Emotion Facilitation and Passive Avoidance Learning in Psychopathic Female Offenders

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EMOTION FACILITATION AND PASSIVE AVOIDANCE LEARNING IN PSYCHOPATHIC FEMALE OFFENDERS

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Research on psychopathy among incarcerated White males has consistently demonstrated deficits in emotion processing and response inhibition. Using the Psychopathy Checklist–Revised to classify participants as psychopathic or nonpsychopathic, this study examined the performance of incarcerated White females on two laboratory tasks: a lexical decision task used to assess emotion processing and a passive avoidance task used to assess response inhibition. Contrary to prediction, deficits in performance typically exhibited by psychopathic males were not exhibited by psychopathic females in this sample. Implications of these findings are discussed and an interpretation of the results in the context of the response modulation hypothesis is presented.

***Keywords*:** psychopathy; female offenders; emotion processing; passive avoidance

Psychopathic individuals are marked by a glib interpersonal style, callous lack of empathy, and impulsive, often antisocial behaviors (Cleckley, 1976; Hare, 1996; Lykken, 1995). For research purposes, these three sets of clinical characteristics are often subsumed under two domains of functioning: affective processing and behavioral regulation. Decades of research on the deficits associated with psychopathy have focused primarily on these domains, which appear central to the psychopathy construct.

Abnormalities in emotional and behavioral functioning inform our current clinical and empirical conceptualizations of the psychopathy syndrome. However, these conceptualizations were established initially and primarily using research conducted with incarcerated White males. Thus, it is an assumption that abnormalities in these domains characterize psychopathy in other populations. It has been crucial, therefore, for researchers to investigate the generalizability of these characteristics across contexts, age cohorts, cultural groups, and gender, preferably by using methodology similar to that employed in previous research with incarcerated White males. Recent attempts to generalize psychopathy across gender have adopted this approach (e.g., Jackson, Rogers, Neumann, & Lambert, 2002; Patrick, Verona, & Sullivan, 2000; Sutton, Vitale, & Newman, 2002; Vitale, Brinkley, Hiatt, & Newman, 2007; Vitale & Newman, 2001; Warren et al., 2003).

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Clinically, psychopathic males present as callous and lacking in the ability to experience a normal range and depth of emotional experience (Cleckley, 1976; Hare, 1996). Given arguments that emotion experience is fundamental to the development of morality (e.g., Nichols, 2002), emotion deficits among psychopathic individuals could relate directly to their antisocial, often violent behavior (e.g., Cima, Tonnaer, & Hauser, 2010; Cleckley, 1976). The clinical presentation of emotion dysfunction is supported in the laboratory, where psychopathic males have demonstrated deficits in both the processing and the use of emotion stimuli. Specifically, these individuals show decreased electrodermal responsivity in anticipation of an aversive event (Arnett, Howland, Smith, & Newman, 1993), reduced startle potentiation in response to fear-inducing pictures (Flor, Birbaumer, Hermann, Ziegler, & Patrick, 2002; Levenston, Patrick, Bradley, & Lang, 2000; Patrick, Bradley, & Lang, 1993; Patrick, Cuthbert, & Lang, 1994), deficits in the recognition of emotion content of faces (e.g., Hastings, Tangney, & Stuewig, 2008; Kosson, Suchy, Mayer, & Libby, 2002) and spoken words (e.g., Bagley, Abramowitz, & Kosson, 2009), and an absence of response facilitation to emotional relative to neutral words on a lexical decision task (Lorenz & Newman, 2002a; Williamson, Harpur, & Hare, 1991).

Attempts to generalize these specific abnormalities to psychopathic adult females have been somewhat successful. For example, there is good evidence that psychopathic women endorse many of the same callous, antisocial attitudes as psychopathic men (Rutherford, Cacciola, Alterman, & McKay, 1996; Vitale, Smith, Brinkley, & Newman, 2002). Furthermore, although there is some inconsistency in the literature on emotion deficits in nonincarcerated females with psychopathic traits (Isen et al., 2010; Justus & Finn, 2007), psychopathic female offenders, like psychopathic male offenders, have exhibited reduced startle potentiation using a picture viewing paradigm (Sutton et al., 2002). Psychopathic women also differ from nonpsychopathic women in patterns of brain activation exhibited during emotion picture viewing and emotion regulation (Harenski, Kim, & Hamann, 2009).

Psychopathic men are also remarkable for their seeming inability to inhibit maladaptive responding or to learn from prior experience. As Cleckley (1976) noted, the psychopathic individual "continues to show the most execrable judgment about attaining what one might presume to be his ends. . . . This exercise of execrable judgment is not particularly modified by experience, however chastening his experiences may be" (p. 345). The psychopathic male's behavioral disinhibition, which is believed to underlie his impulsive, often violent, behavior has been demonstrated in the form of poor passive avoidance (i.e., learning to avoid responding to a previously punished stimulus; e.g., Blair et al., 2004; Lykken, 1957; Newman & Kosson, 1986; Newman & Schmitt, 1998; Thornquist & Zuckerman, 1995), deficits in the ability to delay gratification (Newman, Kosson, & Patterson, 1992), and response perseveration in the face of steadily increasing punishment contingencies (Fisher & Blair, 1998; Newman, Patterson, & Kosson, 1987; O'Brien & Frick, 1996; Siegel, 1978).

Psychopathic women do show elevated rates of criminal behavior relative to nonpsychopathic women (e.g., Crawley & Martin, 2006; Hicks, Vaidyanathan, & Patrick, 2010; Nicholls, Ogloff, Brink, & Spidel, 2005; Rutherford et al., 1996; Salekin, Rogers, Ustad, & Sewell, 1998; Vitale et al., 2002), which suggests a deficit in behavioral regulation. However, laboratory evidence for behavioral inhibition deficits is less clear. In the only study designed to address response perseveration among psychopathic females, Vitale and Newman (2001) administered a response perseveration task that has reliably demonstrated differences between psychopathic and nonpsychopathic males (Newman et al., 1987). In their study,

Vitale and Newman found no evidence for response perseveration among the psychopathic females, suggesting that the deficits in behavioral inhibition exhibited by psychopathic males may not be as readily observed among psychopathic females. Similarly, in a study of passive avoidance performance among male and female adolescents with relatively high scores on the Antisocial Process Screening Device (Frick & Hare, 2001), males demonstrated the expected deficits in passive avoidance, whereas females did not (Vitale et al., 2005).

In contrast, Epstein and colleagues (Epstein, Poythress, & Brandon, 2006) found that the relation between psychopathy traits and commission errors on a go/no-go passive avoidance task were not moderated by gender, suggesting generalizability of this deficit across gender. These results are complicated, however, by several factors. First, the authors used a measure of self-report psychopathy (SRPS; Levenson, Kiehl, & Fitzpatrick, 1995) that correlates modestly, albeit significantly, with the Psychopathy Checklist–Revised (PCL-R; Hare, 2003) scores, allowing for differences in the construct being assessed (Brinkley, Schmitt, Smith, & Newman, 2001). Second, the authors used an analytic strategy that differed from previous studies, choosing to examine psychopathic traits dimensionally using hierarchical regression. Third, the authors found that using intelligence as a covariate reduced the overall association between psychopathy traits and passive avoidance errors to zero in this mixed-gender sample.

In the two studies presented here, we undertake to increase our understanding of psychopathy in women by testing for specific deficits in affective and behavioral processes previously demonstrated among psychopathic males. If the performance of psychopathic women in this sample is consistent with that of psychopathic men, we should see that psychopathic women will show significantly less response facilitation to emotion words on a lexical decision task relative to nonpsychopathic women. In addition, we should demonstrate that psychopathic women will show deficient behavior regulation in the form of poor passive avoidance on a go/no-go task.

Evidence for abnormalities in these domains would provide additional support for the cross-gender generalizability of the psychopathy construct as it is currently defined. Conversely, if the predicted deficits are not apparent, as has been the case in a limited number of emerging studies (e.g., Isen et al., 2010; Justus & Finn, 2007; Vitale & Newman, 2001; Vitale et al., 2005) it would suggest that important differences in the etiology, expression, and/or assessment of the syndrome are present across gender.

GENERAL METHOD

PARTICIPANTS

Participants were White females incarcerated at the Taycheedah Correctional Institution, a multi-security-level prison in central Wisconsin. A file prescreen was conducted to exclude individuals who were 45 or more years old, who had performed below the fourth grade level on the prison's standardized measures of reading or math achievement, or who had diagnoses of bipolar disorder or psychosis.

Individuals meeting the inclusion criteria were invited to participate in an ongoing study being conducted at the prison. All participants were presented with the elements of informed consent both orally and in writing.

PSYCHOPATHY ASSESSMENT

Psychopathy was assessed using the PCL-R (Hare, 2003). The PCL-R is composed of 20 items that tap the personality and behavioral characteristics of psychopathy. Each item is rated as 0 (*not present*), 1 (*may be present*), or 2 (*definitely present*). PCL-R scores were based on information gathered during 1-hr semistructured interviews and reviews of the inmates' prison files (including presentence investigations and conduct reports) that were conducted by trained graduate students. As reported elsewhere (Vitale et al., 2002), interrater agreement for PCL-R scores in this sample is high (.95).

Historically, scores of 30 and above have been recommended for classifying participants as psychopathic (Hare, 2003). Although this score has served as the hallmark in much experimental research, there are data suggesting that this cut score may not apply to all populations (e.g., Cooke, 1996; Cooke & Michie, 1997).

There is also evidence that this may be the case for female populations. First, the base rates for psychopathy in women using the traditional cut score are lower than in men. For example, in a sample of female methadone patients, Rutherford et al. (1996) did not find any women scoring above 30 on the PCL-R. This was not the case among male methadone patients (Alterman, Cacciola, & Rutherford, 1993). Similarly, although the base rate for psychopathy in male prison populations typically ranges from 15% to 30% (Salekin et al., 1998), among incarcerated women, the base rates have been as low as 11% (Loucks, 1995; Neary, 1990) and 9% (Vitale et al., 2001).

Second, Bolt, Hare, Vitale, and Newman (2004) compared the test characteristic curves of the PCL-R for male and female samples and found that the curve for females differed significantly from that of a male offender reference group. This difference translates to differences across gender at each level of the latent psychopathy trait. As a result, the level of the latent trait roughly equivalent to the diagnostic cutoff of 30 differs for males and females (Bolt et al., 2004).

Finally, although the PCL-R assesses much more than antisocial behavior, antisocial behavior is an important component of the instrument. For example, high scores on items such as "Juvenile Delinquency," "Criminal Versatility," and "Revocation of Conditional Release" all depend on extensive histories of criminal behavior. Although there are clearly women with such histories, rates of violent and criminal behavior are typically higher for males than females (Goldstein, Powers, McCusker, & Mundt, 1996; Zoccolillo, 1993).

Taken together, these findings suggest that a cut score based on findings in male samples may not be applicable to a female population. As a result, in the current study, we use an alternative cut score of 24, which has demonstrated utility in other studies (e.g., Vitale et al., 2007). This score is similar to the lower cut scores being used in studies of both men (e.g., Cima et al., 2010, cut score of 26) and women (e.g., Sturek, Loper, & Warren, 2008, cut score of 25) and creates percentages of psychopathic women similar to those found in male samples. Furthermore, this cut score results in larger sample sizes more likely to yield reliable estimates of performance. However, to facilitate a direct comparison across studies of males and females, means, standard deviations, analyses, and effects sizes for participants scoring 30 and higher on the PCL-R are included in both studies.

ADDITIONAL MATERIALS

Shipley Institute of Living Scale (SILS; Zachary, 1986). The SILS is a measure of intellectual functioning. It consists of a 40-item vocabulary test and a 20-item abstraction test.

The measure can be used to obtain reliable estimates of Wechsler Adult Intelligence Scales–Revised (WAIS-R) scores (Zachary, 1986). The SILS has demonstrated good psychometric properties including split-half reliabilities ranging from .84 to .92 (Zachary, 1986). In keeping with previous studies of psychopathic males, participants with borderline or lower intelligence (i.e., < 70) were excluded from the analyses.

Welsh Anxiety Scale (WAS; Welsh, 1956). The WAS is a 39-item true–false questionnaire that was derived from the Minnesota Multiphasic Personality Inventory (MMPI) to measure anxiety and negative affect. Consistent with Gray's (1991) anxiety construct, the WAS correlates approximately .66 with neuroticism and .33 with introversion. In this sample, the internal consistency of the WAS was alpha = .92. Median splits on the WAS were used to divide participants into high- and low-anxious groups.

PROCEDURE

On the 1st day of the study, a semistructured interview was conducted to aid in psychopathy assessments. Following the interview, participants completed the SILS, WAS, and SCL-90. Participants returned for two to four subsequent sessions. These sessions typically occurred 1-2 weeks apart. Each of the laboratory tasks presented here were included with two or three others tasks in 1-hr testing sessions. Participants were tested individually by a female experimenter who was blind to group membership.

STUDY 1

Research with males has demonstrated abnormalities in the lexical decision task performance of psychopathic versus nonpsychopathic individuals (Lorenz & Newman, 2002a; Steuerwald & Kosson, 2000; Williamson et al., 1991). On such tasks, which require participants to determine whether a briefly presented letter string is a word or nonword, control participants respond more quickly to emotion words relative to nonemotion words (e.g., Challis & Krane, 1988; Graves, Landis, & Goodglass, 1981; Strauss, 1983). However, psychopathic males fail to exhibit this facilitated response speed for emotional words, although they do not differ from controls in their ratings of the emotion content of the words (Lorenz & Newman, 2002a; Williamson et al., 1991).

There may be important limitations to the lexical decision finding that must be taken into account when testing the generalizability of the deficit to women, however. First, the deficit does not appear to generalize to psychopathic African American males (Lorenz & Newman, 2002b). Further, the deficit in response facilitation is also associated with antisocial personality disorder (APD) in both males and females (Lorenz & Newman, 2002c). Finally, in their initial study, Lorenz and Newman (2002a) found that the deficit was relatively specific to low-anxious psychopathic males when they were responding with their right hand, which is consistent with a growing body of research suggesting that deficient performance of psychopathic individuals may be particularly apparent on tasks that involve left hemisphere activation (e.g., Bernstein, Newman, Wallace, & Luh, 2000; Kosson, 1996).

In light of these constraints, the current study will test the hypothesis that White, low-anxious psychopathic women will not show response facilitation to emotion words relative to a comparison group of nonpsychopathic women on lexical decision trials involving

right-handed response. For completeness, data for high-anxious women, and trials involving left-handed responses, will be presented. Furthermore, given Lorenz and Newman's (2002c) finding that APD is associated with increased facilitation to emotion words among females, we will control for diagnoses of APD.

METHOD

Participants. Participants were 117 White female inmates. Participants were excluded if they had low intelligence (estimated WAIS < 70) or were left-handed (total scores on Chapman Handedness Scale ≥ 21; Chapman & Chapman, 1987). This process yielded 111 participants.[1]

Using PCL-R cut scores of 24 and 14 and a median split on the WAS yielded the following groups: 20 low-anxious controls, 10 low-anxious psychopaths, 16 high-anxious controls, and 15 high-anxious psychopaths.

Task and stimuli. The lexical decision task used in this study is identical to the one used by Lorenz and Newman (2002a, 2002b, 2002c). The stimuli in the lexical decision task consisted of 12 positive words, 12 negative words, 24 neutral words, and 48 nonwords and were grouped into four experimental blocks. Each experimental block consisted of 3 positive, 3 negative, 6 neutral, and 12 nonwords. In addition, a practice block consisted of 12 neutral words and 12 nonwords that differed from the words used for the test trials.

The positive, negative, and neutral words for the experimental trials were selected from Rubin and Friendly's (1986) word list and matched on frequency, pronounceability, length, number of letters, number of syllables, concreteness, and imagery as described by Lorenz and Newman (2002a). Changing two letters for each of the words used in the experiment resulted in the 48 pronounceable nonwords.

The stimuli were presented in a central position on a computer screen for 100 ms. The participants responded by pressing either the *D* and *F* keys (right-handed responses) or the *J* and *K* keys (left-handed responses) on a standard keyboard. Participants used their index fingers to indicate if the presented stimulus was a word and their middle finger to indicate if the presented stimulus was a nonword. The *F* and *J* keys each were covered with a small blue sticker and indicated that the presented stimulus was a word. The *D* and *K* keys each were covered with small white sticker and indicated that the presented stimulus was a nonword.

Procedures. A tester, who was blind to group membership of the participants, was in the room with the participants running the computer program and administering the questionnaires. Participants were seated in front of a computer monitor and read the following task instructions on the computer screen:

> This experiment involves focusing on a fixation point and then viewing a group of letters. Half of the time the letters will spell a word, and half of the time they will not. Your job is to press the blue dot if the letters spell a word or press the white dot if they do not spell a word. Respond as quickly as you can without making mistakes. Remember: Press the blue dot for words, the white dot for non-words. For this block, please use your right hand.

All participants began the experiment responding with their right hand and then alternated their response hand after each block. Between each block participants had a 10-s rest

TABLE 1: Bivariate Correlations Between Variables in Study 1 (n = 111)

	1	2	3	4	5
1. Emotion facilitation	1.0				
2. PCL-R	.27**	1.0			
3. WAS	–.02	.13	1.0		
4. APD	–.30**	.44**	.00	1.0	
5. IQ	–.06	–.14	–.27**	1.0	

Note. PCL-R = Psychopathy Checklist–Revised total score; WAS = Welsh Anxiety Scale total score; IQ = Shipley Institutes of Living Scale estimated Wechsler Adult Intelligence Scales–Revised IQ; APD = diagnosis of antisocial personality disorder.
**$p < .01$.

period. After the rest period, participants were instructed to prepare for the next block and were reminded of which hand to use for their responses. The four experimental blocks (A, B, C, D) were presented in the following order: A, B, C, D, B, A, D, C, so that each block was completed once with the right hand and once with the left hand. After completing the fourth block of experimental trials, the participants were given a 30-s break. The entire task lasted approximately 20 min.

RESULTS AND DISCUSSION

Correlations between variables are presented in Table 1.

Reaction time analyses used data from correct responses only. Initial analyses of overall reaction time revealed no significant effects of psychopathy level, $F(1, 60) = .081$, *ns*, or anxiety, $F(1, 60) = .017$, *ns*, and no significant Psychopathy × Anxiety interaction, $F(1, 60) = .364$, *ns*.

Psychopathy. A 2 (psychopath or control) × 2 (WAS anxious or nonanxious) × 2 (left- vs. right-hand response) × 3 (positive, neutral, and negative words) mixed-model ANCOVA was conducted, with psychopathy and anxiety as the between-participant factors and valence and hand of response as the within-participant factors. Given the results of Lorenz and Newman (2002c), diagnoses of APD were used as a covariate in all analyses.

Consistent with Lorenz and Newman (2002c), APD diagnosis was a significant predictor of emotion facilitation, $F(1, 56) = 4.49$, $p < .05$, $\eta_p^2 = .074$. There were no significant main effects or interactions for either valence or hand of response. Furthermore, there was no significant main effect for psychopathy, $F(1, 56) = 1.69$, *ns*, $\eta_p^2 = .029$ and no significant Psychopathy × Anxiety interaction, $F(1, 56) = .34$, *ns*, $\eta_p^2 = .006$.

Given the absence of an effect for valence or for hand of response, a one-way ANCOVA was used to examine emotion facilitation among low-anxious psychopathic individuals and controls, specifically. The analysis showed no effect for psychopathy, $F(1, 27) = .05$, *ns*, $d = .14$, 95% CI [–.62, .90].[2] Means and standard errors can be found in Table 2.

Supplemental analyses. Using the traditional PCL-R cut scores of 30 and 20 yielded 20 low-anxious controls (mean facilitation = 25.60, SE = 7.70) and 5 low-anxious psychopathic individuals (mean facilitation = 20.35, SE = 19.35). A one-way ANCOVA testing for differences in emotion facilitation between these groups showed no significant difference, $F(1, 24) = .05$, *ns*, $d = .13$, 95% CI [–.79, 1.17].

TABLE 2: Mean Response Facilitation for High- and Low-Anxious Psychopathic and Nonpsychopathic Participants After Covarying Diagnoses of Antisocial Personality Disorder

	Low Anxious		*High Anxious*	
	Nonpsychopathic (n = 20)	*Psychopathic (n = 10)*	*Nonpsychopathic (n = 16)*	*Psychopathic (n = 15)*
	M (SE)	*M (SE)*	*M (SE)*	*M (SE)*
Response facilitation	24.83 (7.14)	32.50 (9.96)	9.36 (7.50)	26.13 (8.12)

Overall, results from the lexical decision task failed to support the hypothesis that the emotion deficit exhibited by psychopathic males would generalize to females. Although previous research has failed to demonstrate this deficit across ethnicity (Lorenz & Newman, 2002b), the failure to demonstrate the deficit among White females is unexpected given research that demonstrates the generalizability of alternative emotion paradigms across gender (e.g., Sutton et al., 2002).

STUDY 2

Deficient behavioral inhibition in the form of poor passive avoidance is a core feature of psychopathy. Numerous studies using a variety of tasks demonstrate that male psychopathic offenders display poor passive avoidance (e.g., Arnett, Smith, & Newman, 1997; Blair et al., 2004; Lykken, 1957; Newman, Patterson, Howland, & Nichols, 1990; Newman & Schmitt, 1998; Thornquist & Zuckerman, 1995). As noted above, however, limited research with psychopathic females has failed to replicate deficits in behavioral inhibition in the laboratory (Vitale & Newman, 2001), which is consistent with research from adolescent females with severe conduct problems (Hartung, Milich, Lynam, & Martin, 2002; Moffitt, Caspi, Rutter, & Silva, 2001; Vitale et al., 2005).

In the current study, we test the generalizability of the passive avoidance deficit to psychopathic women using a passive avoidance task that has differentiated the performance of incarcerated male psychopaths and controls (Newman & Schmitt, 1998). This go/no-go discrimination task involves presenting two-digit numbers on a computer screen and requires participants to learn whether responses to particular numbers are rewarded or punished. Responding to a "bad" (i.e., punished) number instead of inhibiting a response represents a passive avoidance error (i.e., error of commission) and is typically used to measure impulsivity. In this particular task, a disinhibited *go* response bias is encouraged because individuals (a) have to respond to receive response feedback, which is necessary for discriminating between good or bad numbers and (b) are given reward feedback on the first several trials. The latter is important because research suggests that psychopathic males are more likely to exhibit disinhibited responding when they are required to alter a prepotent (i.e., dominant) *go* response set (e.g., Newman et al., 1990).

If this deficit is similar in males and females, we would predict that psychopathic females would commit significantly more passive avoidance (i.e., commission) errors than a comparison group of nonpsychopathic females.

METHOD

Participants. Participants were 220 White female offenders. The elements of informed consent were presented both orally and in written form.

After excluding participants who always or never responded, or who had low intelligence (estimated WAIS < 70), there were 204 participants remaining. Using the median score on the WAS (median = 16), we subdivided psychopathic and nonpsychopathic groups into high- and low-anxious groups, resulting in 40 low-anxious controls, 22 low-anxious psychopaths, 23 high-anxious controls, and 28 high-anxious psychopaths.

Task and stimuli. The passive avoidance task was administered with a PC computer and 14-in. monitor. Responses were recorded with an 8 × 5 × 2.5 cm button box with one push button (1.5 cm) on the top surface of the box. The task was identical to the go/no-go discrimination task used by Newman and Schmitt (1998). Participants were instructed to learn by trial and error when to respond (by pressing a button) and when not to respond. Stimuli consisted of 10 two-digit numbers (03, 15, 42, 69, 74, 21, 38, 57, 84, 96) presented in nine pseudorandomized sequences for a total of 90 test trials. Each number was presented on the monitor as white light on a dark background and measured approximately 1.8 cm high and 1.1 cm wide. The stimulus sign of the 10 stimulus numbers was counterbalanced so that the stimuli serving as S+ stimuli (i.e., go stimuli) for half of the participants (e.g., the first 5 numbers listed above) served as S– stimuli (i.e., no-go stimuli) for the other half.

Following Newman and Schmitt (1998), participants received a reward pretreatment, during which each of the S+ stimuli was presented as in the test trials. The purpose of the pretreatment was to establish a dominant response set for reward by providing a high probability of reward for responding at the beginning of the task (see also Newman et al., 1990; Siegel, 1978). Test trials began immediately after the five-trial pretreatment with no noticeable break. Throughout the pretreatment and test trials, each response resulted in visual, auditory, and monetary feedback. Following a correct response, the stimulus number was immediately replaced by the message "You WIN 10 cents!" A high-pitched tone (400 Hz) was then presented, and the experimenter gave the participant a plastic chip worth 10 cents. If the response was incorrect, the message "You LOSE 10 cents" appeared, a low tone (100 Hz) occurred, and the experimenter removed a chip. No feedback was provided in the absence of a response. The stimulus duration was 2.5 s and the intertrial interval was fixed at 1 s. Participants received 10 chips before beginning the task. A tester who was blind to participants' group membership sat next to participants to dispense and remove chips.

RESULTS AND DISCUSSION

Correlations between variables are presented in Table 3.

Performance cannot reflect learning until participants have been presented with each stimulus at least once. Thus, as in prior studies (e.g., Newman et al., 1990; Newman & Kosson, 1986; Newman & Schmitt, 1998), data for the first block of test trials were not analyzed.

To analyze errors, we conducted a 2 (psychopathic or control) × 2 (anxious or control) × 2 (passive avoidance or omission errors) mixed-model ANOVA, with psychopathy and anxiety (i.e., WAS) as the between-participant variables and type of error as the within-participant variable. Furthermore, given a significant association between IQ and passive

TABLE 3: Bivariate Correlations Between Variables in Study 2 (*n* = 204)

	1	*2*	*3*	*4*	*5*
1. Omission errors	1.0				
2. Commission errors	–.46**	1.0			
3. PCL-R	–.04	.06	1.0		
4. WAS	–.02	.05	.19**	1.0	
5. IQ	–.04	–.19**	–.19**	–.29**	1.0

Note. PCL-R = Psychopathy Checklist–Revised total score; WAS = Welsh Anxiety Scale total score; IQ = Shipley Institutes of Living Scale estimated Wechsler Adult Intelligence Scales–Revised IQ.
**$p < .01$.

TABLE 4: Mean Errors on the Passive Avoidance Task for High- and Low-Anxious Psychopathy Groups After Covarying WAIS-R Estimated Intelligence

	Low Anxious		*High Anxious*	
	Nonpsychopathic (n = 40)	*Psychopathic (n = 22)*	*Nonpsychopathic (n = 23)*	*Psychopathic (n = 28)*
	M (SE)	*M (SE)*	*M (SE)*	*M (SE)*
Omission errors	8.58 (1.26)	7.65 (1.64)	7.68 (1.60)	7.63 (1.52)
Commission errors	15.65 (1.40)	17.25 (1.81)	18.25 (1.77)	15.16 (1.68)

Note. WAIS-R = Wechsler Adult Intelligence Scales–Revised.

avoidance errors, $r(208) = –.19$, $p < .05$, WAIS-R scores were used as a covariate in all analyses. Consistent with the need to establish a dominant *go* response set when assessing failures to inhibit dominant response, the analysis revealed a significant effect for error type, $F(1, 108) = 4.34$, $p < .05$, $\eta_p^2 = .039$, with participants committing more commission (i.e., passive avoidance) errors than omission errors (see Table 4).

Contrary to the hypothesis, the results showed no significant main effect for psychopathy, $F(1, 108) = .46$, *ns*, $\eta_p^2 = .007$, and no significant Psychopathy × Anxiety interaction, $F(1, 108) = 1.25$, *ns*, $\eta_p^2 = .011$. Furthermore, planned comparisons revealed that low-anxious psychopaths did not commit more commission avoidance errors than low-anxious controls ($M = 17.25$, $SE = 1.81$ vs. $M = 15.65$, $SE = 1.40$), $t(60) = 1.06$. *ns*, $d = .18$, 95% CI [–.24, .80].[3]

Supplemental analyses. Using the traditional PCL-R cut scores of 30 and 20 yielded 76 low-anxious controls and 13 low-anxious psychopathic individuals. A planned comparison revealed no significant difference between these two groups in the number of commission errors performed ($M = 15.77$, $SE = .98$ vs. $M = 18.12$, $SE = 2.36$), $t(87) = 1.28$, *ns*, $d = .27$, 95% CI [–.21, .97].

The results of Study 2 failed to support the generalizability of a passive avoidance deficit to this sample of White psychopathic females. This is consistent with research with adolescent females (e.g., Hartung et al., 2002; Vitale et al., 2005) and suggests that the passive avoidance deficit may not be expressed by psychopathic females as it is by psychopathic males.

GENERAL DISCUSSION

Male psychopaths consistently demonstrate less emotion facilitation than controls on lexical decision tasks (Lorenz & Newman, 2002a; Williamson et al., 1991) and poor passive avoidance (e.g., Blair et al., 2004; Newman & Kosson, 1986; Newman & Schmitt, 1998; Thornquist & Zuckerman, 1995). However, the results of both Study 1 and Study 2 failed to support the generalizability of these deficits to psychopathic females. In Study 1, we used a lexical decision task to test the prediction that low-anxious, psychopathic White female prisoners would show less emotion facilitation than low-anxious White female controls. Results failed to support this hypothesis. In Study 2, we used a passive avoidance task to test the prediction that low-anxious, psychopathic White females would commit more passive avoidance errors than low-anxious White female controls. Contrary to prediction, these two groups did not differ in passive avoidance performance. Thus, the results from both studies suggest that the laboratory performance of psychopathic males does not consistently replicate in females.

Based on studies of psychopathic males, abnormalities in affective processing and behavioral regulation are considered core features of the psychopathy syndrome. Taken together with results from other studies testing response inhibition (e.g., Vitale et al., 2005; Vitale & Newman, 2001) and emotion processing (Isen et al., 2010; Justus & Finn, 2007), the present results strongly suggest that these deficits may be less apparent among psychopathic females. This is striking in light of research that demonstrates that other abnormalities in emotion processing and behavioral regulation demonstrated by psychopathic males have generalized across gender.

It is not clear how many of the prevailing models of psychopathy would account for this discrepancy. For example, "low-fear" models of psychopathy (e.g., Lykken, 1957) would suggest that psychopathic females should be as insensitive to punishment stimuli on the passive avoidance task as males. Similarly, affective deficit models that emphasize psychopathic individuals' deficits in the processing of negative emotion stimuli (e.g., Blair, Mitchell, & Blair, 2005) do not readily provide an explanation for these inconsistencies.

One potential framework for understanding these inconsistent findings is the response modulation hypothesis (RMH; Newman, 1998). A key component of the RMH concerns the distinction between a person's dominant response set (i.e., focus of selective attention) and secondary cues that are potentially relevant to the dominant response set. According to the RMH, many of the behavioral and emotional abnormalities demonstrated by psychopathic individuals stem from a deficit in these individuals' ability to allocate sufficient attentional capacity to secondary cues that would otherwise suggest more adaptive evaluations and/or responses. This failure to devote sufficient attention to potentially important contextual information is referred to as a deficit in response modulation (e.g., Newman & Wallace, 1993).

Importantly, previous research with male psychopaths has demonstrated adequate responsivity to secondary cues when the importance of processing these cues is made salient from the outset of the task and when the participants are given sufficient time to process the relevant information (Arnett et al., 1993; Newman et al., 1990). For example, psychopathic males performed normally in a punishment-only condition of the passive avoidance task (Newman & Kosson, 1986), potentially because avoiding punishment cues was part of the psychopaths' dominant set. This interpretation is supported by Newman et al. (1990), who

predicted and found that psychopaths performed normally on a passive avoidance task when they were required to attend to both reward and punishment cues from task onset.

In both tasks used here, abnormal responding is viewed as the result of insensitivity to secondary cues of the type described by the RMH. In the lexical decision task, the secondary information is the affective content of the word, whereas in the passive avoidance task, the secondary information is the punishment following responses to a "bad" number. On this basis, the RMH provides a framework for examining gender differences in psychopathy and the inconsistent results in the literature. Specifically, in the context of the RMH, it might be hypothesized that gender differences across tasks are the result of gender differences in the tendency to allocate attention to threat and other emotion-related cues in the environment. If women in general attend to threat and emotion differently than men, psychopathic women may profit from this information in a way that psychopathic men cannot.

Although the literature on gender differences is complicated, this formulation has some support. For example, women and men with high anxiety sensitivity show differences in their perceptions of threatening stimuli, with females demonstrating greater responsivity to physical threat words than males (Stewart, Conrod, Gignac, & Pihl, 1998). Gender also may play a role in the relation between attentional bias toward threat stimuli and experience of anxiety symptoms. Nay, Thorpe, Roberson-Nay, Hecker, and Sigmon (2004) found that the attentional bias toward threat was a stronger predictor of anxiety symptomotology among their female participants than among their male participants, suggesting some difference across gender in the perception and response to threat cues.

Additionally, Eisenberg and her colleagues (Eisenberg, Fabes, Schaller, & Miller, 1989) have concluded that differences in facial and self-report indexes of emotion indicate "greater responsivity" for females, suggesting that women may be more reactive to threatening or emotionally relevant information than men. Finally, in a study of personality in 37 countries, Lynn and Martin (1997) found that women had lower extraversion scores than men (although see Feingold, 1994), whereas women consistently have higher neuroticism scores than men (Lynn & Martin, 1997; Martin & Kirkcaldy, 1998). This may provide support for the idea that women are more sensitive to punishment cues than men. Additional research also suggests that in addition to differences in the perception of threat cues across gender, males and females may differ in their responses to these cues. That is, although men may be less generally responsive to these cues, when they do respond, they do so through action. Women, although generally more sensitive to these cues, may be more likely to respond by attempting to understand the predictability of events through reflection (Mineka & Kihlstrom, 1978; Patterson & Newman, 1993). Thus, differences in responsivity to secondary cues may be augmented further by gender differences in the tendency to engage in behavioral inhibition.

Consistent with this, research has found that adolescent boys have elevated rates of externalizing disorders whereas girls have higher rates of internalizing disorders (Cauce et al., 2000; Gjerde, Block, & Block, 1988). Similarly, relative to adult men, adult women are 2 to 3 times more likely to have panic disorder, are 3 times more likely to experience dysthymia, and have twice as many episodes of major depression (American Psychiatric Association [APA], 1994). Males are more likely than females to be diagnosed with conduct disorder, their rates of attention deficit hyperactivity disorder range from 4 to 9 times greater than females, and the prevalence for a diagnosis of APD is 3% in males compared to 1% in females (APA, 1994). Even among adolescents with psychopathic traits, there is evidence

that although parents report deficient affective empathy for males, they do not report a similar deficit for females (Dadds et al., 2009), suggesting heightened experiencing and processing of emotion in females with psychopathic traits relative to males with these traits.

Gender differences in behavioral inhibition have also been observed in laboratory settings. Fillmore and Weafer (2004) found that under a moderate dose of alcohol, male participants were significantly less able to inhibit a prepotent response than female participants on a go/no-go task. This difference in behavioral inhibition has also been demonstrated among males and females with externalizing problems, with males appearing less able to inhibit responding than females (Hartung et al., 2002; Moffitt et al., 2001). Taken together, this research suggests that males and females may differ in their response biases and sensitivity to threatening and affective cues.

The results of the lexical decision and passive avoidance tasks could be explained on the basis of such differences. On the lexical decision task, it is assumed that a word will activate semantic, phonological, orthographic and other word-related networks (Plaut, 1997; Seidenberg & McClelland, 1989), whereas an emotion word activates an emotion-related network (Balota & Chumbley, 1984; Bower, 1981). If the emotion facilitation demonstrated by controls on the lexical decision task reflects the combined activation of both the word-related and emotion-related networks, the gender difference found among psychopathic individuals may be better understood as a difference in the activation of the emotion-related network across gender. That is, because emotion-relevant information may more easily be perceived by the female participants than the male participants, the psychopathic female benefits from the relatively stronger and faster activation of this network compared to psychopathic males.

On the passive avoidance task, psychopathic males show increased passive avoidance errors relative to controls when rewards and punishments are given. According to the current formulation, this is because their attentional capacity is dedicated to an approach–reward set established by the prepotent *go* response. As a result, the secondary punishment cues are not as easily perceived by these psychopathic males.

In the current study, low-anxious psychopathic females did not show this same pattern of responding. Potentially, as a result of gender differences in sensitivity to punishment and threat, the dominant set of a female psychopath includes both reward and punishment cues. Reward cues are made particularly salient by the reward pretreatment. Punishment cues, on the other hand, may be salient because of a female sensitivity to punishment cues. With both types of cues included in their dominant set, dedicating all their capacity to this set does not prevent the perception and use of any task-relevant cue. Thus, psychopathic females perform normally on the task.

The current study is not without important limitations. Foremost among these is the difficulty inherent in interpreting null effects. Furthermore, the sample sizes in the current study are relatively small, leaving room for the possibility that low power, among other possible factors, might account for the absence of significant effects. These data are not entirely inconsistent with emerging research on psychopathy in women, however, and as we attempt to elucidate the differences in psychopathy across gender, it is important to report and to consider failures of replication. To do otherwise will skew our perception in such a way that psychopathy in females could begin to appear more similar to the syndrome in males than it actually is.

It is also necessary to consider the role of anxiety in these data. Increasingly, researchers are focused on the longstanding distinction between "primary" and "secondary" psychopathy (e.g., Karpman, 1941; Lykken, 1957; Widom, 1976). More recent analyses have revealed important differences in the relations between these subtypes of antisociality and behavioral, personality, and emotion correlates (Hicks et al., 2010; Hicks, Markon, Patrick, Krueger, & Newman, 2004; Skeem, Johansson, Andershed, Kerr, & Eno Louden, 2007). Specifically, whereas primary psychopaths are typically characterized by deficits in affective experience and a glib, callous interpersonal style, secondary psychopathy is associated with impulsivity, substance use, and high levels of negative emotionality, including anxiety.

Among nonpsychopathic individuals, anxiety has been related to dysregulated behavior (e.g., Bagby et al., 2007; Cooper, Agocha, & Sheldon, 2000; Myrseth, Pallesen, Molde, Johnsen, & Lorvik, 2009; Wallace, Bachorowski, & Newman, 1991), and it has been suggested that the impulsive, violent behavior of some antisocial individuals may result from a hypersensitivity to emotion cues (Blackburn & Lee-Evans, 1985; Lorenz & Newman, 2002c). The current data are consistent with this. For example, in the passive avoidance task, high-anxious controls committed a greater number of commission errors than low-anxious controls (M = 18.25 vs. M = 15.65, respectively).

Given these associations, it is necessary to account for anxiety in studies of primary psychopathy. For that reason, in this study, the focus was exclusively on low-anxious participants. However, gender differences in anxiety are evidence for gender differences in emotion processing. Thus, future research should consider how these differences may interact with other factors to influence the task performance of psychopathic females relative to psychopathic males.

The gender differences in emotion processing discussed here also have direct relevance to theories of psychopathy beyond the RMH. This is particularly true of existing, emotion-based models of psychopathy. Gender, among other factors, has been implicated in differences in emotion processing at the neuronal level (Hamann & Canli, 2004). If psychopathy is primarily a deficit in emotion processing, gender differences in these processes should result in differences across psychopathic males and females. Thus, although gender differences in emotion can be used to inform our understanding of psychopathy according to the RMH, these same differences will likely play an important role for other theories of psychopathy, as well.

Research has established the reliability and utility of PCL-R assessments in female offenders, but it has also revealed inconsistencies in the laboratory performance of psychopathic males and females. Clarifying these inconsistencies is likely to require a more theoretically sophisticated view of the psychopath's processing limitations. Toward this end, we have provided an explanation rooted in the specifications of the RMH and the ways that gender may interact with these specifications. Although clearly speculative at this point, this response-modulation-based formulation provides a means not only to reconcile the seemingly inconsistent results in the field but also to suggest new research hypotheses that could considerably expand our understanding of psychopathy in women and men.

NOTES

1. Data on the association between antisocial personality disorder (APD) and lexical decision facilitation for 95 of these participants are presented separately by Lorenz and Newman (2002c). Psychopathy was used as a covariate in that study; its individual association with lexical decision performance was not reported.

2. For completeness, we conducted a series of regression analyses using the Psychopathy Checklist–Revised (PCL-R) dimensionally, as well as using the four facets of the PCL-R (e.g., Bolt, Hare, Vitale, & Newman, 2004). As in the categorical analyses, with IQ entered as a covariate, there was no significant main effect of psychopathy on passive avoidance errors ($\beta = .12$, *ns*) and no significant Psychopathy × Anxiety interaction ($\beta = -.26$, *ns*). Similarly, there were no significant effects for any of the facet scores.

3. A series of regression analyses were conducted for emotion facilitation using the PCL-R dimensionally, as well as using the four facets of the PCL-R. As in the categorical analyses, with APD entered as a covariate, there was no significant main effect for psychopathy on emotion facilitation ($\beta = .10$, *ns*) and no significant Psychopathy × Anxiety interaction ($\beta = .41$, *ns*). Similarly, there were no significant effects for any of the facet scores.

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