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The Association between Callous-Unemotional Traits and Emotional Processing Within Individuals and Across Generations

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THE ASSOCIATION BETWEEN CALLOUS-UNEMOTIONAL TRAITS AND EMOTIONAL PROCESSING WITHIN INDIVIDUALS AND ACROSS GENERATIONS

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Abstract

There is evidence to suggest that an impaired ability to process distressing and threatening emotional stimuli may result in a callous-unemotional (CU) and thrill-and-adventure-seeking (TAS) personality. In this study we examined emotional processing in fifty community children, each with one parent, using the emotional pictures dot-probe task, which is a computerized task measuring attention to emotional pictures in the form of a facilitation score. The relationship between emotional processing, CU traits, and TAS were examined to determine whether individuals high on CU traits would also be more TAS, and show a lack of facilitation to emotional pictures. The results generally did not support study hypotheses; however, post-hoc analyses comparing children based on ethnicity found that Caucasian and minority children with CU traits show different and often opposite affective responses to emotional pictures, as well as different behavioral correlates to these traits.

Introduction

Individuals with psychopathic traits constitute the most severe group of antisocial individuals. Therefore, the development of psychopathic traits is an especially important focus of research for a number of reasons. First, individuals with psychopathic tendencies are much more severe and violent offenders, presenting with a particularly chronic pattern of antisocial behavior (Hare, Hart, & Harpur, 1991; Kosson, Smith, & Newman, 1990) and higher rates of criminal recidivism (Harris, Rice, & Cormier, 1991). Second, researchers have found that psychopathic traits in adults are especially difficult to treat (see Hare, 2003 for review; Ogloff, Wong, & Greenwood, 1990), which makes early identification of this population important for prevention efforts. Third, criminals with psychopathy have unique correlates suggesting that different causal factors may underlie their behavior compared to non-psychopathic criminals (Frick, in press; Hare, et al., 1991). For example, criminals with psychopathy are less likely to show verbal intelligence deficits, dysfunctional family backgrounds, and low socioeconomic status, but more likely to show deficits in their emotional processing and experience of anxiety (Hare, et al., 1991), implying that their impairment may be more biological in nature. All of these considerations have led to an increased focus on the causes of psychopathy and the core deficit that can lead to this personality disturbance.

Definitions of Psychopathy

Cleckley's (1982) definition of psychopathy focused on the affective and interpersonal style of individuals with psychopathy. He proposed that individuals with psychopathy do not develop appropriate morality because their early socializing experiences are not accompanied by normal affective experiences. Specifically, they do not learn to associate a given internal state and its related physiological markers to a given emotional experience because they do not experience this state internally like nonpsychopathic individuals. This deficit leads to a callous-unemotional (CU) affective and interpersonal style, which is described by a lack of remorse or shame, poor judgment and failure to learn by experience, untruthfulness and insincerity, and superficial charm (Cleckley, 1982). This definition is quite different from the Diagnostic and Statistical Manual IV-TR (American Psychological Association, 2000) criteria for Antisocial Personality Disorder (APD). Because psychopathic traits and APD have both been tied to antisocial behavior and criminality, many researchers have used the terms psychopathy and APD interchangeably; however, APD is defined by a pattern of impulsive, irresponsible, and antisocial behavior but does not include callous-unemotional traits. In this paper the terms 'callous-unemotional (CU) traits' and 'psychopathy/ psychopathic traits' are used interchangeably.

Hare combines the impulsive/ antisocial behavioral criteria common to APD and the affective/ interpersonal characteristics common to psychopathy in his system of classification and assessment, the Psychopathy Checklist (PCL-R) (Hare, 1985). Factor analyses of the PCL-R have consistently revealed two separate factors (Harpur, Hare, & Hakstian, 1989). The items from Factor 1, callous-unemotional style, are similar to

Cleckley's original affective and interpersonal criteria describing the individual with psychopathic traits. The items from Factor 2 (impulsive/antisocial lifestyle) are positively correlated with diagnoses of APD and encompass the DSM-IV behavioral definition (Hare, et al., 1991). Factor analyses have supported that these are separate but highly correlated dimensions, explaining the high incidence of antisocial behavior and criminality in individuals with psychopathic traits. Hare and colleagues (1991) explain that individuals who meet criteria for APD may have different motivations behind their antisocial behavior, while the motivation behind a psychopath's antisocial behavior may be an "[impaired] capacity for empathy, remorse, anxiety, or loyalty" (Hare, et al., 1991, pp. 393).

Frick and colleagues were the first to test definitions of psychopathy in children (Frick, O'Brien, Wootton, & McBurnett, 1994). Using the Psychopathy Screening Device (PSD; Frick & Hare, 2001), a childhood version of Hare's Psychopathy Checklist (PCL-R; Hare, 1991), they found similar dimensions to those found in adults. Analyses of the PSD, renamed the Antisocial Process Screening Device (APSD), revealed a callous-unemotional (CU) factor, mapping onto the affective dysfunction (Factor 1) component of adult psychopathy, and an impulsivity-conduct problems (I/CP) factor, similar to the APD (Factor 2) dimension in adults. While most children with conduct disorder score high on the I/CP dimension, only a minority shows CU traits. These findings, in addition to multiple recent studies (Barry, Frick, Grooms, et al., 2000; O'Brien & Frick, 1996), provide support for the extension of the construct of psychopathy to childhood, based on the presence of CU traits.

Search for the Core Deficit

This recognition of the importance of a person's affective style to the construct of psychopathy has led to research on the potential causes of the emotional deficits central to this disorder. From a biological perspective, some researchers suggest that early damage to a single brain structure may be responsible for these affective deficits. Specifically, researchers have proposed that damage to the amygdala, a set of subcortical nuclei that are part of the limbic system of the brain, can have a profound effect on a person's affective experience and behavior (Blair, 2001; Patrick, 1994). In a review of case studies by Fine and Blair (2000), they found that a number of impairments may result from amygdala damage. Specifically, lesions to the amygdala disrupt conditioning to negatively conditioned stimuli, and impair the processing of affective facial and auditory expressions and memory for affective experiences. Also, a separate case study determined that impaired 'theory of mind' (the ability to attribute mental states to ones self and others) resulted from congenital unilateral damage specific to the left amygdala (Fine, Lumsden, & Blair, 2001). Antisocial behavior, a secondary component of psychopathy, has also been tied to amygdala damage (Fine & Blair, 2000). Overall, the prime responsibility of the amygdala in the processing of emotional stimuli implicates this brain structure as playing a potential role in the psychopathic affective dysfunction.

Blair and colleagues (in press) reviewed multiple findings that suggest that individuals with psychopathic traits may have an amygdala deficit contributing to their deficient affective experiences. First, amygdaloid volume is significantly reduced in individuals with psychopathy compared with controls (Tiihonen, Hodgins, Vaurio, et al., 2000). Second, researchers have found that during an emotional memory task, individuals

with psychopathy showed reduced amygdala activation (Kiehl, Smith, Hare, et al., 2001). Third, children with psychopathic traits show a selective recognition impairment for both sad and fearful expressions and fearful vocal tones (Blair, Budhani, Colledge, & Scott, in press; Blair, Colledge, Murray & Mitchell, 2001; Stevens, Charman, & Blair, 2001). Although it remains a viable hypothesis until falsified, it is still too premature to isolate the amygdala as the area of dysfunction given that another connected or isolated structure could still explain the affective dysfunction central to psychopathy.

In addition to mediating affective response, the amygdala also plays a central role in the human fear response. Lesions to the amygdala result in deficient physiological fear response (specifically fear-potentiated startle response, Hitchcock & Davis, 1986, 1987). Multiple studies demonstrate that the amygdala is at the heart of the defense system (Davis, 1992; Gloor, 1960; Gray, 1989; Kapp, Pascoe, & Bixler, 1984; LeDoux, 1987). The defense system is composed of two stages, the defensive mobilization stage and the defensive action stage, which are organized by the amygdala (Lang, Davis, & Ohman, 2000). The first stage, defensive mobilization, places the individual in a state of attentional orienting and vigilance. During this stage the startle reflex is initiated and the heart rate decelerates. Following from the defensive mobilization stage, the defensive action stage is characterized by an acceleration of heart rate and an increase in skin conductance response (SCR). Both responses are initiated once a threat becomes more imminent.

Individuals with psychopathy may be impaired at one or both stages of the defense system process, causing them to be less responsive to threat than nonpsychopathic individuals. There is evidence to suggest that the normal pattern of

physiological response to fear, which comprises both stages of the defense system process that is regulated by the amygdala (Davis, 1989), is deficient in individuals high on psychopathy. Specifically, Patrick (1994) found that the priming of defensive action (the defensive mobilization stage) in individuals with psychopathy is impaired. Using aversive slides, he examined the potentiation of the startle blink response in both individuals high on psychopathy and individuals low on psychopathy. When aversive stimuli were used to evoke defensive states in nonpsychopathic subjects, startle blink response was potentiated; however, this typical fear response was absent in individuals with psychopathy (Patrick, Bradley, & Lang, 1993). Also, studies on the electrodermal and cardiac components of defensive mobilization in individuals with psychopathy show a consistent pattern of physiological underarousal to threat stimuli (Patrick, et al., 1994).

In addition to the underreactivity to threat, individuals high on psychopathy are also physiologically underaroused to cues of distress and sadness in others (Aniskiewz, 1979; Blair, Jones, Clark, & Smith, 1997; Blair, 1999; House & Milligan, 1976). In a study examining physiological arousal to slides of various affective valences, Blair and colleagues (1997) found that adults high on psychopathy showed reduced skin conductance response to distress slides compared with incarcerated nonpsychopaths. In studies with youth, children with psychopathic tendencies showed reduced SCR to distress and threat slides compared to children without psychopathic tendencies (Blair, 1999). Overall, these findings from adult and child studies suggest that an affective deficit is central to psychopathy. This affective deficit could underlie the cognitive and interpersonal deficits in individuals with psychopathy.

Emotional Deficit and Secondary Characteristics of Persons with Psychopathic Traits

On a card-playing task, both adults and children with psychopathic tendencies persisted in a previously rewarded response, even if the rate of punishment for this response increased, showing a reward dominant response style (Newman & Kosson, 1986; Newman, Patterson, & Kosson, 1987; O'Brien & Frick, 1996). Interestingly, the amygdala has been implicated in a person's ability to inhibit behavior in response to cues for punishment (Gray, 1982). This reward dominant response style could explain the high rates of criminal recidivism in individuals with psychopathy, because they are not able to inhibit behaviors that result in a positive outcome even when there is a simultaneous threat of punishment, such as arrest and jail time.

The impairment in threat processing and response modulation that could result from amygdala dysfunction, may also explain the tendency to seek out sensational and thrilling activities by individuals with psychopathic traits, which has been documented in both adult (Levenson, Kiehl, & Fitzpatrick, 1995) and child samples (Frick, Cornell, Bodin, et al., 2003; Frick, Lilienfeld, Ellis, et al., 1999). Carton and colleagues (1992) hypothesized that this sensation-seeking trait may arise as a compensatory adaptive mechanism for an existing arousal deficit (Carton, Jouvent, Bungener, & Widlocher, 1992). Thrill-and-adventure-seeking (TAS) is significantly correlated with both positive and negative risk behavior, whereby criminality and drug-use may be a more feasible outlet for some individuals with this TAS trait who come from lower socioeconomic backgrounds, with less opportunities available to them (Hansen & Breivik, 2001). Other thrill-seeking individuals may have the means to be involved in more acceptable forms of thrilling and adventurous activities, such as rafting, climbing, and, skydiving (Pierson, Le

Houezac, Fossaert, et al., 1999). This may explain why not all individuals with callous-unemotional traits engage in antisocial and criminal behavior.

Emotional Deficit and Primary Characteristics of Persons with Psychopathic Traits

A number of biological and developmental theories have attempted to directly link the insensitivity to threat to the development of guilt and empathy, the core components of CU traits. For example, Blair (1995) proposed the existence of an innate mechanism, the Violence Inhibition Mechanism (VIM), which causes individuals to inhibit ongoing aggressive behaviors when confronted with cues of distress. A non-verbal communication of distress functions as a trigger to activate the VIM. When the VIM is activated, it produces a physiological arousal in the individual that is interpreted as a moral emotion, such as empathy. Normal moral development results from repeated experiences of pairing transgressions and distress cues, whereby transgressions become classically conditioned to activate the VIM (Blair, 1995). In individuals with psychopathy, who are impaired in their processing of sadness and distress in others, these cues will not elicit a physiological arousal response for the individual to interpret as a moral emotion.

Kochanska's (1993) model of early conscience development also focuses on the importance of emotional arousal. The conditioning for early moral development begins in toddlerhood when the parent responds to the child's transgressions with an affective response. The child's internal model of morality develops as a result of repeated pairings of these unpleasant affective parental responses with misconduct, such that future transgressions become conditioned to elicit strong emotions of fear and guilt in the child.

Because both comprehension of emotion in others and intact fear arousal are necessary components of early conscience development (Kochanska, 1993), individuals who are lacking these characteristics are more likely to have impairments in conscience development.

Intergenerational Link

There is evidence to suggest that antisocial behavior runs in families. Multiple studies document a link between child and parent antisocial behavior and aggression (Mason & Frick, 1994; Raine, 1993). There are a number of ways in which antisocial traits in parents may be transmitted to children. In a review of studies examining the association between parent and child antisocial behavior, Frick and Loney (2002) determined three potential mechanisms that may be responsible for this intergenerational transmission. These mechanisms include heredity, observational learning, and the disruptive effects on the family environment by an antisocial parent.

The contribution of genetics to antisocial behavior may be greater for parents and children with CU traits specifically. In a meta-analysis of ten twin studies, Raine (1993) found that there was a 51.5% concordance rate for criminality for monozygotic (MZ) twins, almost double that for dizygotic (DZ) twins, 20.6%. Supporting this finding, Mason and Frick (1994) also determined through meta-analysis of twin and adoption studies that heredity accounts for around 50% of the variance in measures of antisocial behavior. Importantly, they found that effect sizes for genetic influence were significantly larger for the most severe cases of antisocial traits. These analyses not only support the heritability of criminality, but also suggest that psychopathy may be more heritable than

other antisocial disorders because this disorder typically constitutes the most severe manifestations of antisocial behavior.

Few behavioral genetics studies have specifically looked at the heritability of traits unique to psychopathy. However, in a group of clinic-referred children, Christian and colleagues (1997) found that only antisocial children with CU traits had high rates of parental antisocial behavior (Christian, Frick, Hill, et al., 1997). This finding suggests that heritability estimates may have underestimated the heritability of CU traits because no existing behavioral genetics studies distinguished between children with and without CU traits. Frick and Loney (2002) hypothesize that mechanisms such as observational learning, and dysfunctional parenting may be responsible for the intergenerational link between parent and child antisocial behavior in children without CU traits, whereas genetics may play a greater role in the transmission of CU traits specifically.

A critical question is what process may be transmitted across generations. Raine (1993) explains that a genetic link between parent and child means that a parent with antisocial traits transmits to the child an increased risk for the development of these traits, not the antisocial traits themselves. Therefore, it is possible that what is transmitted from the parent with psychopathic traits to his or her child is an emotional deficit, potentially resulting from an impairment in the amygdala, which results in deficits in processing distressing and threatening stimuli in the child. These processing deficits constitute risk factors for the child's development of psychopathic traits. Because heritability estimates do not explain the total amount of variance in the intergenerational transmission of antisocial behavior, the child's environment may then determine whether these risk factors will manifest into CU traits and thrill-seeking.

Measuring Emotional Processing

One method for evaluating affective processing deficits comes from research on anxiety. Anxious individuals show a pattern of emotional processing that appears to be opposite to the pattern of fearlessness in individuals with psychopathy, whereby they selectively attend to threatening stimuli, showing a cognitive bias for its processing (Eysenck, 1992; MacLeod, Mathews, & Tata, 1986; Martin, Williams, & Clark, 1991; Mogg, Bradley, De Bono, & Painter, 1997). One reason why anxious individuals may show this attentional bias is because they have a lower threshold for detecting threat stimuli. For example, on the Stroop color-naming task, where participants must identify the color of words that are either neutral or threatening (i.e., mutilated, pathetic), anxious individuals, who are hypervigilant to threat, are slower to process the color of threat words because they require a greater allocation of processing resources for these individuals (MacLeod, et al., 1986; Martin, et al., 1991; Mogg, Bradley, Dixon, et al., 2000).

One paradigm for assessing this lower threshold for detecting threat stimuli is the dot-probe task. Multiple studies of anxious individuals have used the dot-probe task as an objective assessment of attention to emotional stimuli (MacLeod, et al., 1986; Vasey, Daleidon, Williams, & Brown, 1995; Vasey, El-Hag, & Daleidon, 1996). In this task, pairs of words are presented, one above the other, in various combinations of positive, negative, and neutral valence on a computer screen. A dot then replaces one of the two words immediately after they disappear. The objective is to press a button as soon as this

dot-probe appears. Attention to words can be measured through dot-probe detection latency, whereby a faster response to probes following emotional words indicates vigilance to these words over neutral words. Uses of this paradigm have consistently indicated that anxious individuals respond faster to probes following emotionally threatening words compared with neutral words in both adult samples (MacLeod, et al., 1986) and child samples (Vasey, et al., 1995; Vasey, et al., 1996), because they are more vigilant to threat cues.

The original dot-probe task uses verbal stimuli; however, pictorial stimuli, which have been normed for both adult and child populations (McManis, Bradley, Berg, et al., 2001; Sabatinelli, Bradley, & Lang, 2001) could also be used and require less advanced verbal ability. Pictures from the International Affective Picture System (IAPS) (Center for the Study of Emotion and Attention, 1999) have been developed to include those that are positive, negative, and neutral in valence. The emotional responses to these pictures have been validated using physiological responses in non-referred samples. For example, using pleasant, unpleasant, and neutral slides selected from the IAPS, McManis and colleagues (2001) found more corrugator EMG activity when viewing pleasant versus unpleasant slides, and less activity when viewing pleasant versus neutral slides. In adults they found that skin conductance response was significantly larger when viewing unpleasant pictures than neutral pictures. They also found that in children, heart rate decelerates more in response to unpleasant compared with pleasant pictures. Taken together, these studies establish a connection between physiological reactivity and the content of affective slides for both children and adults.

Loney (2003) developed a revised emotional pictures dot-probe task that assesses processing in terms of temporal response to images. Similar to the original word version of this task, the subject is presented with pairs of pictorial stimuli on a screen, which appear simultaneously. The valences of the pictures include distressing, threatening, negative, positive, and neutral pictures. A dot-probe then replaces one of the two images and the subject must press the key that corresponds to the location on the screen where the dot-probe appears. Performance is measured in terms of temporal response to the replacement of the image by the dot-probe. Analogous to the word version of the task, normal individuals are expected to respond to affective pictures faster than they respond to neutral pictures. This is because the affective pictures have more biological relevance than neutral pictures leading them to selectively attend to them over the neutral images. However, because individuals high on psychopathy show deficits in processing emotional stimuli specific to threat and distress, they should show no difference in response latencies to sad and threatening pictures over neutral pictures because they process these affective images in the same way that they would process neutral stimuli.

Theoretical Model

The theoretical model used to guide study hypotheses proposes that some deficit, such as an amygdala deficit, is largely responsible for both defensive mobilization impairment (impaired fear response) and affective processing impairments in the individual with psychopathy. These deficits may subsequently result in the phenotypic manifestations of thrill-and-adventure-seeking behavior and CU traits. As a result, individuals high on CU traits should show impairments in their processing of both sad and threatening stimuli on the dot-probe task because this is indicative of deficits

associated with brain dysfunction and related physiological responsiveness. In addition, CU traits and processing of sad and threat cues should be related to thrill-and-adventure-seeking behavior. Based on evidence of the heritability of criminality and the proposition that CU traits in children are a developmental precursor to adult psychopathy, these correlations should be the same in both adults and children.

In this model, the structural deficit is the most elementary level of dysfunction, followed by physiological, cognitive, and finally behavioral processes (top-down process). It is proposed that because the dysfunction is at the most basic level of impairment, it is this biological deficit that is passed down across generations. Therefore, parents and their offspring should show significant correlations in their level of CU traits, thrill-seeking, and processing of sad and threat stimuli, which are all potential manifestations of this underlying deficit. Importantly, the cross-generational correlations for thrill-seeking and CU traits should be mediated by the correlation between parents and children in their processing of threat and distress stimuli. This model leads to several hypotheses that were tested in the current study.

Hypotheses

Hypothesis 1: CU traits should be significantly correlated with measures of thrill seeking and processing of distress and threat stimuli, as measured by the dot-probe task.

Hypothesis 2: Measures of thrill seeking should be significantly correlated with processing of threat and distress stimuli, as measured by the dot-probe task.

Hypothesis 3: The correlations between CU traits, measures of thrill seeking, and processing of distress and threat stimuli should be similar in both adults and children.

Hypothesis 4: CU traits, measures of thrill seeking, and processing of distress and threat stimuli should be significantly correlated between parents and their offspring.

Hypothesis 5: The shared variance between parent and child processing of affective stimuli should be significantly correlated with the shared variance between parent and child measures of callous-unemotional traits. Also, the shared variance between parent and child processing of affective stimuli should be significantly correlated with the shared variance between parent and child measures of fearlessness. These correlations would support the contention that a deficit in processing emotional stimuli that is transmitted from parent to child accounts for the associations between parent and child on measures of CU traits and thrill-seeking.

Methods

Participants

Participants included 46 female and 4 male adults, with at least one child between the ages of seven and thirteen, recruited from undergraduate classes at the University of New Orleans (UNO). Each parent participated with one male or female biological child for a total of fifty children in this sample (23 female, 27 male). Parents with more than one biological child between the ages of seven and thirteen were asked to participate with the oldest child within the given age range.

Demographic characteristics of the sample are provided in Table 1. The mean age of the children in this sample was 9.30 (*SD*=2.00) and the mean grade was 3.92 (*SD*=1.96). The children were ethnically diverse, including 35 Caucasians (70%), 11 African-Americans (22%), 2 Hispanics (4%), 1 Native American and one child classified as "Other". Twenty out of the fifty children (40%) were involved in some type of special education, including gifted and talented programs (*n*=12), and sixteen out of the fifty had received some type of mental health care (32%). The proportion of children receiving some type of special education, mental health care, or involvement in gifted/talented programs was evenly distributed across boys and girls and children of different ethnicity. The mean socioeconomic index of the families in this study was 54.73 (*SD*=23.24). This indicates that the mean of the sample was middle class.

Table 1

Demographic Data on Participating Parent and Child

Child Variables	
Mean child's age	9.30 (2.00)
Gender (% female)	46
Ethnicity (% Caucasian)	70
Mean grade	3.92 (1.96)
Special Education (%)	40
Mental Health Care (%)	32
Parent Variables	
Mean SEI	54.73 (23.24)
Mean parent's age	35.86 (6.73)
Gender (% female)	92
Ethnicity (% Caucasian)	66
Mean grade completed	15.04 (1.34)
Percentage Employed	68
Married (%)	42

Note: SEI = Duncan's socioeconomic index (Mueller & Parcel, 1981).

A description of the adult sample is also given in Table 1. The mean age of parents in this study was 35.86 (*SD*=6.73). All participating parents were attending the University of New Orleans, so the mean grade completed was particularly high at 15.04 (*SD*=1.34). In this sample 42% of the participating parents were currently married. The ethnic composition of the adult sample was comparable in diversity to the child sample and included, 33 Caucasians (66%), 10 African-Americans (20%), 5 Hispanics (10%), 1 Native-American, and one parent classified as "Other". This sample was representative of the UNO population, which consists of 56% Caucasian, 22% African-American, 5% Asian/Pacific Island, 5% Hispanic, and 7% other ethnicity students.

Procedures

The parent and child arrived at the lab together and were read a consent/ assent form. After signing the forms, the child was taken to an adjoining room to complete the Antisocial Process Screening Device (APSD) self-report, the Children's Sensation Seeking Scale (CSSS) self-report, and the Revised Children's Manifest Anxiety Scale (RCMAS), with a researcher. All children were read questionnaire items by the researcher unless judged to be mature enough to complete questionnaires alone. While the child completed these forms, the parent was given a brief demographic interview by a researcher. Following this interview, the instructions for the emotional pictures dot-probe task were explained to the parent. After the researcher confirmed that the parent understood the task in the first practice trial, the parent completed the remaining six trials and was allowed a short break between each trial if needed. The task took ten to fifteen minutes to complete.

After completing the emotional pictures dot-probe task, the parents was asked to give permission for his or her child to complete the task. All parents agreed for their child to complete the task. At this time the parent and child switched rooms and a researcher explained questionnaire instructions to the parent. At this time the parent completed the Psychopathic Personality Inventory (PPI) self-report, the Sensation Seeking Scale, Form V (SSS) self-report, and the Antisocial Process Screening Device (APSD) about the child. In the adjoining room the child was given a mood checklist on which he or she rated his or her emotions at the present time to establish a mood baseline. The mood checklist evaluated the child's experience of twelve emotions on a scale of 1 ("Very slightly/ Not at all") to 5 ("Extremely"). After completing this checklist the child was given instructions for the emotional pictures dot-probe task. Once the researcher confirmed that the child understood the task on the practice trial, the child completed the remaining six trials with the necessary breaks in between trials. After completing the task the child was given a second mood checklist to compare to the mood baseline. If scores between the two checklists indicated that the task affected the child's mood negatively, the child played some fun computer games (i.e., pinball) and was then given a third mood checklist to confirm that the child's mood had returned to baseline. Comparisons of pre- and post-task mood checklists resulted in only one child whose mood was negatively affected by the computer task; however, after playing the computer game for five minutes, mood checklist ratings were equivalent to baseline ratings. After completing the visit each child picked a prize from a toy box.

Measures

Questionnaires

Demographic Interview. The demographic interview included questions about the parent and child's age, sex, race and ethnicity, the family's Duncan's socioeconomic index (SEI; Mueller & Parcel, 1981), and whether the child had received special education or mental health services.

Psychopathic Personality Inventory (PPI: Lilienfeld & Andrews, 1996). The PPI is a self-report measure in which items are rated on a four-point scale from 1 (False) to 4 (True). This study used a shortened version of the inventory, comprised of 56 items selected from the full 187-item version of the PPI. The seven items that loaded most highly on each of the following eight subscales constitute this shortened version of the PPI: Machiavellian Egocentricity (manipulativeness), Social Potency (charm and ability to influence or persuade others), Coldheartedness (callousness and lack of remorse), Carefree Nonplanfulness (absence of forethought), Fearlessness (risk taking behaviors), Blame Externalization (a tendency to blame others for mistakes), Impulsive Nonconformity (a disregard for social norms), and Stress Immunity (lack of anxiety). A sample item from the fearlessness subscale is, "I might enjoy flying across the Atlantic in a hot-air balloon". For these eight subscales, internal consistency is estimated from .70 to .90, and test-retest coefficients for a mean interval of 26 days ranged from .82 to .94. The PPI is significantly correlated with other measures of psychopathy (Lilienfeld & Andrews, 1996).

In this sample the Coldheartedness score was used to evaluate psychopathic traits, the Carefree Nonplanfulness score was used to evaluate impulsivity, the Stress Immunity

score was used to evaluate anxiety, and the Total PPI score was used to evaluate total antisocial behavior. The descriptive data on these scales in the current sample is given in Table 2. This table shows that the reliability coefficients for Coldheartedness, Fearlessness, Carefree Nonplanfulness, Stress Immunity, and Total PPI in the current sample were .66, .78, .57, .78, and .81, respectively, and the mean scores were 12.96 (*SD*=3.40), 13.72 (*SD*=4.83), 11.44 (*SD*=2.49), 18.82 (*SD*=4.15), and 116.22 (*SD*=14.75), respectively. These mean scores could not be compared to mean scores from other college samples because there are currently no published studies that have used this shortened version of the PPI in college samples.

The Sensation Seeking Scale, Form V (SSSV: Zuckerman, 1979). The SSS, Form V is a 40-item self-report measure for adults. Given two preferences, one for sensation seeking behaviors, and one against sensation seeking behaviors, the individual selects the preference that best describes him or herself. A sample preference for sensation seeking behavior is, “I like “wild” uninhibited parties”, and a sample preference against is, “I prefer quiet parties with good conversation”. Factor analysis has revealed four factors, including: Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (Dis), and Boredom Susceptibility (BS). Internal consistency is estimated to range from .56 to .77, with the TAS factor having the highest estimate. For a three-week interval, the test-retest coefficient for total score was estimated at .94. Of all the SSSV factors, the TAS subscale is the most highly correlated with harm avoidance (Levenson, et al., 1995), suggesting that it is the most appropriate measure of fearlessness in individuals with psychopathy. Descriptive data for the TAS subscale is given in Table 2. In the current sample the reliability coefficient for the TAS subscale was 0.86 and the mean score was

Table 2

Descriptive data on parent and child variables and correlations with demographic variables

	Mean (SD)		Alpha	Age	Sex	Race	Grade	Family SEI
Child Behavioral Variables								
CU-resolved	3.56	(1.98)	.48	.26	-.20	-.14	.30*	-.18
TAS	19.88	(7.91)	.81	.13	-.47**	-.25	.10	.04
Impulsivity-resolved	5.82	(1.85)	.61	-.02	-.26	-.15	-.02	-.03
Total anxiety	13.04	(6.86)	.89	-.15	.03	.04	-.20	.10
Total APSD-resolved	14.78	(5.25)	.79	.17	-.35*	-.17	.12	-.11
Child Laboratory Variables								
Facilitation to Distress	54.79	(270.52)		-.01	.10	-.09	-.03	.12
Facilitation to Threat	47.26	(264.93)		.15	.14	-.14	.08	.02
Facilitation to Negative	-258.90	(402.23)		.04	.04	.12	.03	.15
Facilitation to Positive	51.82	(161.53)		.02	.08	.17	-.01	.26
Parent Behavioral Variables								
Coldheartedness	12.96	(3.40)	.66	-.10	-.18	.20	.09	-.12
TAS	4.86	(3.28)	.86	-.25	-.38**	-.14	.05	-.20
Fearlessness	13.72	(4.83)	.78	-.09	-.45**	-.11	-.08	-.16
Carefree Nonplanfulness	11.44	(2.49)	.57	.20	-.22	-.27	-.17	-.17
Stress Immunity	18.82	(4.15)	.78	-.19	-.26	.35*	.20	-.04
Total PPI	116.22	(14.75)	.81	-.15	-.40**	.18	.01	-.22
Parent Laboratory Variables								
Facilitation to Distress	55.11	(171.37)		.14	-.13	.18	.13	-.08
Facilitation to Threat	50.87	(222.14)		.14	.11	.04	.16	.19
Facilitation to Negative	-176.43	(304.94)		.10	.04	.05	.02	-.10
Facilitation to Positive	73.60	(210.16)		.01	-.24	-.16	-.06	-.11

Note: * p<.05. ** p<.01. Sex and Race were coded dichotomously and point biserial correlations were done for these variables. Males were coded as 1 and females were coded as 2 for Sex, and Caucasians were coded as 1 and minorities were coded as 2 for Race. Grade = child's current or last grade completed and parent's last grade completed; CU = Callous/unemotional traits (The resolved score is the sum of the highest score on each item out of parent and child report, for all items); TAS = thrill and adventure seeking on the Sensation Seeking Scale; APSD = total score on the Antisocial Process Screening Device (Frick & Hare, in press); PPI = total score for the Psychopathic Personality Inventory (Lilienfeld & Andrews, 1996).

4.86 (*SD*=3.28). In the current sample, the reliability of the TAS subscale is comparable to that found by Zuckerman (1979).

The Antisocial Process Screening Device (APSD: Frick & Hare, 2001). This measure is a reliable 20-item behavior rating scale that can be completed by the child and his or her parent. Items describing the child, such as "His/her emotions seem shallow and not genuine", are rated on a three-point scale from 0 (Not at all true) to 2 (Definitely true). The APSD is the childhood version of the adult Psychopathy Checklist (PCL-R) (Hare, 1985), whereby each item of the PCL-R was translated for relevance to child samples. This measure identifies two dimensions that are analogous to those dimensions found in adult samples, and includes an impulsivity/conduct problems factor, and a callous/unemotional factor. Based on combined parent and teacher report, internal consistency for the CU factor was estimated at .76 for a community sample, and .65 for a clinic-referred sample (Frick, Bodin, & Barry, 2000). The CU dimension has been shown to designate a group of children with conduct problems who show characteristics consistent with theories of psychopathy (Frick, in press) and has been used in multiple research studies with children as young as age five (Frick, et al., 1999).

In this study a resolved score was calculated for each of the factors and the total score by summing the highest score on each item from both parent and child ratings. Descriptive data for the APSD factor scores are given in Table 2. In the current sample the alphas for resolved CU, Impulsivity, and Total APSD scores were .48, .61, and .79, respectively. The reliability of the CU score in this sample was much lower than the alpha found by Frick and colleagues (2000) in the community sample. The mean scores for resolved CU, Impulsivity, and Total APSD are also reported in Table 2. The mean CU

score of 3.56 (*SD*=1.98) corresponds roughly to the 50th percentile of a community sample of children, the mean Impulsivity score of 5.82 (*SD*=1.85) corresponds roughly to the 70th percentile, and the mean Total APSD score of 14.78 (*SD*=5.25) corresponds roughly to the 60th percentile (Frick & Hare, 2001).

Children's Sensation Seeking Scale (CSSS: Russo, Stokes, Lahey, et al., 1993). The format of the CSSS is analogous to the Sensation Seeking Scale for adults and is a self-report measure of sensation seeking behavior. Given two choices of preference, the child selects the one that best describes him or herself. One preference is against sensation seeking behaviors, and includes items such as, "I'd never do anything that's dangerous", and the other preference is for sensation seeking behaviors, including items such as, "I sometimes like to do things that are a little scary". This study used a modified version, in which the child rates how well the behavior describes him or her by selecting between "sort of true of me" or "really true of me" after making the initial preference selection, yielding a response on a four-point scale. The CSSS yields three reliable factors: A thrill and adventure seeking (TAS) factor, an experimentation with substances factor (DAA: Drug and Alcohol attitudes), and a social extraversion factor (SD: Social Disinhibition). In this study only the 12-item TAS factor was used. Internal consistency for the TAS factor in the modified version is estimated at .84. Analogous to the adult version, the TAS subscale is most appropriate for measuring the fearlessness component of psychopathy (Frick, et al., 2003).

Descriptive data for the CSSS TAS subscale is given in Table 2. In the current sample the reliability of the TAS subscale was 0.81, which is comparable to the reliability estimate reported by Russo and colleagues (1993). The mean TAS score in this sample

was 19.88 (*SD*=7.91). To compare this mean score with that from a large school sample of children between the ages of 9 and 15 that used a two-choice response format of the CSSS, the TAS score from the current sample was adjusted by recoding variables to 0 or 1. This resulted in a mean TAS score of 6.86 (*SD*=3.11), which is comparable to the mean TAS score of 6.26 (*SD*=3.08) found by Russo and colleagues (1993) in their sample of 358 girls, but is somewhat less than the mean TAS score of 9.15 (*SD*=2.66), which was found for their sample of 302 boys. This difference may be explained by the age difference between the two samples.

Revised Children's Manifest Anxiety Scale (RCMAS: Reynolds & Richmond, 1985). The RCMAS is a self-report measure of anxiety, consisting of 37 items, standardized for children between the ages of 6 and 19. This measure is in the form of a two-choice response format where children circle "yes" or "no" for each of the items. The measure consists of four subscales: 10 items assessing Physiological Anxiety (i.e., "Often I have trouble getting my breath"), 11 items assessing Worry/Oversensitivity (i.e., "I worry a lot of the time"), 7 items assessing Social Concerns/Concentration (i.e., "Others seem to do things easier than I can"), and a 9-item Lie subscale (i.e., "I never get angry"). Only the 28-item Total Anxiety score was used in the current study as an indicator of anxiety. In a sample of 329 children, Reynolds and Richmond (1985) obtained an internal consistency estimate of .83 for the Total Anxiety score. Descriptive data for the Total Anxiety score in the current sample is given in Table 2. The reliability of the Total Anxiety score was .89, which is comparable to the estimate reported by Reynolds and Richmond (1985). The mean Total Anxiety score for the current sample was 13.04 (*SD*=6.86), which corresponds to a T score of 52 (57th percentile) for a sample

of 9-year-old boys, and a T score of 51 (52nd percentile) for a sample of 9 year-old-girls. The T-score and percentile equivalents for 9-year-olds were selected because the mean age of the current sample was 9.30 years.

Computer Task

Emotional Pictures Dot-probe Task (Loney, 2003).

Each parent and child completed the emotional pictures dot-probe task. This cognitive-affective task uses threat (e.g., vicious dog), distress (e.g., crying child), negative (e.g., angry face), positive (e.g., kittens) and neutral (e.g., book) slides. Most slides were taken from International Affective Picture System (IAPS; Center for the Study of Emotion and Attention, 1999). The threat, distress, and negative slides that were chosen from IAPS for the dot-probe task had been used in previous studies and were judged to be acceptable for use with children (Blair, 1999; McManis, et al., 2001). Because the number of affective images was not sufficient for dividing the slides into neutral, distress and threat categories, additional slides were added to the selection. These supplementary slides were developed using analogous content to those IAPS slides previously used in studies with children. For example, additional slides of snakes were added to the existing IAPS slides of snake images.

The emotional pictures dot-probe task consists of six test trials and one practice trial with a short break between each. In each trial around twenty pairs of images are shown. The dot-probe task begins with an 'X' presented in the center of the screen for 500 milliseconds. Following this 'X', two pairs of images are briefly presented (500 milliseconds), one on top of the other, in various combinations of valence on a computer screen. The image pairs are either neutral-neutral or emotional (threat, distress, negative,

positive)-neutral combinations. After the image pairs disappear, one of the two pictures is immediately replaced by an asterisk (the dot-probe). The objective is to select the key on the keyboard that corresponds to the location on the screen (up or down) where the dot-probe appears. If no key is pressed within 5000 milliseconds the response is recorded as incorrect. Because incorrect responses reflected that the participant was not paying attention to a specific stimulus pair, these responses were not included in the calculation of facilitation indices. Also, response times less than 100 milliseconds were not included in calculations because they were considered to be outliers resulting from program error.

Facilitation indices for distress slides were calculated by taking the mean response time (latency) to all distress-neutral image pairs and subtracting this from the mean latency to all neutral-neutral image pairs. Because normal individuals attend to emotional stimuli over neutral stimuli, they are expected to respond more quickly to probes replacing distressing images because their attention immediately goes to the distressing image over the neutral image. Since this normal response would result in an overall shorter mean response time to distressing pictures, a facilitation to distressing stimuli would be indicated by a positive facilitation index. A lack of facilitation to distressing pictures, such as a mangled kitten, would be indicated by a negative facilitation index, whereby the mean response time to distressing images is longer than the mean response time to neutral pictures, resulting in a negative number when the first is subtracted from the second. The facilitation indices for threatening, negative, and positive slides were calculated in the same way.

Descriptive data on facilitation indices in the current sample are presented in Table 2. Overall, children and adults showed a similar pattern of facilitation to the

various affective stimuli. Specifically, the mean facilitation to distress images was 54.79 (*SD*=270.52) milliseconds for children and 55.11 (*SD*=171.37) milliseconds for adults. The mean facilitation to threat images was 47.26 (*SD*=264.93) milliseconds for children and 50.87 (*SD*=222.14) milliseconds for adults. The mean facilitation to negative images was –258.90 (*SD*=402.23) milliseconds for children and –176.43 (*SD*=304.94) milliseconds for adults. Finally, the mean facilitation to positive images was 51.82 (*SD*=161.53) milliseconds for children and 73.60 (*SD*=210.16) milliseconds for adults. These figures suggest that on average both children and adults in this sample responded more quickly to probes replacing distressing, threatening, and positive pictures than probes replacing neutral pictures, suggesting that they attended to these emotional images over neutral images when presented with both together. Interestingly, both children and adults in this sample, on average, responded more slowly to probes replacing negative images, such as an angry face, than neutral images.

Results

Preliminary Analyses

Preliminary analyses of the data are presented in Table 2. The correlations between demographic variables and primary study variables are reported in this table. Overall, there were few significant associations with demographic variables. However, boys tended to be significantly more thrill-and-adventure seeking (r=-.47, p<.01) and have higher total APSD scores (r=-.35, p<.05) than girls. In addition, older children and children in higher grades tended to have higher CU scores, although only the correlation with grade was significant (r=.30, p<.05). Overall there were no significant associations between demographic variables and laboratory measures for children in this sample.

Correlations between study variables and demographic variables were also examined for adults. These associations are also presented in Table 2. Overall, there were few significant associations among primary study variables and demographic variables; however, like the boys described above, men in this sample tended to have significantly higher thrill-and-adventure seeking (r=-.38, p<.01), fearlessness (r=-.45, p<.01), and total PPI (r=-.40, p<.01) scores than the women. Unlike in the sample of children, minority adults tended to have significantly higher Stress Immunity scores (r=.35, p<.05). As with the children in this sample, there were no significant associations between demographic variables and laboratory measures for the parents.

Primary Analyses

The first hypothesis predicted that CU traits in both children and adults would be significantly correlated with measures of thrill seeking and the processing of distress and threat stimuli, as measured by the dot-probe task. The correlations for children are presented in Table 3. Overall, there were very few significant correlations among study variables for children. As predicted, CU traits were positively associated with thrill-and-adventure seeking (r=.22), and negatively associated with facilitation to distressing pictures on the dot-probe task (r=-.16); however, although these associations were in the predicted direction, they did not reach significance. Contrary to expectations, CU traits were not correlated with facilitation to threat stimuli on the dot-probe task. Overall these findings did not support the prediction that CU traits in children are significantly associated with thrill and adventure seeking or a facilitation to distressing and threatening pictures.

Analogous correlations for adults are presented in Table 4. Similar to the child data, there were very few significant associations among primary study variables. Contrary to expectations, CU traits (as measured by the Coldheartedness score of the PPI) were not correlated with thrill-and-adventure seeking in adults, nor were they correlated with a facilitation to distressing or threatening pictures, as measured by the dot-probe task. Interestingly, Coldheartedness was positively correlated with Stress Immunity (r=.35, $p<.05$). Overall these findings do not provide support for the prediction that CU traits would be significantly correlated with thrill and adventure seeking or a facilitation to distressing or threatening pictures in adults in this sample.

Table 3

Correlations between Child Behavioral and Laboratory Measures (n=50)

Variable	CU-Resolved	Child TAS	Impulsivity-Resolved	Total Anxiety	APSD-Resolved	Facilitation Distress	Facilitation Threat	Facilitation Negative
Child TAS	.22							
Impulsivity-Resolved	.49***	.38**						
Total Anxiety	.23	-.01	.39**					
APSD-Resolved	.77***	.34*	.78***	.48***				
Facilitation Distress	-.16	-.13	-.12	-.21	-.24			
Facilitation Threat	.01	.08	.02	-.11	-.05	-.08		
Facilitation Negative	-.18	.10	-.15	-.23	-.19	.44**	-.12	
Facilitation Positive	.06	-.08	.11	.06	.11	.21	.12	.04

Note: * p<.05. ** p<.01. *** p<.001. CU = Callous/unemotional traits (The resolved score is the sum of the highest score on each item out of parent and child report, for all items); TAS = thrill and adventure seeking on the Sensation Seeking Scale; APSD = total score on the Antisocial Process Screening Device (Frick & Hare, in press).

Table 4

Correlations between Parent Behavioral and Laboratory Measures (n=50)

Variable	Cold-Hearted	TAS	Fearlessness	Carefree Nonplanful.	Stress Imm.	PPI Total	Facilitation Distress	Facilitation Threat	Facilitation Negative
TAS	.01								
Fearlessness	-.13	.68***							
Carefree Nonplanfulness	.14	.14	.05						
Stress Immunity	.35*	.26	.17	-.34*					
PPI Total	.34*	.46**	.65***	.12	.56***				
Facilitation Distress	.13	.10	-.04	.10	.06	.08			
Facilitation Threat	.00	.02	-.05	.03	.34*	.12	.07		
Facilitation Negative	.16	.19	.04	.33*	-.09	.13	.37**	.20	
Facilitation Positive	.01	.17	.05	.18	.02	.07	.07	.26	.16

Note: * p<.05. ** p<.01. *** p<.001. TAS = thrill and adventure seeking on the Sensation Seeking Scale; PPI = total score for the Psychopathic Personality Inventory.

Hypothesis 2 predicted that measures of thrill seeking (TAS) would be significantly correlated with processing of threat and distress stimuli, as measured by the dot-probe task for both adults and children. The results for children are again reported in Table 3. Overall, for child variables few correlations were significant and some were actually in the opposite direction than predicted. Contrary to expectations, TAS was not significantly correlated with a facilitation to distress, although the relationship was in the expected direction. Also, contrary to expectations TAS was uncorrelated with a facilitation to threat stimuli, with this association weakly in the opposite direction than predicted. Overall, these findings do not support the prediction that TAS would be significantly associated with a facilitation to threatening and distressing pictures in children in the current sample.

Analogous correlations for adults are presented in Table 4. Overall, correlations tended to be weak and in the opposite direction than predicted. Specifically, TAS was uncorrelated with a facilitation to distressing and threatening pictures, contrary to expectations. Interestingly, fearlessness was also not significantly correlated with a facilitation to distressing and threatening stimuli, although the weak correlation was in the predicted direction. Overall, similar to what was found for children, these findings do not support the prediction that TAS would be significantly correlated with a facilitation to both threatening and distressing pictures for the adults in this sample.

Hypothesis 3 predicted that the correlations among CU traits, measures of TAS, and processing of distress and threat stimuli should be similar in both adults and children. These comparisons between parent and child data are made from Tables 3 and 4. These tables show that contrary to expectations, the relationships between these measures were

not similar between parents and children. However, overall there were few significant associations between primary study variables for both adults and children in this sample. As previously mentioned, the positive correlation between CU traits and TAS observed in children was not observed in parents. Also, parents did not show the expected negative correlations between these traits and measures of distress and threat processing, while children exhibited weak relationships in the expected direction.

The fourth hypothesis predicted that CU traits, measures of thrill seeking, and processing of distress and threat stimuli should be significantly correlated between parents and their offspring. These cross-generational correlations are presented in Table 5. Overall, and contrary to predictions, there were few significant correlations between parent and child variables. The one exception was that the TAS scales in children and their parents were positively correlated (r=.28), although this did not reach significance. However, fearlessness in parents was significantly correlated with TAS in children (r=.32, $p<.05$). Children and parents also showed weak but positive correlations between measures of impulsivity (r=.19), CU traits (r=.12) and measures of total antisocial behavior (r=.12), although these correlations were not significant.

There was a fifth hypothesis predicting that a deficit in affective processing, which would be passed from parent to child, would account for associations found between parent and child on measures of CU traits and fearlessness. However, there were only weak and nonsignificant correlations between parent and child on measures of CU traits and on the laboratory measures of affective processing. Therefore, the necessary conditions for this hypothesis were not met.

Table 5

Intergenerational correlations between behavioral and laboratory measures (n=50)

					Parent Variables					
Variable	Cold-Hearted	TAS	Fearlessness	Carefree Nonplanful.	Stress Imm.	PPI Total	Facilitation Distress	Facilitation Threat	Facilitation Negative	Facilitation Positive
Child Variables										
CU-Resolved	**.12**	.01	.08	.19	-.10	.16	.02	-.12	-.06	-.02
Child TAS	-.12	**.28**	**.32***	-.22	.12	.26	.02	-.07	-.27	.03
Impulsivity-Resolved	-.13	.22	.22	**.19**	-.15	.13	.09	-.02	-.04	.12
Total Anxiety	-.26	-.02	-.18	-.01	**-.07**	-.18	-.03	.22	.02	.01
APSD-Resolved	-.03	.06	.08	.23	-.18	**.12**	.01	-.01	-.08	.08
Facilitation Distress	.07	-.16	-.02	-.15	-.02	-.10	**.05**	-.13	-.19	.11
Facilitation Threat	-.23	.27*	.23	.20	-.06	.10	-.14	**.10**	.07	.22
Facilitation Negative	-.04	-.20	-.02	-.18	.01	-.17	-.07	-.18	**-.14**	-.14
Facilitation Positive	-.06	.04	.07	.13	.06	.11	-.14	.03	-.09	**.18**

Note: * p<.05. ** p<.01. *** p<.001. CU = Callous/unemotional traits (The resolved score is the sum of the highest score on each item out of parent and child report, for all items); TAS = thrill and adventure seeking on the Sensation Seeking Scale; APSD = total score on the Antisocial Process Screening Device (Frick & Hare, in press); PPI = total score for the Psychopathic Personality Inventory (Lilienfeld & Andrews, 1996). Intergenerational correlations between primary study variables are highlighted in bold.

Post-hoc Analyses

Because the results of the data analyses were not consistent with predictions, several additional analyses were conducted to consider potential reasons for these results. One consideration was whether effects differed for boys and girls, Caucasian versus minority individuals, or individuals taking psychotropic medication and those not on medication. The only variable that seemed to influence the findings was ethnicity. Correlations were examined separately for Caucasian and non-Caucasian (minority) children and these correlations are reported in Tables 6 and 7. Specifically, the correlations for Caucasian children are presented in Table 6, and the correlations for minority children are presented in Table 7. Overall, the pattern of results differed for the two groups of children.

For behavioral measures, hypotheses were more strongly supported by the minority child sample. Specifically, TAS was positively correlated with CU (r=.37), although this correlation was not significant due to the small sample size (n = 15). The associations for behavioral measures in Caucasian children showed a different pattern than in minority children. Overall there was little support for associations between behavioral measures in Caucasian children.

Overall, there was an opposite pattern of results for the laboratory measures. Specifically, expected associations with laboratory measures were found for Caucasian children, but not for minority children. As predicted, CU and TAS were negatively correlated with a facilitation to distressing pictures (r=-.26 and r=-.18, respectively), although neither was significant due to the small sample size (n=35). Interestingly, the total APSD score was significantly negatively correlated with a facilitation to distressing

Table 6

Correlations between Behavioral and Laboratory Measures for Caucasian Children (n=35)

Variable	CU-Resolved	Child TAS	Impulsivity-Resolved	Total Anxiety	APSD-Resolved	Facilitation Distress	Facilitation Threat	Facilitation Negative
Child TAS	.12							
Impulsivity-Resolved	.45**	.35*						
Total Anxiety	.34*	-.21	.44**					
APSD-Resolved	.77***	.23	.75***	.59***				
Facilitation Distress	-.26	-.18	-.18	-.23	-.38*			
Facilitation Threat	-.02	.13	-.03	-.20	-.03	-.06		
Facilitation Negative	-.18	.08	-.19	-.43*	-.29	.49**	-.01	
Facilitation Positive	.09	.05	-.04	-.06	.03	.22	.06	.04

Note: * p<.05. ** p<.01. *** p<.001. CU = Callous/unemotional traits (The resolved score is the sum of the highest score on each item out of parent and child report, for all items); TAS = thrill and adventure seeking on the Sensation Seeking Scale; APSD = total score on the Antisocial Process Screening Device (Frick & Hare, in press).

Table 7

Correlations between Behavioral and Laboratory Measures for Minority Children (n=15)

Variable	CU-Resolved	Child TAS	Impulsivity-Resolved	Total Anxiety	APSD-Resolved	Facilitation Distress	Facilitation Threat	Facilitation Negative
Child TAS	.37							
Impulsivity-Resolved	.58*	.37						
Total Anxiety	.02	.34	.33					
APSD-Resolved	.78**	.47	.85***	.33				
Facilitation Distress	.22	-.16	.09	-.20	.16			
Facilitation Threat	.03	-.18	.10	.12	-.19	-.27		
Facilitation Negative	-.11	.36	.12	.33	.19	.23	-.62*	
Facilitation Positive	.08	-.18	.53*	.22	.31	.36	.33	-.04

Note: * p<.05. ** p<.01. *** p<.001. CU = Callous/unemotional traits (The resolved score is the sum of the highest score on each item out of parent and child report, for all items); TAS = thrill and adventure seeking on the Sensation Seeking Scale; APSD = total score on the Antisocial Process Screening Device (Frick & Hare, in press).

pictures for Caucasian children (r=-.38, p<.05). Contrary to expectation, the associations for laboratory measures in minority children were in the opposite direction. Specifically, CU traits and total APSD score were positively correlated with a facilitation to distressing pictures for minority children (r=.22 and r=.16, respectively). Overall, the predicted behavioral associations were found for minority children, whereas a number of predicted relationships for laboratory measures were found in Caucasian children.

Analogous post-hoc correlations for adults split by race did not provide significantly different results from the combined sample of adults. However, there were some differences in the intergenerational correlations. The intergenerational correlations for Caucasian dyads are presented in Table 8 and the intergenerational correlations for minority dyads are presented in Table 9. Overall, there was a somewhat opposite pattern of results for the two groups. For behavioral measures, CU traits were positively correlated between minority children and their parents (r=.37), although this correlation was not significant due to the small sample size. There was no association between CU traits for Caucasian dyads (r=.01). However, TAS and fearlessness were significantly positively correlated for Caucasian dyads (r=.35, p<.05, and r=.49, p<.01, respectively), but uncorrelated for minority dyads (r=-.01 and r=-.08, respectively). Interestingly, anxiety measures were positively correlated between minority dyads (r=.12), but negatively correlated between Caucasian dyads (r=-.18), although these correlations were not significant. For laboratory measures, intergenerational correlations were weak or in the opposite direction than predicted for both Caucasian and minority dyads.

Table 8
Intergenerational correlations between behavioral and laboratory measures for Caucasian children (n=35)

	Parent Variables									
Variable	Cold-Hearted	TAS	Fearlessness	Carefree Nonplanful.	Stress Imm.	PPI Total	Facilitation Distress	Facilitation Threat	Facilitation Negative	Facilitation Positive
Child Variables										
CU-Resolved	**.01**	-.02	-.03	.14	-.06	.05	.00	-.15	-.05	-.27
Child TAS	-.17	**.35***	**.49****	-.19	.25	.50**	-.14	-.14	-.33	-.20
Impulsivity-Resolved	-.19	.28	.21	**.15**	-.05	.21	.05	-.05	.05	-.02
Total Anxiety	-.34*	-.07	-.19	.05	**-.18**	-.21	-.12	.21	.11	.15
APSD-Resolved	-.21	.01	-.04	.18	-.12	**.06**	-.12	-.04	-.09	-.10
Facilitation Distress	.04	-.18	.00	-.25	.08	-.11	**.08**	-.07	-.20	.07
Facilitation Threat	-.10	.21	.26	.20	-.02	.32	-.16	**.12**	.15	.25
Facilitation Negative	-.04	-.18	.04	-.15	-.01	-.21	-.09	-.20	**-.14**	-.10
Facilitation Positive	-.11	-.09	.07	.07	.00	.13	-.31	.05	-.15	**.21**

Note: * p<.05. ** p<.01. CU = Callous/unemotional traits (The resolved score is the sum of the highest score on each item out of parent and child report, for all items); TAS = thrill and adventure seeking on the Sensation Seeking Scale; APSD = total score on the Antisocial Process Screening Device (Frick & Hare, in press); PPI = total score for the Psychopathic Personality Inventory (Lilienfeld & Andrews, 1996). Intergenerational correlations between primary study variables are highlighted in bold.

Table 9
Intergenerational correlations between behavioral and laboratory measures for minority children (n=15)

	Parent Variables									
Variable	Cold-Hearted	TAS	Fearlessness	Carefree Nonplanful.	Stress Imm.	PPI Total	Facilitation Distress	Facilitation Threat	Facilitation Negative	Facilitation Positive
Child Variables										
CU-Resolved	**.37**	-.06	.28	.24	.00	.48	.08	.10	-.08	.38
Child TAS	-.01	**-.01**	**-.08**	-.63*	.29	.08	.37	.36	-.19	.21
Impulsivity-Resolved	-.01	-.04	.17	**.22**	-.28	.07	.21	.28	-.34	.34
Total Anxiety	-.17	.10	-.14	-.15	**.12**	-.18	.17	.29	-.15	-.19
APSD-Resolved	.28	.03	.25	.26	-.15	**.32**	.29	.22	-.08	.30
Facilitation Distress	.26	-.27	-.19	.29	-.27	-.05	**-.12**	-.56*	-.21	.19
Facilitation Threat	-.48	.35	.07	.07	.04	-.28	-.06	**.09**	-.14	.08
Facilitation Negative	-.05	-.20	-.16	-.17	-.13	-.16	.00	-.19	**-.17**	-.17
Facilitation Positive	-.03	.40	.14	.49	-.06	.01	.21	-.12	.03	**.27**

Note: * p<.05. CU = Callous/unemotional traits (The resolved score is the sum of the highest score on each item out of parent and child report, for all items); TAS = thrill and adventure seeking on the Sensation Seeking Scale; APSD = total score on the Antisocial Process Screening Device (Frick & Hare, in press); PPI = total score for the Psychopathic Personality Inventory (Lilienfeld & Andrews, 1996). Intergenerational correlations between primary study variables are highlighted in bold.

Discussion

In the search for the core deficit of psychopathy, a large body of research has accumulated whose focus is on affective and cognitive deficits in emotional processing (Blair, et al., in press; Stevens, et al., 2001; Patrick, 1994; Patrick, et al., 1994). However, this research has largely focused on clinical and forensic adult samples with minimal research examining these processing deficits in community and child samples. This study suggests that the relationship between callous-unemotional traits and emotional processing may not be as strong in community samples, as has been found in clinical and forensic samples. Also, the results of the current study stress the importance of searching for factors that might moderate the association between CU traits and emotional processing. Specifically, the findings of this study suggest that this relationship might not be consistent across different ethnic groups.

The results of the present analyses indicate that Caucasian and minority children with CU traits show different and often opposite affective responses to emotional pictures in a dot-probe task, as well as different behavioral correlates to these traits, suggesting that psychopathic traits may manifest differently in Caucasian versus minority populations. Specifically, thrill-and-adventure-seeking traits and callous-unemotional traits, two primary behavioral characteristics of psychopathy, were positively associated in minority children, but were not associated in Caucasian children. Also, Caucasian children high on CU traits did not show a facilitation to pictures of distress over neutral

pictures, while minority children with CU traits showed appropriate facilitation to distressing images. These findings suggest that CU traits may have differential roots across different groups of individuals.

The findings of this study support previous research that has found differential affective and information-processing styles in individuals high on psychopathy for persons from different ethnic groups (Lorenz & Newman, 2002b). The majority of studies that have examined affective, processing, and physiological deficits in individuals with psychopathy have used predominantly Caucasian offender samples (Hiatt, Lorenz, & Newman, 2002; Newman, et al., 1987; Patrick, et al., 1994). Surprisingly, there are few studies to date comparing Caucasian and minority psychopathic samples (Kosson, et al., 1990; Lorenz & Newman, 2002b; Lorenz & Newman, 2002c), and no known studies examining race differences in children.

In one study with adults, Lorenz and Newman (2002b) examined how African-Americans high on psychopathy performed on a lexical decision task that had differentiated the performance of Caucasian individuals with and without psychopathic traits (Lorenz & Newman, 2002a). In the lexical decision task, participants view non-words and emotional or neutral words and they must respond to whether or not the stimulus is a word or non-word. This task is similar to the dot-probe task in that it examines attention to emotional stimuli. This study found that African-Americans with psychopathy compared with African-Americans low on psychopathy did not show the same affective processing deficits as Caucasian adults with psychopathy. These results provide preliminary data suggesting that it is incorrect to "assume that the physiological, behavioral, cognitive, and affective correlates that characterize Caucasian male

psychopathic offenders will generalize to other samples" (Lorenz & Newman, 2002b, pp.1078).

The finding that African-American children with CU traits do not show the same affective processing deficits as Caucasian children with CU traits in this sample suggests that their cognitive and potentially physiological response to emotional stimuli is intact. One potential explanation of these differences is that environmental influences may play more of a role in the etiology of CU traits for minority children, while biological factors may play a stronger role in the development of CU traits in Caucasian children. While affective processing deficits in Caucasian individuals may provide a risk factor for the development of CU traits, unknown environmental factors, such as exposure to violence in the community, may contribute to a learned type of callousness in minorities. The findings from this study and previous studies examining race differences in individuals with psychopathy (Kosson, et al., 1990; Lorenz & Newman, 2002a; Lorenz & Newman, 2002b; Newman & Schmitt, 1998), suggests that much further research is needed into the causes of race differences in behavioral, cognitive, affective and physiological correlates to psychopathy.

All of these interpretations need to be made in the context of a number of limitations of the study. First, the sample was relatively small, which resulted in a lack of statistical power. This limitation is especially important within the context of the race differences found in the sample. Specifically, when the samples were split by ethnicity, this resulted in even smaller sample sizes that may have prevented some correlations from reaching significance. Another limitation of this study was its lack of specification

on the sex of the participants. This resulted in a large sample of female parents, which did not allow for an adequate comparison of parents based on gender.

The specification of sex is especially relevant to the adult sample in this study because the existing body of literature on cognitive-affective impairments in adults with psychopathic tendencies has largely focused on males. However, the little research that has examined cognitive and emotional processing deficits in women with psychopathic traits has found no evidence of the same response perseveration deficits on a card playing task that has been found to differentiate men high on psychopathy from men low on psychopathy (Vitale & Newman, 2001). This research has also found that women with psychopathic traits show both normal and attenuated startle response to unpleasant pictures depending on the time between picture presentation and startle probe (Sutton, Vitale, & Newman, 2002), and greater facilitation to emotional stimuli than female controls on a lexical decision task (Lorenz & Newman, 2002c). Therefore, the failure to find expected correlations in the adult sample may have been due to it being predominantly female.

Selection based on sex may also be relevant for child samples because McManis and colleagues (2001) found that community girls and boys show some significant differences in their physiological responsiveness to affective slides. Specifically, girls were more reactive to unpleasant pictures than boys, as measured by corrugator EMG activity, skin conductance response, and blink magnitude (McManis, et al., 2001). Also, the only studies that have examined responsiveness to affective cues in children with psychopathic tendencies have specifically looked at boys (Blair, 1999; Blair, et al., in

press; Stevens, et al., 2001). However, our analyses dividing the sample by boys and girls did not find differences by sex.

Another limitation to this study was the newness of the emotional pictures dot-probe task. First, because the task requires attention to the picture presentations, it may not be measuring the same emotional processing deficits that have been previously found in adults with psychopathy (Aniskiewz, 1979; Blair, et al., 1997; Blair, 1999; House & Milligan, 1976). Second, given that our findings were particularly divergent from hypotheses for adults in this sample, it may be that the pictures used by the dot-probe task were not appropriate for measuring emotional reactivity in adults. Specifically, the valence of the pictures may not have been strong enough to evoke the expected facilitation to stimuli designated as "distressing" or "threatening". Patrick **(**1994**)** found that pleasant and unpleasant slides had to be substantially arousing to evoke a physiological reaction in his adult sample. Because the same task was used with parents and their children in the current study, it was not ethically possible to have more emotionally valent distressing and threatening stimuli. However, future studies might create two separate versions of the task, whereby the adult version could include significantly more valent slides to evoke the necessary affective responses in adults.

The relevance of handedness in processing tasks is becoming more prevalent in the psychopathy research. Specifically, Kosson (1996, 1998) found that persons with psychopathy showed performance deficits when using their right hand on attentional tasks. Lorenz and Newman (2002a) also found these same deficits for handedness in low-anxious Caucasian individuals high on psychopathy. They explained that tasks in which participants use their right hands rely on left hemisphere activation, where the origin of

deficit may be located. The mounting research on differential hemispheric importance for psychopathic traits may have implications for research pointing to the left amygdala as the locus of affective attribution (theory of mind) deficits (Fine, et al., 2001). However, in this study participants were not excluded because of handedness. In fact, participants could select which hand they preferred to use for the emotional pictures dot-probe task.

There are a number of assumptions made in this study that may have further contributed to our negative findings. Specifically, in using a community sample it was assumed that psychopathic traits are continuous rather than taxonomic. Overall, researchers of psychopathy are mixed in their conceptualization of the disorder. Although many studies specify a PCL-R score cutoff to designate an adult with psychopathy, or an APSD score cutoff to designate a child with psychopathic tendencies, this study followed from the viewpoint of Levenson and colleagues (1995), who conceptualized psychopathic traits within a continuous framework (Levenson, et al., 1995). A second assumption is that the APSD generalizes to minority samples to identify children with CU traits. The APSD was developed by extending PCL-R items to be relevant and developmentally appropriate for children within the form of a rating scale. However, the PCL-R was developed in a predominantly Caucasian sample and its validity in minority samples is still unclear (Harpur, et al., 1989). In fact, Lorenz and Newman (2002b) suggested that "the PCL-R may not be measuring the same construct across Caucasian and African American samples" (Lorenz and Newman, 2002b, pp. 1083). This may account for the significantly low reliability coefficient obtained for the CU factor for children in this sample.

Future research might address all of these issues by focusing on either children or adults of a given ethnicity with psychopathic traits to obtain larger, more homogeneous groups between which to make comparisons. Given the findings of sex differences in psychopathy (Salekin, Rogers, & Sewell, 1997; Vitale, Smith, Brinkley, & Newman, 2002) and the minimal research on cognitive and affective processing deficits in females with psychopathic traits, future studies might also examine sex-differences in performance on processing tasks by individuals with psychopathic traits. Given that it is unclear whether psychopathic traits exist on a continuum or constitute a discrete disorder, future studies might compare affective processing across individuals with and without psychopathic traits, based on a specified cut-off score. Given the potential relevance of handedness, future studies might also examine differences between participants' performance on the emotional pictures dot-probe task using both the right and left hand separately.

Overall, the findings of the current study suggest that the emotional deficit found in individuals with psychopathic traits may not be as robust as once thought. This study highlights the need to consider a number of factors when investigating emotional deficits in individuals with psychopathic traits. Specifically, these factors include the sex and ethnicity of the sample, the type of stimuli, the type of task, the handedness of the individual, and the method for assessing psychopathy. Consideration of these potential moderators could have important implications for understanding psychopathy and the core deficit that might lead to this serious personality disturbance.

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Appendix

IRB Approval Form

UNIVERSITY OF NEW ORLEANS
COMMITTEE ON THE USE OF HUMAN SUBJECTS

Form Number: 6JUN02 ***(please refer to this number in all future correspondence concerning this protocol)***

Principal Investigator: Eva R. Kimonis **Title:** Graduate Student

Department: Psychology **College:** Sciences

Name of Faculty Supervisor: Paul Frick, Ph.D. ***(if PI is a student)***

Project Title: The association between callous-unemotional traits and emotional processing within individuals and across generations.

Date Reviewed: June 10, 2002

Dates of Proposed Project Period: From 6/02 **to** 6/03*
***approval is for one year from approval date only and may be renewed yearly.**

Note: Consent forms and related materials are to be kept by the PI for a period of three years following the completion of the study.

☐ **Full Committee Approval**
☐ **Expedited Approval**
☐ **Continuation**
☐ **Rejected**
☒ **The protocol will be approved following receipt of satisfactory response(s) to the following question(s) within 15 days:**

Extra Credit Question?
Simplify language of child assent form

Committee Signatures:

_____ Matthew S. Stanford, Ph.D. (Chair)

_____ Scott Bauer, Ph.D.

_____ Gary Granata, Ph.D.

_____ Betty Lo, M.D.

_____ Hae-Seong Park, Ph.D.

_____ Jane Prudhomme

_____ Jayaraman Rao, M.D. (NBDL protocols only)

_____ Richard B. Speaker, Ph.D.

_____ Gary Talarchek, Ph.D.

Vita

Eva Kimonis was born in Portsmouth, England and received her B.A. from Brandeis University in Waltham, Massachusetts, with a double major in psychology and anthropology and with high honors in psychology. Following her undergraduate education she worked under Dr. Carolyn Zahn-Waxler in the Section on Developmental Psychopathology at the National Institute of Mental Health in Bethesda, Maryland. She began in the Applied Developmental Psychology doctoral program at the University of New Orleans in August, 2001. She plans to continue investigating psychopathic traits across development, with special interest in emotional processing.

THESIS EXAMINATION REPORT

CANDIDATE: Eva R. Kimonis

MAJOR FIELD: Applied Developmental Psychology

TITLE OF THESIS: The Association Between Callous-Unemotional Traits and Emotional Processing Within Individuals and Across Generations

APPROVED:

Major Professor & Chair -

Dean of the Graduate School

EXAMINING COMMITTEE:

DATE OF EXAMINATION: _____