to mean CU score was found among those with different levels of suicidality, $F(2,50) = 1.55, p = .22$. This finding is in contrast to the hypotheses, and suggests that it is unlikely that the expected mediation effect will hold true. No statistically significant correlations (Table 3) were found between the scales of the APSD and other study variables, in contrast to the expected results.

Table 4. Comparison of Study Variables by Diagnostic Group

Variable	1	2	3	4	F	Dunnett's C
Suicide Index	1.9 (.64)	2.2 (1.9)	2.4 (1.1)	3.5 (1.8)	3.23* (3, 50)	4 > 1
APSD I/CP	3.8 (1.0)	4.5 (1.9)	4.1 (1.6)	5.4 (2.0)	2.28 (3, 49)	
APSD CU	2.6 (1.3)	3.6 (1.3)	4.4 (1.9)	4.8 (2.2)	3.14* (3, 49)	4 > 1
SSRT	402.3 (152.8)	348.6 (260.2)	295.0 (152.6)	401.0 (228.1)	.574 (3, 46)	
RDT No Pause	138.8 (25.0)	163.4 (26.5)	131.6 (31.6)	146.7 (39.9)	1.41 (3, 49)	
LDT Positive	105.5 (131.8)	49.0 (73.6)	62.7 (48.8)	13.8 (76.1)	2.72 (3, 47)	4 > 1
LDT Negative	5.8 (61.8)	4.7 (46.3)	-19.9 (64.5)	-1.11 (77.1)	.240 (3, 47)	

N = 54 for 1-7 Suicide Index variable; *N* = 53 for APSD variables and RDT variable; *N* = 51 for SSRT variable and LDT variables. Mean scores and standard deviations for diagnostic groups.

1 = No diagnosis, 2 = Depressive symptoms only, 3 = Conduct problems only, 4 = Comorbid depressive symptoms and conduct problems.

* *p* < .05.

Table 5. Distribution of Study Variables by Level of Suicidality

Variable	1	2	3	F	Post-hoc
APSD I/CP	4.0 (1.7)	5.3 (1.4)	5.7 (2.2)	4.78* (2, 50)	3 > 1
APSD CU	3.7 (2.2)	4.6 (1.5)	4.7 (1.9)	1.55 (2, 50)	
SSRT	374.5 (197.1)	355.2 (231.5)	395.1 (237.9)	.110 (2, 47)	
RDT No Pause	149.5 (28.1)	138.1 (34.6)	148.3 (46.0)	.478 (2, 50)	
LDT Positive	66.6 (92.5)	38.0 (72.9)	3.9 (82.1)	2.41 (2, 48)	
LDT Negative	4.1 (66.8)	3.5 (64.2)	-17.2 (75.4)	.479 (2, 48)	

$N = 53$ for APSD variables and RDT variable; $N = 51$ for SSRT variable and LDT variables. Mean scores and standard deviations for differing levels of suicidality. 1 = No acknowledgement of suicidality, 2 = Mild suicidal ideation, 3 = Moderate to severe ideation or attempts.

* $p < .05$.

Computer tasks. Results of the SST were first analyzed with regard to probability of inhibition, in an effort to determine whether each participant had responded according to the task instructions. One participant was excluded from the analyses, because the individual failed to respond correctly on any of the trials of the “go” task. For the

remaining participants, the tracking algorithm employed by the computer program, which is designed to operate so that individuals can inhibit responding on approximately 50% of trials, functioned as expected for roughly half ($n = 27$; 52%) of the subjects. Many participants, however, responded incorrectly on more than 80% of the stop signal trials ($n = 15$; 30%). Despite this finding, the mean reaction time on the “go” task, the mean delay, and the mean SSRT were consistently within the range reported in previous literature. SSRT was positively correlated with age, $r(47) = .398$, $p = .004$, such that increases in age were associated with longer SSRT duration. When averaged over all participants, the mean reaction time on the “go” task was 712.64 ms ($SD = 120.68$). The mean delay was 337.83 ms ($SD = 255.88$) and the average estimated SSRT was 374.81 ($SD = 213.15$). Contrary to the hypotheses, no main effects for SST performance were found with regard to level of suicidality as measured by the three-level scale, $F(2, 48) = .110$, $p = .896$ (Table 5) or current diagnostic status, $F(3, 46) = .574$, $p = .64$ (Table 4). No significant correlations were found between SST performance and performance on the other computer tasks or scores on the self-report measures, with the exception of performance on the negative response facilitation index of the lexical decision task, $r(47) = -.460$, $p = .001$ (Table 3).

Regarding the reward dominance task, the total number of trials played was recorded for each of the four games. As outlined in the previous discussion of measures, the conditions under which the games were played were varied within subjects by the presence or absence of a cue (number of points represented on the screen) and the presence or absence of a forced 5-second pause. The results were analyzed with regard to the mean number of trials played under the conditions of pause versus no pause and cue

versus no cue (Table 6). Consistent with earlier research on this task (O'Brien & Frick, 1996; Frick et al., 2003), the 5-second forced pause interrupted the reward dominance response set, resulting in a lower number of trials played. Subsequently, and following the procedure outlined by Frick et al. (2003), only the two conditions in which there was no forced pause were used in the analyses.

Table 6. Reward Dominance Task: Trials Played by Within Subjects Condition

	Mean	Standard Deviation	Range
Forced Pause	88.51	43.17	21 - 190
No Pause	146.40	35.15	52 - 190
Cue	125.13	33.76	42 - 190
No Cue	109.77	39.37	31 - 190

N = 53.

Contrary to the hypotheses, no main effects for reward dominance task performance were found with regard to level of suicidality, $F(2, 50) = .478, p = .623$, (Table 5) or diagnostic status, $F(3, 49) = 1.41, p = .251$ (Table 4). No significant correlations were found between reward dominance task performance and response patterns on the self-report measures or performance on the other computerized tasks (Table 3). A modest non-significant relation between reward dominance task performance and SSRT on the SST, $r(47) = -.267, p = .06$, was found, which suggests that those who played more trials on the reward dominance task tended to have lower stop signal response times.

As previously described, two difference scores were calculated for use in analyzing data from the lexical decision task. A difference score to assess response time facilitation for negative words was calculated by subtracting each participant's average response time to negative words from her mean response time to neutral words (variable labeled "Negative"). Likewise, a difference score was computed to assess response time facilitation for positive words by subtracting the average response time for positive words from the mean response time to neutral words (variable labeled "Positive"). Consistent with the published literature on the lexical decision task (Loney et al., 2003) the two participants with word identification accuracy rates of less than 70% were excluded from the analyses. Response times were also evaluated to ensure that participants' scores were not unduly influenced by outlying scores. Two participants had an average response time that was over three standard deviations from the sample mean. These two scores were altered, and set at precisely three standard deviations above the mean, so that the participants' scores could be retained in the analyses. Thus, no response times or participants were excluded from the analyses due to extremes in performance on the lexical decision task.

An association was found between the positive response facilitation index of the lexical decision task and diagnostic status, $\eta = .385$. One-way ANOVAs were used to assess the impact of diagnostic status and level of suicidality on lexical decision task response facilitation. Contrary to the hypotheses, no main effects for positive response facilitation were found with regard to level of suicidality, $F(2, 48) = 2.41, p = .101$, although the main effect regarding diagnostic status did approach significance, $F(3, 47) = 2.7, p = .055$. Likewise, no main effects for negative response facilitation were found

with regard to level of suicidality, $F(2, 48) = .479, p = .622$ (Table 5), or diagnostic status, $F(3, 47) = .240, p = .868$ (Table 4). Correlational analyses (Table 3) revealed a relation between performance on the lexical decision task and one other study variable. Negative response facilitation scores were negatively correlated with performance on the SST, $r(47) = -.460, p < .01$, with those with higher SSRTs, or greater difficulty stopping their response on the SST, displaying less response facilitation to negative words.

Hierarchical multiple regression analysis. Given the association between diagnostic status and suicidality outlined above, hierarchical multiple regression analyses were undertaken to ascertain which of the study variables predicted suicidal ideation above and beyond diagnostic status. Suicidality was assessed using the full 7-point CDRS-R scale in the first regression analysis, and the 3-point simplified scale based upon CDRS-R ratings in the second. In each analysis, a two-step hierarchical procedure was used, introducing current diagnostic group in the first step, followed by the addition of APSD CU and I/CP, SSRT, negative and positive response facilitation scores (lexical decision task), and trials played on the “no pause” conditions of the reward dominance task. When diagnostic status was entered into the regression analysis by itself (Step 1), it significantly predicted suicidality on the 7-point scale, $F(1, 46) = 5.99, p = .018$, accounting for 12% of the variance in suicidality. The addition of the other study variables accounted for only an additional 9% of the variance, a difference which was nonsignificant, $F(7, 40) = 1.47, p = .205$. Further, when the additional variables were added into the regression, diagnostic status was rendered nonsignificant. The beta weights, presented in Table 7, suggest that none of the study variables serve as predictors for suicidality over and above diagnostic status taken alone.

When the regression analysis was performed using the 3-point scale based upon the CDRS-R ratings, diagnostic status entered alone (Step 1) served as a significant predictor of suicidality, $F(1, 46) = 10.24$; $p = .002$, with diagnostic status accounting for 18% of the variance in suicidality. The addition of the other study variables accounts for an additional 11% of the variance in suicidality, a significant addition to diagnostic status alone, $F(7, 40) = 2.39$, $p = .038$. Further, diagnostic status remained a significant predictor, despite the addition of the other study variables. The beta weights (Table 8) suggest, however, that impulsivity as measured by the I/CP scale of the APSD is the only predictor, other than diagnostic status, that approaches significance with regard to suicidality.

Table 7. Hierarchical Multiple Regression Analysis Summary Predicting 7-Point Suicidality Scale

Predictor Variable	Standardized beta	
	Step 1	Step 2
Diagnostic Group	.339*	.252
CU		.130
I/CP		.139
SSRT		.001
LDT Negative		.004
LDT Positive		.062
RDT No Pause		.116
R ²	.115	.205

R² change .090

N = 47.

* $p < .05$.

Table 8. Hierarchical Multiple Regression Analysis Summary Predicting 3-Point Suicidality Scale

Predictor Variable	Standardized beta	
	Step 1	Step 2
Diagnostic Group	.427**	.349*
CU		-.029
I/CP		.279^
SSRT		-.115
LDT Negative		-.129
LDT Positive		.009
RDT No Pause		.113
R ²	.182	.296
R ² change		.114

N = 47.

* $p < .05$.

** $p < .01$.

^ $p = .07$.

Based upon these results, the mediated relation hypothesized between diagnostic status, level of CU traits, and suicidality was not supported. The procedure outlined by Baron and Kenny (1986) as a means of assessing mediation, reveals that although suicidality can be predicted based upon diagnostic status, the link between CU traits and

suicidality was not significant. Therefore, level of CU traits does not appear to mediate the link between diagnostic status and suicidality within the population under study.

Hierarchical logistic regression analysis. To explore further the relations between the predictor variables and suicidality among this population of adolescent girls, logistic regression analysis was conducted. Logistic regression analysis allows one to compare actual group membership relative to predicted group membership using independent clinical variables of interest. In this analysis, only dependent measures that demonstrated statistically significant between-group differences in level of suicidality were entered as predictors in the regression analysis. Inclusion of dependent measures was based on an alpha of .05. Suicidality was assessed using the dichotomous scale based upon CDRS-R ratings. Diagnostic status was entered in the first block and APSD I/CP were entered in the second block of a forward stepwise logistic regression. Diagnostic status alone predicted suicidality and was associated with a beta weight of .978, an estimated odds ratio of 2.66, and a Wald value of 10.25, $p = .001$. Using only diagnostic status, 24 of 28 members of the suicidal group were correctly identified, producing a sensitivity coefficient of 85.7%, but only 14 of 25 members of the non-suicidal group were correctly identified, resulting in a specificity coefficient of 56%. The overall correct classification was 71.7%. When impulsivity as measured by the APSD I/CP scale was added into the regression, both current diagnosis and impulsivity as measured by the APSD I/CP scale remained in the final equation. Diagnostic status and impulsivity were associated, respectively, with a beta weight of .86 and .38, and estimated odds ratio of 2.37 and 1.46, and a Wald value of 7.29, $p = .007$, and 4.05, $p = .04$. The resulting classification matrix correctly identified 21 of 28 members of the suicidal group, producing a sensitivity

coefficient of 72%, and 18 of 25 members of the non-suicidal group, producing a specificity coefficient of 75%. The overall correct classification rate was 73%.

Although significant group differences for those with differing levels of suicidality were not found on the APSD CU scale, an exploratory logistic regression analysis was conducted in an effort to ascertain the predictive utility of CU with regard to suicidality. A similar procedure to that described above was used to assess whether the addition of CU to the regression would enhance the prediction of suicidality. Diagnostic status was entered into the regression first, and then APSD I/CP and CU raw scores were entered in the second step. The addition of CU was associated with a beta weight of .001, an estimated odds ratio of 1.001, and a Wald value of .000, $p = .994$. The overall correct classification rate did not change with the addition of CU to the regression, and, contrary to expectations, its addition did not enhance the prediction of suicidality over and above the use of diagnostic status and impulsivity.

Discussion

This study examined the association between diagnostic status, CU traits, and impulsivity as relevant to the prediction of suicidality among adolescent females residing in a bootcamp facility. Although adjudicated adolescents are at increased risk of suicide relative to normative groups of adolescents (Rhode et al., 1997), delinquent girls are a traditionally understudied population in this regard. This investigation also is the first to assess CU traits in combination with diagnostic and behavioral variables as predictors of suicidality. Thus, this study makes a unique contribution to the literature by virtue of both the sample used and constructs assessed.

Consistent with previous research on adjudicated adolescents (Sanislow et al., 2003), a relatively high percentage of the participants endorsed experiencing suicidal ideation and making at least one serious suicide attempt during their lives (24.1%). An additional 9% of the sample admitted experiencing suicidal ideation and making a superficial, yet potentially dangerous, suicidal gesture, such as cutting. These findings are of particular importance, as previous nonfatal attempts are considered to be definite risk factors for completed suicide (Esposito et al., 2003).

Factors hypothesized by Sanislow and colleagues (2003) to explain the relatively high rates of suicidal behavior among adjudicated adolescents include high levels of psychological distress, elevated rates of depression and other psychopathology, and significant impulsivity. Consistent with this hypothesis, and as found in numerous earlier

studies of risk factors for suicide (e.g., Esposito et al., 2003; Horesh et al., 2003; Mazza & Reynolds, 2001; Rohde et al., 1997; Shaffer et al., 1996), current diagnostic status was found to be related significantly to the presence of suicidal ideation and attempts in the current study's participants, particularly for those with comorbid depressive symptoms and conduct problems. Although individuals with diagnoses reflecting either conduct problems or depressive symptoms endorsed more suicidal ideation and attempts than those with no diagnosis, these differences were not statistically significant. In contrast to the hypotheses, individuals with depressive symptoms actually obtained a lower mean score on the CDRS-R suicidality scale than those with conduct problems, although the difference was not statistically significant.

The lack of group differences in suicidality potentially reveals homogeneity among the diagnostic groups. For example, some participants within the conduct problems only group experienced substantial depressive symptoms at the time of the interview, but failed to meet the threshold for diagnosis. Thus, suicidality reported by these participants might actually reflect underlying sub-threshold depressive symptoms, rather than a relation between suicidality and conduct problems. Individuals meeting K-SADS-PL criteria for diagnoses of dysthymia and adjustment disorder with depressed mood were included in the groups reflecting either depressive symptoms alone or comorbid symptoms, despite experiencing lower levels of symptom severity or impairment than the group members with diagnoses of major depression. In fact, most of the individuals in the depressive symptoms only group obtained a K-SADS-PL diagnosis of adjustment disorder with depressed mood (70%). Only 30% of group members were diagnosed with current major depressive disorder. This result is in contrast to the

comorbid group, in which only 21% were diagnosed with adjustment disorder, but 64% were diagnosed with major depressive disorder. Thus, the symptoms of depression being experienced by those in the comorbid group are potentially more chronic and severe than those experienced by participants in the depressive symptoms only group. This lack of severity is associated with lower rates of suicidality in the latter group, and potentially explains the lack of group differences with regard to suicidality.

The relation between suicidality and disruptive behavior disorders such as CD and ODD merits further study, however. The data reveal a trend suggesting that the presence of conduct problems, and particularly conduct problems in combination with depressive symptoms, are associated with increased risk for suicide. This finding is consistent with published reports regarding the link between suicidality and conduct problems (Brent et al., 1993), and it highlights the importance of investigating behavior disorders and their associated traits (e.g., CU and impulsivity) as they relate to suicidality. These findings also affirm the need to investigate types of disorders (e.g., internalizing, externalizing, and comorbid) separately in future investigations of suicidality, given the differences in suicidal ideation and attempts reported by those with comorbid disorders relative to other diagnostic groups.

The hypothesis regarding the expected group differences in level of CU traits among those of varying diagnostic status was partially supported. Those with comorbid depressive symptoms and conduct problems endorsed higher levels of CU on the APSD than any other diagnostic group. Although there was no statistically significant difference between the conduct problems only, depressive symptoms only, and no diagnosis groups, participants with conduct problems alone did endorse more items on the APSD

suggesting elevated CU traits than those with depression alone or no diagnosis. This trend is to be expected given the literature linking CU traits to behavior problems (Frick et al, 2003; Silverthorn & Frick, 1999), but the lack of significant differences among these three groups remains surprising.

The participants who reported both depressive symptoms and conduct problems displayed more attitudes reflecting elevated CU traits and potentially exhibit and endorse more severe problem behavior than those who acknowledged conduct problems alone. The conduct problems only group might represent a subset of individuals who have been adjudicated due to behaviors related to “adolescent rebellion” (e.g., parent conflict resulting in an incident of running away; Silverthorn & Frick, 1999), and who truly exhibit fewer signs of elevated CU traits than those with more severe and varied psychopathology. This possibility has implications for the future study of conduct problems in adolescent girls. Silverthorn and Frick (1999) have studied the female-specific developmental pathway to antisocial behavior and have suggested that the very presence of elevated levels of CU traits can distinguish those girls at risk for psychopathy from those with a more positive trajectory. Thus, those with comorbid symptoms and elevated CU may be at highest risk of continued antisocial behavior and prolonged involvement in the legal system in the future.

Group differences were also expected in level of CU traits among those with differing levels of suicidality, and it was hypothesized that level of CU traits would mediate the relation between diagnostic status and suicidality. High scores on the CU scale were expected to be associated with lower levels of suicidality. However, no significant group differences were found in CU across levels of suicidality, whether the

individual reported no history of suicidality or a history of mild or moderate to severe suicidality. Likewise, the correlations that were hypothesized between CU and performance on the computerized tasks were non-significant. Specifically, CU was expected to be correlated negatively with performance on the lexical decision task, suggesting a lack of reactivity to emotional stimuli, and with performance on the reward dominance task, signifying a deficit in sensitivity to punishment for those with high levels of CU. These constructs have been previously shown to be connected, and it was anticipated that each construct would be related to the others and to suicidality.

The lack of significant correlations between CU and suicidality or performance on the computer tasks is in contrast to these hypotheses. The non-significant correlation between CU and response time facilitation index on the lexical decision task is consistent with the results obtained by Loney et al. (2003), who also found no correlation between these measures. Despite the initial lack of correlation, however, Loney and colleagues were able to use regression analysis to reveal a lack of facilitation to emotional words for adolescents with high levels of CU and substantial behavior problems. This finding was not replicated in the current study. The participants with high levels of CU in this sample did not display a reward dominant response style as has been previously found among those high in the CU trait (Barry et al., 2000). One potential reason for these non-significant findings regarding the APSD is related to the participants' performance on the measure. The females in the present study obtained scores on both scales of the APSD that were lower than the scores published by Loney et al. (2003) for their sample of adjudicated males, and the range of scores obtained showed less variability. Gender-specific normative data is not yet available for this measure, although it is probable that

somewhat lower scores are to be expected from a sample of females. In contrast to the aggressive behavior of adolescent boys, it is known that much of the antisocial behavior exhibited by adolescent girls is non-aggressive in nature (Silverthorn & Frick, 1999), and it is likely that future research regarding CU will reveal gender differences in this construct as well. For the purposes of the present study, the lower and less variable scores obtained by the current small sample potentially diminished the utility of the measure itself in distinguishing among those with varying levels of CU.

The findings related to level of CU traits, performance on the computer tasks, and suicidality may also be reflective of differences in the type of problem behaviors exhibited by different members of the sample. Frick and Marsee (2006) described two types of aggressive behavior that have been identified in the literature: reactive aggression and proactive aggression. These two types of aggressive behavior are related to phenomena such as emotional reactivity in different ways. For example, children who exhibit reactive aggression in the face of perceived provocation show high levels of emotional reactivity to aversive stimuli, are more impulsive, and show high rates of psychological problems such as depression. However, those individuals who engage in proactive aggression, or acts which are committed to reach some external goal, in addition to reactive aggression, show reduced levels of emotional reactivity and sensitivity to punishment. It is this group that is believed to exhibit elevated CU traits. In the present study, detailed data regarding the nature of each participant's aggressive behavior was not gathered. Thus it is possible that the sample included a number of girls who exhibit reactive aggression but who lack the tendency toward proactive aggression. If only a small number exhibited both types of aggression, as well as the emotional and

behavioral correlates that are associated with the combination, then the sample size might be too small to reflect significant associations between CU traits and suicidality or performance on the measures.

Level of self-reported impulsivity and ability to inhibit responding on the computerized stop signal task were also expected to vary among those with differing diagnostic status. Those with conduct problems alone or comorbid conduct problems and depressive symptoms were expected to report and exhibit higher levels of impulsivity than those with no diagnosis or depressive symptoms alone. The analyses revealed, however, that the diagnostic groups showed no significant differences with regard to impulsivity as measured by the I/CP scale of the APSD. Although the group differences were non-significant, the comorbid group and the depressive symptoms only groups showed the highest scores, with the conduct problems only group acknowledging fewer impulsive behaviors.

Likewise, no significant group differences were found for the diagnostic groups with regard to performance on the SST. The findings regarding impulsivity are unexpected, given the established link between impulsivity and conduct problems or antisocial behavior (Hart & Dempster, 1997). The lack of diagnostic group differences when using the I/CP and SST can be explained by a number of factors. As with the findings outlined above, the lack of variability in scores on the I/CP scale of the APSD is one potential reason for the lack of group differences with regard to this scale. With regard to the SST, there is some concern about the validity of the data, given the large number of participants who performed poorly on the “go” trials of the task. This phenomenon potentially reveals a flaw in the administration or computer-monitoring of

the task despite careful adherence to the administration protocol provided by the task's developers. Further research with this measure is needed to determine the true nature of the task's relationship to the other study variables.

Despite these limitations, and given the negative findings regarding diagnostic status and impulsivity, further discussion of the construct of impulsivity as it relates to psychopathology is warranted. Impulsivity is considered a core feature of some forms of ADHD (American Psychiatric Association (APA), 2000), and is often found in other disorders of childhood, such as CD (Zaparniuk & Taylor, 1997). Although impulsivity is considered central when diagnosing ADHD, particularly the hyperactive-impulsive or combined subtypes, the centrality of impulsivity with regard to other disorders is open to debate. Impulsivity has been shown to be associated with conduct problems, but not all individuals who exhibit conduct problems behave impulsively. In particular, those who engage in stable and serious patterns of conduct problems and delinquency tend to show higher levels of impulsivity on both behavioral and self-report measures of impulsivity than those who engage in only occasional or limited delinquent acts (White et al., 1994). Thus, impulsivity is a hallmark of certain types of conduct problem behavior, but not all. Many of the current study's participants are "first offenders," thus lack a long and chronic history of delinquency and conduct problems. This tendency in turn could be associated with less variability in impulsivity than would be seen among a population that included those with more serious, stable conduct problems, and can help explain the lack of group differences found with regard to diagnostic status.

In keeping with the hypothesized relation between self-reported impulsivity and suicidality, significant group differences in I/CP raw score were found among those

participants with differing levels of suicidality. Those individuals who have experienced moderate to severe suicidal ideation and who have made suicide attempts in the past endorsed significantly more impulsivity than those with mild ideation or no experience of suicidality. No significant group differences in performance on the SST were found based upon level of suicidality, suggesting no substantial differences in response inhibition for those with differing experiences of suicidal ideation and attempts. Again, these latter results are best viewed with caution, given concerns regarding the validity of the SST data. Nonetheless, the SST measures a different construct related to impulsivity than the I/CP scale of the APSD. By using both self-reported impulsive behavior and laboratory measures of impulsivity in the analyses, the present study utilized a multi-method means of assessing impulsivity, as recommended by White et al. (1994) to measure multiple constructs relevant to impulsivity. Historically, weak correlations have been found between self-report and behavioral measures of impulsivity (Gerbing, Ahadi, & Patton, 1987), thus it is not altogether surprising that a link was found between one measure and suicidality, but not the other. White et al. (1994) found that impulsivity that is self-reported on pen-and-paper measures such as the APSD often taps into disinhibited, undercontrolled behavior. These authors labeled this phenomenon “behavioral impulsivity” and found that it is most relevant to delinquency. In contrast, laboratory measures assess constructs relevant to planned and effortful cognitive action, which White et al. labeled “cognitive impulsivity.” The results of the present study suggest that behavioral impulsivity is also most relevant to suicidality, given the group differences in I/CP responding across the levels of suicidality.

As stated above, the expected links between the constructs of impulsivity, CU traits, emotional reactivity, and reward dominance were not found in the present sample. Likewise, no significant group differences were found in SST performance, reward dominance task performance, or lexical decision task response facilitation for those with differing diagnostic status or level of suicidality. Although impulsive individuals were expected to show greater reactivity to emotional stimuli on the lexical decision task and decreased sensitivity to punishment on the reward dominance task, these hypotheses were mostly unsupported. As noted previously, lack of significant correlations among these measures of impulsivity and inhibitory control is a relatively common occurrence in impulsivity research (e.g., Loney et al., 2003). The lack of association between measures is reflective of the multidimensional nature of the construct of impulsivity (Zaparniuk & Taylor, 1997). Each of the constructs measured by the computerized tasks taps into a different domain or set of domains of impulsivity, including attention, response initiation, execution, or inhibition, and the processing of reward or punishment cues. Each of these falls within the area of cognitive impulsivity identified by White et al. (1994), but each plays a separate role in the etiology of impulsivity and maintenance of the associated problematic behaviors (Zaparniuk & Taylor, 1997), a phenomenon that is reflected in the lack of correlation between measures of impulsivity and inhibition found in the present study.

Only one correlation between the various computerized tasks was found to be significant. Performance on the SST was negatively correlated with performance on the negative response facilitation index of the lexical decision task. This finding suggests that those with slower SSRTs, or who have poorer inhibitory control, showed less response

facilitation to negative words than those with faster SSRTs. Their responding on the lexical decision task potentially reflects impulsivity in responding regardless of the emotional content of the word presented.

Of all variables examined, diagnostic status was most highly correlated with suicidality in the total sample. Diagnostic status alone significantly predicted suicidality, accounting for a substantial proportion of the variance. The addition of the other main study variables to the regression analysis added significantly to the predictive ability of diagnostic status, however, accounting for an additional 11% of the variance. Impulsivity, as measured by the self-report APSD, is the most important additional predictor identified in the current study, and can be used along with diagnostic status to identify those at risk for suicidal behavior. These findings were confirmed using hierarchical logistic regression analyses, which revealed that the combination of diagnostic status and impulsivity allows one to correctly classify 73% of the sample into groups based upon suicidality. The addition of CU into this regression did not change the correct classification rate. This result does not support the hypothesized mediational relation between CU traits and suicidality, but suggests instead that impulsivity is the more crucial element in the complex endeavor of predicting suicidality among adolescents. Impulsivity has been identified as a characteristic of adolescents who attempt suicide, and it has long been described as a risk factor for suicide in the research literature (Horesh, 2001). Suicidality and impulsivity have been linked biologically, with studies revealing low serotonergic activity among those with impulsive behavioral tendencies and a history of suicidal behavior (Oquendo & Mann, 2000). Horesh (2001) posited that impulsivity, although it does not characterize every suicide attempter, is a useful construct for

identifying at risk subgroups. In the present study, impulsivity was shown to help predict group membership with regard to suicidality over and above diagnostic status alone, thus confirming the utility of employing level of impulsivity in combination with diagnostic status in identifying those at risk for suicidality.

It is important to recognize the unique characteristics of this sample of adjudicated female adolescents relative to normative high school samples. The rate of suicidal gestures and attempts reported in this sample is high, and is similar to that seen among inpatient populations (Sanislow et al., 2003). The prevalence rate of psychiatric disorders also was quite high, with 85% of the sample receiving a diagnosis of at least one current psychiatric disorder. There was no indication that the participants were over-reporting psychiatric difficulties. The adolescents were highly motivated to participate in the interview and assessment battery, as it provided a welcomed break from the rigorous daily curriculum. They enjoyed the opportunity to interact with the mental health professionals, and spoke openly about their past experiences and symptoms. As a result, the present findings are believed to be an accurate representation of the participants' actual experiences. This sample appeared to exhibit or experience greater numbers of psychiatric symptoms than normative adolescent samples, and may be more likely to act on suicidal ideation. However, no normal comparison group was used for the present study. Thus, no empirical statements can be made regarding the performance of the participants relative to "normal" controls. As a result of the potential differences between the present study's participants and normative adolescents, the generalizability of the findings may be limited. However, it is important to study this group of youth, as they represent a traditionally understudied subset of adolescents.

The results of this study should be viewed in light of a number of other limitations as well. First, the sample size was small relative to the number of variables under study. As a result, there may be inadequate power to validly evaluate all hypotheses. Efforts were made to conduct analyses so as to minimize this risk, such as including only variables that were significantly related to suicidality in the logistic regression analysis. Second, the lack of multiple informants leaves the assessment susceptible to reporter bias. Much of the data were generated from the interview with the adolescent and youth self-report measures. This technique was necessary given certain limitations of the setting, as the staff was not sufficiently familiar with the youth at the time of the interview to provide valid information. Furthermore, parents or other caregivers were typically unavailable for lengthy contact. The use of the self-report measures was also deemed appropriate for this age-group, as previous research has demonstrated that the reliability and validity of adolescent reports is often more valid than parental report of adolescent psychopathology (Loney et al., 2003), particularly when the disorders under study include internalizing symptoms such as depression (Kamphaus & Frick, 2005), as in the current investigation.

An additional limitation of the current study surrounds the use of only the sections of the K-SADS-PL interview pertaining to depressive disorders, ODD, and CD. Due to time constraints, it was not possible to administer the full K-SADS-PL interview to each participant. As a result, other patterns of symptoms or comorbidity were not assessed, including attention-deficit/hyperactivity disorder, generalized anxiety disorder, or PTSD. Likewise, only uni-polar depression was assessed; the modules of the K-SADS-PL designed to assess mania were not administered. Subsequently, the present study can

provide no insight into the role these disorders or other patterns of comorbidity might play with regard to suicidality.

The results also are potentially limited by the use of computerized tasks to measure constructs such as response inhibition, reward dominance, and emotional responsivity. These are indirect measures of the constructs being assessed. It is possible that more ecologically valid techniques could be used with this population, potentially producing more meaningful results. For example, Loney (2003) has recently developed a measure of attentional bias for emotional stimuli that utilizes pictures, rather than words, which would likely be more interesting for adolescent responders and possibly yield results with greater ecological validity. Additionally, only one measure each was used to assess emotional reactivity, sensitivity to punishment, and response inhibition. In the case of the SST, for which the validity of the data is questionable, only limited the interpretations were made. Adding an additional measure of response inhibition would have allowed greater confidence in the results, potentially allowing for more meaningful interpretation. Future research in this area should utilize multiple methods of assessment of behavioral inhibition, as opposed to only one measure per construct. Overall, the procedures used provide a snapshot of each participant's functioning. The picture could be made more complete by utilizing techniques such as behavioral observation, parent or other caregiver report, and even measurements of biological activity (e.g., electrocortical activity).

Within the confines of these limitations, the results of the present study join a growing body of research focused on understanding the phenomenon of suicidality in adolescence, particularly within the context of adjudicated youth. This research has the

potential to inform suicide research, assessment efforts, and intervention, as it points to the need to pay particular attention to diagnostic status and impulsivity when working with female adolescents. This study confirms the need for further research on the personality, behavioral, and diagnostic correlates of suicidality, as well as interactions between the three. Particular attention should be given to the impact of comorbid psychopathology on risk for suicidality, given the potential ramifications upon clinical practice. Clinically, adolescents presenting with a combination of depressive symptomatology and conduct problems should be carefully assessed for suicide risk, especially when a history of impulsive behavior is present, as these youth are at high risk for suicidal ideation and attempts. Adolescents with such difficulties can present in any clinical setting, from an inpatient psychiatric facility to a school counselor's office. Thus, it is necessary to educate those working with these at-risk youth about suicide risk and provide resources for assessment and interventions designed to address psychopathology and impulsive behavior. Suicide is a leading cause of death among adolescents in the United States (CDC, 2004), and it does not occur only among chronically depressed adolescents. A thorough assessment must be undertaken with every adolescent client if mental health personnel are to combat this epidemic effectively.

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Appendix A

Antisocial Process Screening Device – Self-Report Version Items

Developed by Paul J. Frick

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Note: Each item is rated on a scale of 0-2.

0 = Not at all true

1 = Sometimes true

2 = Definitely true

Items:

1. You blame others for your mistakes.
2. You engage in illegal activities.
3. You care about how well you do at school/work.*
4. You act without thinking of the consequences.
5. Your emotions are shallow and fake.
6. You lie easily and skillfully.
7. You are good at keeping promises.*
8. You brag a lot about your abilities, accomplishments, or possessions.
9. You get bored easily.

10. You use or “con” other people to get what you want.
11. You tease or make fun of other people.
12. You feel bad or guilty when you do something wrong.*
13. You do risky or dangerous things.
14. You act charming and nice to get things you want.
15. You get angry when corrected or punished.
16. You think you are better or more important than other people
17. You do not plan ahead or you leave things until the “last minute.”
18. You are concerned about the feelings of others.*
19. You hide your feelings or emotions from others.
20. You keep the same friends.

* Negatively scored item

Appendix B

Correlations (Spearman's Rho) between K-SADS-PL Suicide Items and Suicide Indices

K-SADS Item	Index (1-7)	Dichotomy (0-1)	Simplified Index (0-2)
Recurrent Thoughts of Death			
Past	.589**	.649**	.708**
Current	.648**	.661**	.706**
Suicidal Ideation			
Past	.692**	.610**	.725**
Current	.684**	.484**	.622**
Suicidal Acts			
Past	.663**	.468**	.606**
Current	.644**	.368**	.523**
Medical Lethality			
Past	.661**	.462**	.597**
Current	.573**	.335*	.462**
Nonsuicidal Self Injury			
Past	.539**	.492**	.459**
Current	.607**	.505**	.318*

Note: $N = 54$. “Index” generated from 7-item CDRS-R measure of suicidality. “Dichotomy” calculated based upon CDRS-R measure, reflecting presence (1) or absence (0) of suicidal ideation or attempts. “Simplified Index” calculated based upon CDRS-R measure, reflecting absence of suicidal ideation or attempts (0), mild (1), or moderate/severe (2) levels of suicidality.

* $p < .05$.

** $p < .01$.