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## Psychopathy, Aggression, and the Processing of Emotional Stimuli in Non-Referred Girls and Boys

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**Research shows that individuals with psychopathic traits differ in how they process negative emotional stimuli. However, it is unclear whether these differences are specific to certain types of negative emotional stimulus and whether they are more strongly associated with psychopathic traits or aggression. Further, it is not clear whether or not deficits in emotional processing generalize to females and ethnic minority individuals with psychopathic traits. In this study, we examined the emotional processing of visual stimuli using a dot-probe task in 50 non-referred girls and boys (mean age of 9.30; SD = 2.00). Overall, there was a significant association between proactive aggression and reduced responsiveness to distressing stimuli. In addition, the predicted association between psychopathic traits and reduced responsiveness to distressing stimuli was only found for children high on aggression. Also, the associations among aggression, psychopathic traits, and responsiveness to distressing stimuli did not differ for boys and girls. Copyright © 2006 John Wiley & Sons, Ltd.**

The construct of psychopathy focuses on a constellation of affective (e.g. lack of guilt and empathy), interpersonal (e.g. using others for one's own gain), self-referential (e.g. considers oneself more important than others) and behavioral (e.g. lack of planning and forethought) traits that are present in a subgroup of antisocial individuals (Hare, Hart, & Harpur, 1991). There has been recent interest in studying potential childhood precursors to psychopathy in an effort to better understand the developmental processes that may lead to this serious form of personality disturbance. Although this research is clearly at an early stage and much more work is needed before firm conclusions about developmental precursors can be made, the results of this research are promising in a number of respects. First, in incarcerated (Kruh, Frick, & Clements, 2005), clinic-referred (Christian, Frick,

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Hill, Tyler, & Frazer, 1997), and community (Frick, Cornell, Barry, Bodin, & Dane, 2003) samples, the presence of psychopathic traits designates a more severe and aggressive group of antisocial youth. Second, antisocial youth with psychopathic traits show a number of characteristics that could suggest different causal processes underlying their antisocial behavior. For example, the antisocial behavior of youth with psychopathic traits is less strongly associated with dysfunctional parenting (Wootton, Frick, Shelton, & Silverthorn, 1997) and low intelligence (Loney, Frick, Ellis, & McCoy, 1998), and is more strongly associated with a preference for thrill and adventure seeking activities (Frick *et al.*, 2003b; Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999), a reward dominant response style (Barry *et al.*, 2000), and deficits in processing negative emotional stimuli (Blair, 1999; Frick *et al.*, 2003b; Loney, Frick, Clements, Ellis, & Kerlin, 2003).

This last characteristic, differences in how negative emotional stimuli are processed, has played a prominent role in many causal theories of psychopathy. For example, Cleckley (1982) proposed that individuals with psychopathy do not develop appropriate morality because their early socializing experiences are not accompanied by normal affective experiences. Similarly, a number of developmental theories have emphasized the importance of normal emotional responses in the development of the affective components of conscience (see Frick & Morris, 2004, for a review). Consistent with these theoretical models, research has found that individuals who show psychopathic traits are impaired in their processing of negative stimuli. For example, while non-psychopathic incarcerated adults show an enhanced startle response when viewing negative emotional stimuli (*i.e.* slides of mutilations, assaults, and direct threat), incarcerated adults high on psychopathy show an attenuated response (Levenston, Patrick, Bradley, & Lang, 2000; Patrick, 1994; Patrick, Bradley, & Lang, 1993). Similarly, antisocial youth with psychopathic tendencies show impairments in recognizing both sad and fearful facial expressions and vocal tones (Blair, Colledge, Murray, & Mitchell, 2001; Stevens, Charman, & Blair, 2001), reduced attentional orienting to negative emotional words (Frick *et al.*, 2003b; Loney *et al.*, 2003), and reduced autonomic responses to distressing (*i.e.* crying child) and threatening (*i.e.* attacking dog) visual images (Blair, 1999; Blair, Jones, Clark, & Smith, 1997). In contrast, antisocial youth without psychopathic traits may in fact show an enhanced response to emotional stimuli (Loney *et al.*, 2003; Pardini, Lochman, & Frick, 2003), suggesting very different patterns of emotional processing in the two groups of antisocial youth.

Based on these findings, there is strong theoretical and empirical support for studying the association between abnormal processing of negative emotional stimuli and psychopathic traits in both adults and children. There are several important avenues for extending this work. First, although the abnormal processing of emotional stimuli seems to be limited to negative emotional stimuli (Loney *et al.*, 2003), it is unclear whether it is even more specific to certain types of negative emotional stimulus (*i.e.* threat or distress). For example, some theories of conscience development have emphasized the lack of fearful inhibitions to threatening stimuli (Kochanska, 1993; Patrick, 2001), whereas others have emphasized a reduced responsivity to the distress cues of others (Blair, 1995). Importantly, these two emotional responses may have different neurological substrates (Blair *et al.*, 2001). Therefore, research needs to test how specific any abnormalities in emotional responding may be in persons with psychopathic traits.

Second, research to date has focused largely on the association between emotional processing deficits and psychopathic traits in antisocial samples (see, e.g., Loney et al., 2003; Patrick et al., 1993). Therefore, it is unclear whether the same abnormalities are associated with psychopathic features across a more normative range of these traits. Further, it leaves open the possibility that the differences in the processing of emotional stimuli may be associated with the antisocial behavior exhibited by persons with psychopathy. For example, in both adults (Woodworth & Porter, 2002) and youth (Frick et al., 2003a; Kruh et al., 2005), individuals with psychopathy show high rates of premeditated and instrumental aggression. Further, this type of aggression has also been linked to reduced responsivity to emotional stimuli (Hubbard et al., 2002; Pitts, 1997). Therefore, it is unclear whether the abnormalities in emotional processing are more strongly related to the presence of psychopathic traits or to the presence of instrumental aggression. Also, as noted previously, there may be an interaction between psychopathic traits and aggressive behavior, with aggressive children high on psychopathic traits showing reduced responsivity to negative emotional stimuli and those low on psychopathic traits showing enhanced responsivity (Loney et al., 2003).

Third, much of the research conducted on the relation between emotional processing deficits and psychopathy has been conducted on predominantly Caucasian and predominantly male samples. Despite a lower base rate of psychopathic traits in females, many studies have documented similar personality and behavioral correlates (i.e. aggressive and criminal behavior) in males and females with psychopathy (Rutherford, Cacciola, Alterman, & McKay, 1996; Silverthorn, Frick, & Reynolds, 2001). Unfortunately, the results related to the cognitive and affective correlates of psychopathy have not been consistent. For example, incarcerated women high on psychopathy have not shown the same cognitive response perseveration deficits as men high on psychopathy (Vitale & Newman, 2001), although women high on psychopathy have shown similar abnormalities in their processing of unpleasant and threatening stimuli in a startle probe paradigm (Sutton, Vitale, & Newman, 2002). Given the importance of emotional deficits to causal theories of psychopathy, the cross-gender consistency in emotional deficits provides important data on the validity of the construct in men and women. Unfortunately, the cross-gender consistency of these emotional deficits has not been tested in samples of youth.

Similar questions have been raised about the construct validity of psychopathic traits across different ethnic groups, with the few studies investigating potential ethnic differences in the correlates to psychopathy reporting different characteristics in Caucasian and African-American adults with psychopathy (Kosson, Smith, & Newman 1990; Lorenz & Newman, 2002a; Lorenz & Newman, 2002b). In one of the only studies to specifically compare the emotional processing of Caucasian and African-American individuals with psychopathy, differences in emotional processing between persons high and low on psychopathy were found for Caucasian but not African-American participants (Lorenz & Newman, 2002b). Again, given the importance of emotional processing to most theories of psychopathy, failure to find consistent emotional deficits across ethnic groups is a critical finding concerning the construct validity of psychopathy and warrants further testing in younger samples.

Based on this background literature, the purpose of the current study was to investigate the association between deficits in processing emotional stimuli and a

measure of psychopathic traits in a community sample of girls and boys. Based on past research, it was predicted that deficits in the processing of negative emotional stimuli would be associated with psychopathic traits but that deficits in the processing of positive emotional visual stimuli would not. However, in the current study, the negative emotional stimuli were divided into those involving threat stimuli and those involving distressing stimuli to test whether the differences in emotional processing generalize across these types of negative emotional stimulus. Also, the association between emotional processing and aggression was tested in the current study, with the prediction that persons high on instrumental forms of aggression would also show deficits in the processing of negative emotional stimuli. However, in the current study, we investigated whether the emotional deficits were more strongly related to aggressive behaviors, to psychopathic traits, or to an interaction of these two dimensions. Finally, the potential moderating roles of ethnicity and sex of the child were tested.

## METHOD

### Participants

Participants were children of college students recruited through undergraduate courses and volunteers responding to flyers posted across an urban university campus in a large metropolitan area in the southeastern United States. Parents were offered extra credit for their child's participation in the study and flyers invited parents to bring in their child between the ages of six and thirteen to participate in a study of children's personality. For parents who had more than one child in this age range, they were requested to participate with their oldest child. This led to a sample of 23 girls and 27 boys (mean age = 9.30; SD = 2.00). According to parent report, participants were ethnically diverse, including 35 Caucasian (70%), 11 African American (22%), 2 Hispanic (4%), and 1 Native American, with one participant classified as "Other". Eight out of the 50 children (16%) were receiving special education services through their school (excluding services for gifted/talented) and 12 (24%) had received some type of mental health treatment. The mean socioeconomic index of the families in this study was 54.73 (SD = 23.24) using Duncan's Socioeconomic Index, which indicates a normative range of socioeconomic status (Mueller & Parcel, 1981).

### Measures

#### *The Antisocial Process Screening Device (APSD; Frick & Hare, 2001)*

The APSD is a 20-item behavior rating scale that was designed to assess traits associated with the construct of psychopathy, similar to those assessed by the Psychopathy Checklist—Revised (PCL-R; Hare, 1991) but with modifications designed to make the content appropriate for pre-adolescent samples (Frick & Hare, 2001). The APSD was designed to be completed by the child's parent and teacher and there are several pieces of evidence supporting its validity. First, scores

on the APSD have designated a group of preadolescent children with conduct problems who show a more severe and aggressive pattern of conduct problem behavior (Christian et al., 1997; Frick et al., 2003b). Second, the APSD has also designated children with conduct problems who show distinct characteristics consistent with the construct of psychopathy, such as a preference for thrill seeking behaviors (Frick et al., 1999), a reward dominant response style (Barry et al., 2000), and deficits in the processing of emotional stimuli (Blair et al., 2001).

In the current study, teacher report could not be obtained and, therefore, a child self-report version of the scale was used to include the report of a second informant. This self-report version of the APSD has been used in several past studies (e.g. Loney et al., 2003; Pardini et al., 2003). When comparing the association between scores on the self-report of the APSD and the PCL-R: Youth Version (PCL-R:YV; Forth, Kosson, & Hare, 2003) with external criteria in an adolescent offender sample, Salekin and colleagues (2004) found that scores on the APSD showed comparable correlations with number of arrests ( $r=0.33$ ) and number of violent arrests ( $r=0.25$ ) to the PCL-R:YV ( $r=0.36$  and  $0.28$ , respectively; all  $p < 0.05$ ). Also, convergent correlations between the self-report version of the APSD and the PCL-R typically range from 0.30 to 0.40 (Lee, Vincent, Hart, & Corrado, 2003; Murrie & Cornell, 2002), which is typical of correlations between psychological constructs that differ in method of assessment (Kamphaus & Frick, 2002).

The parent and child ratings on the APSD were significantly correlated ( $r=0.54$ ;  $p < 0.001$ ). Therefore, ratings from parents and children were combined using the higher score for each item from either informant, as recommended in the APSD manual (Frick & Hare, 2001) and elsewhere (Piacentini, Cohen, & Cohen, 1992). The coefficient alpha for this combined parent and child rating of psychopathy was 0.79 for all 20 items. The APSD has three subscales, measuring callous-unemotional traits, impulsivity, and narcissism. However, given the low internal consistencies of these subscales (i.e. 0.48, 0.61, and 0.71), the primary analyses used only the APSD Total Score. The mean of the parent Total APSD score in the current sample (10.00;  $SD = 5.25$ ) was equivalent to the 63rd percentile of the normative sample, a non-referred sample of school-age children in grades 3 through 7, reported in the APSD manual (Frick & Hare, 2001). Because the published version of the APSD only includes parent and teacher versions, self-report norms are not available.

*Aggressive Behavior Rating Scale (ABRS; Brown, Atkins, Osborne,  
& Milnamow, 1996)*

The Aggressive Behavior Rating Scale was developed to distinguish between reactive and proactive forms of aggression. Using factor analysis, Brown and colleagues (1996) isolated a 10-item proactive aggression factor (e.g., “I have hurt others to win a game or contest”) and a 6-item reactive aggression factor (e.g., “I get mad when I don’t get my own way”) in a sample of children in grades 3 through 5. They reported high internal consistency for the proactive and reactive aggression scales ( $\alpha = 0.91$  and  $0.90$ , respectively) and a moderately high intercorrelation ( $r = 0.67$ ) between these scales. Frick et al. (2003a) reported that children with high levels of conduct problems and psychopathic traits showed higher

scores on both the proactive and reactive aggression scales of the ABRS in an elementary-school-aged sample, whereas children with conduct problems without psychopathic traits showed moderately elevated scores on the reactive aggression scale only. In the current study, parent and child report versions of this scale were used and combined by taking the higher score for each item from either informant. The correlations between parent and child report were  $r = 0.36$  ( $p < 0.01$ ),  $r = 0.40$  ( $p < 0.01$ ), and  $r = 0.30$  ( $p < 0.05$ ) for the Total Aggression, Proactive Aggression, and Reactive Aggression scores, respectively. The coefficient alphas for the multi-informant composite for these scales were 0.88, 0.83, and 0.74, respectively. In the current sample, the correlation between composite scores on proactive and reactive aggression was  $r = 0.68$  ( $p < 0.001$ ).

### *Emotional Pictures Dot-Probe Task (Loney, 2003)*

At an early stage of information processing, stimulus analysis mechanisms automatically direct attention towards biologically relevant stimuli (Ohman, 1993). The dot-probe task is a common laboratory paradigm used to index attentional bias for emotional stimuli at this early stage of processing (MacLeod, Mathews, & Tata, 1986). The emotional pictures dot-probe task presents a series of picture pairs of varied emotional content including threat (e.g. vicious dog attacking), distress (e.g. crying child), positive emotion (e.g. kittens), and neutral (e.g. book) emotion. It has primarily been used to assess the relation between anxiety and attentional orienting responses in adults (Mogg & Bradley, 1999) and children (Vasey, Daleidon, Williams, & Brown, 1995; Vasey, El-Hag, & Daleidon, 1996). However, it has also been used to investigate the relation between emotional processing and child aggressive behavior (see, e.g., Schippell, Vasey, Cravens-Brown, & Bretveld, 2003). This is the first study to use the dot-probe task to investigate the relationship between emotional processing and psychopathic traits.

The dot-probe task is typically modified in terms of specific emotional content based on the focus of a given investigation. The task used in the current study was developed using slides primarily taken from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1997). These slides were selected because they had been used in previous studies with children to tap threat and distress content domains (Blair, 1999; McManis, Bradley, Berg, Cuthbert, & Lang, 2001). Because the number of slides was not sufficient for dividing them into neutral, distress, and threat categories, a small number of additional slides were added that directly matched the IAPS slide content. For example, additional slides of an attacking snake were added to the existing IAPS slides of snake images.

The task consisted of one block of practice stimuli (16 picture pairs) followed by six experimental blocks. The six test blocks each contained 24 picture pairs and were separated by a short break. Each picture presentation consisted of three sequential components: (1) a 500 millisecond fixation cross appearing in the center of the screen, (2) a 500 millisecond simultaneous presentation of two picture stimuli that are centered and located immediately above and below the location of the fixation cross, and (3) an asterisk (i.e. dot-probe) appearing in either the top or bottom picture location. On every trial, the child had to select a key on the keyboard that corresponded to the location on the screen (up or down) where the dot-probe

appeared. If no key was pressed within 5000 milliseconds, the response was recorded as incorrect. Incorrect responses and response times less than 100 milliseconds were not included in the calculation of facilitation indices. Only six children got less than seventy percent of their responses correct.

The picture pairs represented one of four potential picture pairings: neutral–neutral, threat–neutral, distress–neutral, and positive–neutral. The number and location of picture stimuli were counterbalanced across test trials in order to assure an equal number of emotional and neutral stimuli appeared in both top and bottom locations. Additionally, there were an equal number of emotional and neutral stimuli that were replaced versus not replaced by a dot-probe stimulus. The primary dependent measure for the current study was an attentional facilitation index. This facilitation index was calculated by subtracting the average response time (latency) to responding to dot-probes replacing distressing pictures in distress–neutral picture pairs from the average latency to responding to dot-probes replacing neutral stimuli in the various neutral–neutral picture pairs. To control for potential location effects, such as an attentional preference for the top or bottom location of the screen, the following formula was used to calculate the facilitation indices that only compared neutral and emotional probes in the same location:  $\text{facilitation} = 1/2[(\text{neutral only/dot-probe up} - \text{distress up/dot-probe up}) + (\text{neutral only/dot-probe down} - \text{distress down/dot-probe down})]$ . The facilitation indices for threatening and positive emotion slides were calculated in the same way. Given that emotional pictures typically facilitate allocation of attention, participants were generally expected to respond more quickly to probes replacing emotional images because these slides capture their initial attention. Since this normal response would result in a shorter mean response time to dot-probes replacing emotional pictures, this would be indicated by positive scores on the facilitation index. Because the facilitation index involves relative reaction times to neutral and emotional pictures, it controls for overall differences in reaction times.

## Procedures

The current study was approved by the University of New Orleans' Institutional Review Board (IRB). All children were accompanied by a parent (46 mothers and 4 fathers). After parental consent and child assent were obtained, the child was taken to an adjoining room to complete the behavior rating scales for the study. All children were read questionnaire items unless judged to have adequate reading ability. While the child completed these forms, the parent completed the dot-probe task. This allowed the parents to see the visual stimuli that would be used in the dot-probe task with their children. Following the task, parents were asked whether they would like their child to complete the task. No parent refused to have his or her child participate after seeing the pictorial stimuli.

Prior to starting the dot-probe task, each participant was given a mood checklist. The mood checklist evaluated the child's experience of 12 emotions on a scale of 1 ("Not at all") to 5 ("Extremely"). After completing this checklist the child was given instructions for the emotional pictures dot-probe task. 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 had affected the child's

mood negatively, the child played a fun computer game (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 for this child. After completing the testing, each child picked a prize from a toy box.

## RESULTS

The distributions of all study variables are described in Table 1. The mean facilitation to distress images was 54.79 ms (SD = 270.52), that to threat images was 47.26 ms (SD = 264.93), and that to positive images was 51.82 ms (SD = 161.53). These scores suggest that on average participants showed a normative response pattern by responding more quickly to probes replacing emotional pictures. Importantly, the distribution of all three of the response facilitation indices did not differ significantly from normality using the Kolmogorov–Smirnov Test of Normality. The distribution of the APSD Total Score also did not differ significantly from normality. However, all three aggression scores showed skewed distributions, with most children scoring at the lower end of the distribution. This skewed distribution was most evident for the measure of proactive aggression.

The correlations between the main study variables and demographic variables are reported in Table 2. Age, race, socioeconomic status, and placement in special education classes were not associated with any of the main study variables. Although sex of the child was not associated with response to distressing ( $r = -0.10$ ,  $p = \text{n.s.}$ ), threatening ( $r = -0.14$ ,  $p = \text{n.s.}$ ), or positive images ( $r = -0.08$ ,  $p = \text{n.s.}$ ), it was significantly associated with psychopathy ( $r = 0.35$ ,  $p < 0.05$ ) and proactive ( $r = 0.31$ ,  $p < 0.05$ ), reactive ( $r = 0.28$ ,  $p < 0.05$ ), and total aggression ( $r = 0.32$ ,  $p < 0.05$ ). As would be expected, boys tended to show more psychopathic traits and higher rates of aggression than girls. Children receiving mental health services also showed higher scores on the measure of proactive aggression and total aggression. The three response facilitation indices were not significantly correlated with any of the demographic variables with the exception of the significant correlation ( $r = 0.36$ ,  $p < 0.01$ ) between receipt of mental health services and the facilitation index to threatening pictures.

Table 1. Distributions of main study variables

	Mean (SD)	Range	Skewness	Kurtosis
APSD—total score	14.78 (5.25)	4–27	0.22	0.01
Proactive aggression	4.46 (3.14)	0–13	1.01	0.45
Reactive aggression	6.12 (2.17)	0–12	0.34	1.47
Total Aggression—resolved	10.58 (4.89)	1–24	0.80	0.48
Facilitation to distress (ms)	54.79 (270.52)	–933–697	–0.48	3.13
Facilitation to threat (ms)	47.26 (264.93)	–638–650	–0.11	–0.01
Facilitation to positive (ms)	51.82 (161.53)	–302–510	0.16	1.20

APSD = Antisocial Process Screening Device (Frick & Hare, 2001). Both psychopathy and aggression ratings were based on a combination of parent and child report.



Table 2. Correlations between main study variables and demographic variables

	Age	Race	Special education	Mental health care	SES	Sex
APSD total score	0.17	0.17	0.07	0.12	-0.11	0.35*
Proactive aggression	-0.23	-0.03	0.09	0.30*	-0.15	0.31*
Reactive aggression	0.04	0.18	0.20	0.24	-0.12	0.28*
Total aggression	-0.13	0.06	0.15	0.30*	-0.15	0.32*
Facilitation to distress	-0.01	0.09	-0.19	-0.07	0.12	-0.10
Facilitation to threat	0.15	0.14	-0.14	0.36**	0.02	-0.14
Facilitation to positive	0.02	-0.17	-0.08	0.13	0.26	-0.08

APSD = Antisocial Process Screening Device (Frick & Hare, 2001). Race was coded as 0 for Caucasian and 1 for minority. Sex was coded as 0 for girls and 1 for boys. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

In Table 3, the correlations among psychopathy, aggression, and the three facilitation indices are provided. As expected from past research, measures of psychopathy and aggression were significantly correlated ( $r = 0.73$ ;  $p < 0.001$ ). Also as expected, there were no significant associations with the positive facilitation index for any of the measures of psychopathy or aggression. Importantly, there were also no significant associations between the facilitation index to threatening pictures and psychopathy ( $r = -0.05$ ;  $p = \text{n.s.}$ ) or aggression ( $r = -0.03$ ;  $p = \text{n.s.}$ ). The one correlation to reach significance was the negative correlation between proactive aggression and facilitation to distressing pictures ( $r = -0.28$ ;  $p < 0.05$ ). This correlation indicates that, as predicted, children with higher scores on the measure of proactive aggression showed less emotional facilitation to the pictures of distress.

Since analyses were run using a combination of parent and child report on psychopathy and aggression, analyses were repeated using parent and child report separately and the results were comparable. Specifically, facilitation to distressing pictures showed similar correlations ( $r = -0.23$  and  $r = -0.16$ ; both  $p = \text{n.s.}$ ) with child and parent report of psychopathy, respectively. Similarly, facilitation to distress showed similar correlations with child and parent report of proactive aggression ( $r = -0.30$  and  $r = -0.24$ ; both  $p < 0.05$ ). In Table 3, the partial

Table 3. Correlations among psychopathy, aggression, and emotional processing variables

	Total APSD	Proactive aggression	Reactive aggression	Total aggression	Facilitation to distress	Facilitation to threat
Proactive aggression	0.68*** (0.43**)					
Reactive aggression	0.65*** (0.34**)	0.68***				
Total aggression	0.73***	0.95***	0.88***			
Facilitation to distress	-0.24	-0.28* (-0.28*)	-0.12 (0.11)	-0.23		
Facilitation to threat	-0.05	-0.03 (-0.01)	-0.03 (-0.01)	-0.03	-0.08	
Facilitation to positive	0.11	0.12 (0.00)	0.18 (0.13)	0.15	0.21	0.12

APSD = Antisocial Process Screening Device (Frick & Hare, 2001). Correlations in the body of the table are zero-order correlations, except for correlations in parentheses which are partial correlations controlling for the overlap between reactive and proactive aggression. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

correlations with each type of aggression, controlling for the other type, are also provided to determine whether the correlation between aggression measures may have obscured differential associations. Controlling for the overlap in types of aggression did not lead to many differences in the correlations, with the one significant correlation between proactive aggression and the facilitation index to distressing pictures remaining significant after controlling for reactive aggression.

It is possible that the weak associations between psychopathic traits and facilitation to either distressing or threatening stimuli were due to the presence of moderator variables. To test for these potential moderating effects, two-step hierarchical multiple regression analyses were conducted. For these analyses, aggression and psychopathy scores were centered by subtracting the sample mean from each participant's score. In step 1, the facilitation index was regressed onto the moderator variable and total psychopathic traits. In step 2, a multiplicative interaction term was entered into the equation to test for the interaction between the moderator and total psychopathic traits. As evident from Table 4, there were no significant interaction effects for the facilitation indices for positive or threatening pictures. There was, however, a strong and significant interaction between psychopathy and total aggression ( $R^2$  change = 0.14,  $p < 0.01$ ) in predicting the facilitation index for distressing pictures.

Table 4. Hierarchical regression analyses testing for the potential moderating role of ethnicity, gender, and aggression

	Facilitation to distress			Facilitation to threat			Facilitation to positive		
	Std. beta	$R^2$	$R^2$ change	Std. beta	$R^2$	$R^2$ change	Std. beta	$R^2$	$R^2$ change
<b>Race</b>									
Race	-0.14			0.15			-0.19		
Total APSD	-0.26			-0.07			0.14		
		0.07			0.02			0.05	
Race	0.10			0.15			-0.21		
Total APSD	0.09			-0.14			0.34		
Race × APSD	0.43			0.09			-0.25		
		0.14	0.06 <sup>a</sup>		0.03	0.00		0.07	0.02
<b>Gender</b>									
Gender	-0.02			-0.14			-0.13		
Total APSD	-0.23			0.00			0.15		
		0.06			0.02			0.03	
Gender	-0.04			-0.13			-0.14		
Total APSD	-0.12			-0.03			0.21		
Gender × APSD	-0.13			0.03			-0.07		
		0.06	0.01		0.02	0.00		0.03	0.00
<b>Aggression</b>									
Aggression	-0.13			0.00			0.17		
Total APSD	-0.14			-0.05			-0.02		
		0.06			0.00			0.02	
Aggression	0.04			-0.05			0.18		
Total APSD	-0.16			-0.04			-0.02		
Aggression × APSD	-0.40**			0.12			-0.02		
		0.20**	0.14**		0.02	0.01		0.02	0.00

APSD = Antisocial Process Screening Device (Frick & Hare, 2001). All predictors were centered using the sample mean prior to entering them into the regression analyses. <sup>a</sup> $p < 0.06$ ; \*\* $p < 0.01$ .

Because of the strong correlation between psychopathy and total aggression, the significant interaction that emerged from this last analysis was further explored to determine whether a higher order trend might better account for relations among the predictor set and criterion variable. Using the procedure recommended by Lubinski and Humphreys (1990), the addition of both the linear interaction and quadratic terms led to an incremental increase of about 5% additional variance explained in the facilitation index to distressing pictures. This pattern of results suggests that a linear interaction or higher order trend could account for the relations equally well. Thus, the more parsimonious linear interaction was interpreted. The significant interaction between psychopathy and aggression was further explored using the procedure recommended by Holmbeck (2002). In this procedure, the regression equation from the full sample is used to calculate predicted values of the dependent variable (i.e. the facilitation index to distressing pictures), at high (one SD above the mean) and low levels (one SD below the mean) of the two predictors (i.e. aggression and total psychopathy scores). *Post hoc* probing was used to determine whether the association between psychopathy and the facilitation index to distressing pictures was significant at either of the two levels of aggression by computing the simple slopes (i.e. standardized beta) and testing these for significance (Holmbeck, 2002). The results of these analyses are summarized in Figure 1. These analyses revealed very different associations between psychopathy at low and high levels of aggression. Specifically, the predicted negative association between psychopathic traits and the facilitation index to distress was significant at high levels of aggression (std. beta =  $-0.46$ ,  $p < 0.05$ ) but not at low levels (std. beta =  $0.13$ ,  $p = \text{n.s.}$ ).<sup>1</sup>

Importantly, there were no significant interactions between gender and psychopathic traits in predicting any of the facilitation indices. As indicated in Table 4, the addition of an interaction term between gender and psychopathy added less than 1% of the variance to the prediction of the facilitation indices. To illustrate this, within children above the mean on aggression, the correlation between facilitation to distress and psychopathy scores was negative for both boys and girls and, in fact, it was somewhat higher for girls ( $r = -0.58$ ) than for boys ( $r = -0.29$ ), although neither of these correlations were significant due to the small sample sizes for these analyses ( $n = 11$  for girls,  $n = 14$  for boys).

The regression analyses reported in Table 4 did not indicate the presence of any significant interactions between race and psychopathy in predicting the facilitation indices. However, the interaction between race and psychopathy for the facilitation index to distressing stimuli was fairly substantial in size for interaction effects (Aiken

<sup>1</sup>Although the low internal consistency of the APSD subscales led us to focus on the Total APSD score in the main analyses, there is some evidence that the association between psychopathy and deficits in emotional processing is largely related to the callous-unemotional dimension (Levenston et al., 2000; Loney et al., 2003). Our data were consistent with this possibility. When testing interactions between total aggression and each of the APSD scales individually, significant interactions emerged for all three subscales. However, as measured by the change in  $R^2$  resulting from the addition of the interaction term, the effect was largest for the callous unemotional dimension (change in  $R^2 = 0.194$ ;  $F(1, 46) = 11.94$ ;  $p < 0.001$ ) compared with the effects for the impulsivity (change in  $R^2 = 0.084$ ;  $F(1, 46) = 4.51$ ;  $p < 0.05$ ) and narcissism (change in  $R^2 = 0.092$ ;  $F(1, 46) = 5.11$ ;  $p < 0.05$ ) dimensions. Also, when the three interaction terms were simultaneously added to the regression analysis, the interaction between CU traits and aggression accounted for the most unique variance in predicting response to distressing stimuli (std. beta =  $-0.589$ ,  $p < 0.01$ ).

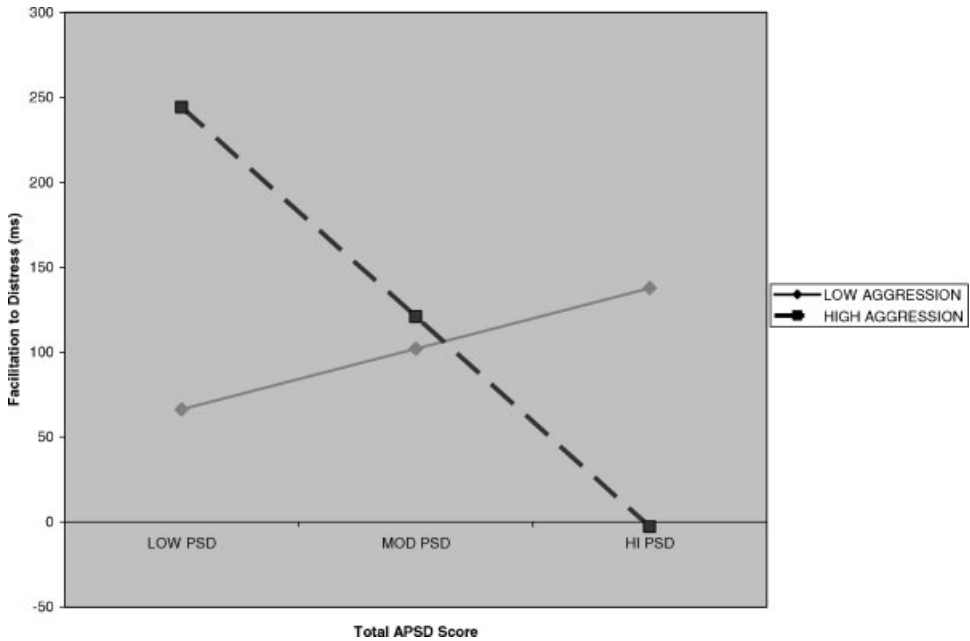


Figure 1. Interaction between Total APSD score and total aggression on a child's emotional response to distressing stimuli.

& West, 1991), accounting for 6% of the variance in the facilitation index. However, it did not reach statistical significance ( $p < 0.06$ ) due to the moderate sample size. Therefore, this interaction should be interpreted cautiously. However, a plot of this interaction revealed that the predicted decrease in facilitation to distressing stimuli as levels of psychopathy increased was evident for Caucasian children (std. beta =  $-0.45$ ,  $p < 0.05$ ) but not for minority children (std. beta =  $0.09$ ,  $p = \text{n.s.}$ ). Thus, the failure to find the predicted association between this facilitation index and psychopathic traits in the full sample appeared to be largely due to the inclusion of minority children, for whom psychopathic traits were not related to emotional deficits. As noted in Table 2, race was only weakly associated with total aggression scores ( $r = 0.06$ ;  $p < \text{n.s.}$ ). Thus, the interaction between race and psychopathy is not likely to be due to confounding relations with aggression.

## DISCUSSION

The current study examined the associations among psychopathic traits, aggression, and processing of negative emotional stimuli in a community sample of children. The strongest finding was that psychopathic traits interacted with aggression in predicting reduced responsiveness to distressing pictorial stimuli. Specifically, the predicted association between psychopathy and the processing of distressing stimuli was only found in children high on aggression. This finding could suggest that the association between psychopathy and deficits in emotional processing reported in past research may be a function of the use of antisocial samples with high rates of

aggression. However, it is also possible that, in this non-referred sample, the presence of aggression may have simply operated as a marker for the severity of psychopathic traits, as suggested by the high correlation between these dimensions in this sample. As a result, it may be only those children in this non-referred sample with high scores on measures of both aggression and psychopathic traits who would show a level of severity that is comparable to persons in more deviant samples. Consistent with this possibility, children selected from a large community screening to be high on psychopathic traits but without significant conduct problems showed a number of features consistent with the construct of psychopathy, such as a preference for thrill and adventure seeking activities and a reward dominant response style (Frick et al., 2003b).

As indicated in Figure 1, children who were highly aggressive but low on psychopathic traits showed an enhanced response to distressing pictorial stimuli, contributing to the significant interaction between aggression and psychopathic traits. Loney et al. (2003) reported similar findings in a sample of adjudicated adolescents in which antisocial youth without psychopathic traits showed enhanced reactivity to negative emotional stimuli (i.e. emotional words). Further, this finding is consistent with other studies showing that antisocial and aggressive youth who do not show psychopathic traits show high levels of emotional distress (Frick et al., 1999) and are more reactive to the distress of others in social situations (Pardini et al., 2003).

These findings support a model in which many aggressive children without psychopathic traits are postulated as having problems regulating their emotions, which can make them particularly susceptible to becoming angry and leading to aggressive acts within the context of high emotional arousal (Frick & Morris, 2004). Further, these findings support the contention that the presence or absence of psychopathic traits may designate distinct subgroups of aggressive and antisocial youth who show very different patterns of emotional reactivity. These patterns of emotional reactivity can disrupt different developmental processes (i.e. the regulation of emotion versus the development of conscience), and thus could be important for explaining diverse pathways to antisocial and aggressive behavior (Frick & Morris, 2004). Importantly, the reduced sensitivity to negative emotional stimuli found for children high on both aggression and psychopathic traits was not consistent across all types of negative emotional stimulus, supporting previous findings in adult samples (Levenston et al., 2000). Also, this finding would be consistent with many models of empathy development that emphasize the sensitivity to others' distress (Blair, 1999).

There were very similar associations among psychopathy, aggression, and emotional deficits for boys and girls, supporting past studies suggesting that the emotional deficits associated with psychopathy may generalize across males and females (Sutton et al., 2002). This finding is important in demonstrating that the abnormal emotional response to distressing stimuli, which is believed to be core to psychopathy in males, may also be important for explaining the development of psychopathic traits in females. Although gender did not play a moderating role, there was some evidence for a moderating role of ethnicity, with the association between psychopathic traits and reduced sensitivity to distressing stimuli being largely confined to Caucasian children. This finding is consistent with a growing body of research suggesting that some of the correlates to

psychopathy may not generalize across different ethnic groups (Lorenz & Newman, 2002b). Much additional research is needed to determine the reasons for these ethnic differences.

All of these interpretations need to be made in the context of a number of limitations to the study. First, there are a number of interpretive issues concerning the sample. The size of the sample was relatively small, which may have resulted in a lack of statistical power to detect a significant association between psychopathy and emotional responsivity, as well as to detect potential interactions. This lack of power may be especially important for detecting interactions with ethnicity. That is, while the sample was fairly equally divided between girls ( $n=23$ ) and boys ( $n=27$ ), the ethnic composition was less evenly distributed between Caucasian ( $n=35$ ) and minority individuals ( $n=15$ ). Also, the use of a normative sample consisting of children of college students could limit the generalizability of the findings. Second, although the dot-probe paradigm has been shown to assess attentional biases in anxious individuals who are highly reactive to emotional stimuli (Mogg & Bradley, 1999; Vasey *et al.*, 1995, 1996), it has only been used in one study to investigate the relation between emotional processing and aggressive behavior (Schippell *et al.*, 2003). Further, the dot-probe task is not a direct index of emotional responsiveness, since a number of cognitive, affective, and motoric processes are operating between the child's perception of the pictorial stimuli and his or her motoric response concerning the location of the dot (Vasey *et al.*, 1996). Therefore, differences in performance may have been due to processes other than the child's responsiveness to the emotional stimuli. Third, the visual images used in this study have not been used extensively with children (Blair, 1999; McManis *et al.*, 2001). Therefore, some of the stimuli may not be as effective as others in evoking the target emotion in children. Fourth, this is a correlational study and causal interpretations cannot be made directly from these findings. Most theoretical models focusing on the abnormalities in emotional processing exhibited by individuals with psychopathic traits have considered the emotional deficits to be a temperamental risk factor that puts a child at risk for problems in conscience development (Frick & Morris, 2004; Patrick, 1994). However, it is also plausible that the significant association between psychopathic traits and reduced responsivity to distressing stimuli may result from a desensitization process in which repeated exposure to aggressive acts leads to reduced emotional responses to the signs of distress in others (Eron, 2001).

Given these limitations, the results of the current study need to be interpreted cautiously. However, this study supports a growing body of research suggesting that the construct of psychopathy may be extended to youth and such extensions may help to delineate divergent pathways through which children develop aggressive and antisocial behaviors. This research could also clarify the important processes involved in the development of psychopathy. The results of this study support past research in suggesting that deficiencies in a person's experience of certain emotions may be a critical part of the causal process (Blair, 1999; Patrick, 2001). Determining how these deficiencies arise and how they can influence the moral development of the child are important directions for future research (Frick & Morris, 2004). Importantly, these emotional deficits seem to be equally important for boys and girls, providing a critical piece of evidence for the construct validity of

the construct of psychopathy across gender. Alternatively, our findings suggest that these deficits may not be consistent across different ethnic groups.

While we have tried to emphasize the theoretical importance of our results, this line of research could also have important implications for practice. For example, there has been great debate about the optimal methods for assessing psychopathy, that typically rely on chart reviews, clinical interviews, self-report inventories, or informant ratings, all of which have limitations (Lee et al., 2003; Murrie & Cornell, 2002). If laboratory markers of psychopathy, such as the dot-probe paradigm, can be developed that reliably and validly distinguish psychopathic individuals from others, such paradigms could be quite useful as part of a comprehensive assessment battery. Further, these findings could have important implications for developing more individualized interventions for antisocial youth. That is, most interventions for antisocial, aggressive, or delinquent youth have focused on selecting the optimal intervention across this very heterogeneous group of individuals (Frick, 2001). By defining important developmental pathways within this diverse group and by understanding the diverse developmental processes that may be contributing to the antisocial behavior across these groups, it may be possible to develop more individualized interventions that consider the unique needs of children who may have very different causal factors underlying their antisocial and aggressive behaviors (Frick, 2001).

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