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Self-reported attentional control differentiates the major factors of psychopathy

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ABSTRACT

The dual-deficit model identifies unique correlates of the two major factors associated with psychopathy (Patrick, 2007). Factor 1 is associated with deficits in amygdala-mediated emotion, while Factor 2 is related to deficits in higher-order cognitive processes. Research suggests that attention to environmental and contextual cues is critical for emotion and cognition (Ochsner & Gross, 2005). Therefore, and by extension, attention may also be important to deficits in both Factor 1 and Factor 2. The present study utilizes a sample of male prisoners in order to examine the relationship between self-reported attentional control (Derryberry & Reed, 2002) and the major factors of psychopathy, as assessed by three different methods. Across all three measures, Factor 1 is associated with superior attentional control, whereas Factor 2 is related to inferior attentional control. Furthermore, results provide support for the external validity of three commonly used methods for assessing psychopathy. We propose that anomalous attentional control may contribute to both major symptom clusters associated with psychopathy.

1. Introduction

Psychopathy is a disorder that is associated with unconstrained "antisocial impulses" (Lykken, 2006, p. 7), but is distinguished from other antisocial syndromes by an interpersonal style that includes glibness, superficial charm, and shallow affect (Cleckley, 1976). When studying the psychological processes that contribute to psychopathy, some investigators advocate parsing psychopathy into these two components so that the unique correlates of these dimensions or factors of psychopathy may be identified (Patrick, 2007).

Such dual-deficit models are predicated on the two-factor model of Hare's Psychopathy Checklist-Revised (PCL-R; Hare, Harpur, & Hakstian, 1990).[1] Here, Factor 1 reflects the interpersonal (charm, grandiosity, and deceitfulness/conning) and affective (lack of remorse, empathy, and emotional depth) features of psychopathy. Alternatively, Factor 2 describes the impulsive and chronic antisocial tendencies associated with psychopathy. According to the dual-deficit model, Factor 1 and Factor 2 are etiologically distinct.

It is suggested that the interpersonal and affective symptoms of psychopathy (i.e., PCL-R Factor 1) correspond to an amygdala-related deficit in emotion processing (Kiehl, Smith, Hare, et al., 2001; Patrick, 2007). For Patrick (2007), for instance, Factor 1 is associated with a weak defensive system that reduces behavioral and physiological reactions to threat cues directly. Consistent with this view, PCL-R Factor 1 is negatively correlated with startle potentiation during affectively negative as opposed to neutral pictures; and, negatively correlated with trait anxiety (Patrick, 2007; cf. Schmitt & Newman, 1999).

The impulsive and antisocial symptoms of psychopathy (i.e., PCL-R Factor 2), however, have been attributed to a deficit in executive control that undermines inhibition of behavior (Patrick, 1994). For Patrick (2007), the impulsive and antisocial behaviors associated with Factor 2 reflect a deficit in higher-order processes that interferes with one's focus on threat cues, precludes activation of the defensive system, undermines inhibition of approach behavior, and indirectly results in weak defensive system functioning. In support of this model, Patrick and colleagues cite laboratory studies on externalizing disorders and the effects of alcohol which appear to provide evidence of weak cognitive control (Curtin & Fairchild, 2003, see also Patrick, 1994). Additionally, in contrast to Factor 1, Factor 2 is positively associated with trait anxiety (Patrick, 2007). Thus, the dual-deficit model suggests distinct etiologies and divergent external correlates for Factor 1 and Factor 2; with Factor 1 symptoms attributed to an emotion deficit and Factor 2 symptoms attributed to deficient higher-order cognitive processes, such as cognitive control.

A critical part of successful cognitive control is attention to the environment and use of contextual cues (Ochsner & Gross, 2005). This suggests that when examining cognitive control, it is essential to understand other cognitive processes, like attention, that may

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[1] Factor analytic studies of the PCL-R have also provided evidence for 3-factor and 4-factor models (e.g. Hall, Benning, & Patrick, 2004; Williams, Paulhus, & Hare, 2007, respectively). However, most of the available data regarding the discriminant and external validity of the PCL-R pertains to the factors of the original two-factor model.

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contribute to or interact with the functioning of this higher-order cognitive process. More specifically, attentional control, a process that is related to the ability to focus and shift attention may be understood as a crucial component of cognitive control (Weissman, Mangun, & Woldorff, 2002). Furthermore, since, Factor 2 is associated with cognitive deficits whereas Factor 1 is not, the Factors should be associated differentially with attentional control. Specifically, the information processing deficits associated with Factor 2 are likely to engender problems with attentional control. Conversely, the dual-deficit model makes no clear prediction about attentional control for Factor 1, as the core problem involves an emotion deficit.

In this study, we use the attention control scale (ACS, Derryberry & Reed, 2002) to evaluate the quality of attention processing associated with Factors 1 and 2, respectively. The ACS is a 20-item self-report questionnaire that taps an individual's ability to focus and shift attention. Based on existing research, we predict that (1) Factor 2 of psychopathy will be associated with inferior attentional control and (2) Factor 1 will be uncorrelated with attentional control. Additionally, we will evaluate the consistency of the finding across three widely used measures of psychopathy: the Psychopathy Checklist-Revised (Hare, 2003), the Psychopathic Personality Inventory-Short (Lilienfeld & Andrews, 1996) and the Multidimensional Personality Questionnaire-Brief (Patrick, Curtin, & Tellegen, 2002). Although all three methods have been used to study Factor 1 and Factor 2 traits, it remains to be seen whether these alternative measures correspond to the same psychobiological processes (see Neumann, Malterer, & Newman, 2008). Finally, because Factor 1 and Factor 2 are differentially associated with trait anxiety and trait anxiety is correlated with attention control (Derryberry & Reed, 2002), we explore the potential confounding effects of anxiety.

2. Method

2.1. Subjects

Participants were male offenders from a maximum security prison in Southern Wisconsin. The number of respondents varied depending on which psychopathy measure was used. For the Psychopathy Checklist-Revised there were 551 participants, for the Psychopathic Personality Inventory-Short Form there were 473 participants, and for the Multidimensional Personality Questionnaire-Brief there were 769 participants. Participants were excluded if they met any of several conditions. First, participants who were 46 or older were eliminated because the expression of psychopathy has been found to change with advancing age (Hare et al., 1990). Second, in order to ensure that participants had the intellectual aptitude to complete self-report measures and laboratory tasks, we excluded those with scores below 70 on an estimated IQ questionnaire. Third, we disqualified individuals with clinical diagnoses of schizophrenia, bipolar disorder, or psychosis NOS, or who were currently using psychotropic medications because such features have been considered as incompatible with a diagnosis of psychopathy (Cleckley, 1976; Hart & Hare, 1989). Given these exclusion criteria, the sample is not a random prison sample.

2.2. Measures

2.2.1. Attention control scale (ACS; Derryberry & Reed, 2002)

The ACS is a 20-item self-report questionnaire that measures the ability to focus (e.g., "When concentrating, I can focus my attention so that I become unaware of what's going on in the room around me") and shift (e.g. "I can quickly switch from one task to another") attention when necessary. Participants rated each item on a 4-item Likert scale (1 = almost never to 4 = always). Evidence for the reliability and validity of the ACS may be found in Derryberry and Reed (2002).

2.2.2. Psychopathy Checklist-Revised (PCL-R; Hare, 2003)

All participants were assessed using file information and a semi-structured interview that lasted approximately 60 min. The PCL-R contains 20-items that are rated 0, 1, or 2 according to the degree to which a characteristic is present: significantly (2), moderately (1), or not at all (0). Early work with the PCL-R revealed a replicable two-factor structure (Hare et al., 1990) with Factor 1 items assessing interpersonal–affective characteristics (e.g., glib, callous) and Factor 2 items relating to impulsive–antisocial behavior (e.g., irresponsible, criminality). The reliability and validity of the PCL-R is well established (see Hare, 2003; Hare et al., 1990).

2.2.3. Psychopathic Personality Inventory-Short Form (PPI-S; Lilienfeld & Andrews, 1996)

The PPI-S is a 56-item self-report questionnaire that includes eight subscales which independently assess Factor 1 and Factor 2. Social Potency, Coldheartedness, Fearlessness, Impulsive Nonconformity, and Stress Immunity comprise Factor 1, whereas Machiavellian Egocentricity, Blame Externalization, and Carefree Nonplanfulness items comprise Factor 2. The PPI shows good convergent validity with other self-report measures of psychopathy (Lilienfeld & Andrews, 1996).

2.2.4. Multidimensional Personality Questionnaire-Brief (MPQ-B; Patrick et al., 2002)

The MPQ-B is a 155 item self-report questionnaire that consists of 11 primary trait scales The Fearless Dominance (FD) and Impulsive Antisociality (IA) dimensions of psychopathy are calculated as linear combinations of specific standardized (i.e., z-scored) MPQ-B primary trait scales. Specifically, Fearless Dominance is calculated as (0.34 * zSocial Potency) + (−0.42 * zStress Reaction) + (−0.21 * zHarm Avoidance). Impulsive Antisociality is calculated as (0.16 * zAggression) + (0.31 * zAlienation) + (−0.13 * zTraditionalism) + (−0.29 * zControl) + (−0.15 * zSocial Closeness) (Benning, Patrick, Hicks, Blonigen, & Krueger, 2003). Prior research suggests that in prisoners, Fearless Dominance is selectively related to Factor 1 and Impulsive Antisociality is preferentially associated with Factor 2 of the PCL-R. The MPQ-B has shown good internal consistency and validity (see Patrick et al., 2002).

3. Results

3.1. Descriptive statistics and correlations

Table 1 reports the means and standard deviations of scores for the two PCL-R, PPI-S, and MPQ-B Factors and the ACS as well as the correlations among the measures.[2] The bivariate correlations reveal positive and significant correlations for all Factor 1 scales with ACS scores. Additionally, across all measures, Factor 2 scales are negatively and significantly correlated with ACS scores.

3.2. Regressions

We used multiple regression analyses to examine how well Factor 1 and Factor 2 predict attentional control while controlling for the effects of the alternative Factor from the same instrument. The unique variance of PCL-R Factor 1, PPI Factor 1, and FD were found

[2] Preliminary analyses indicated that the effects of the Factors on ACS scores were comparable across race. Adding race as a factor in the regression made no difference. Therefore, a decision was made to collapse across race.

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Table 1
Correlation matrix for PCL-R factors, PPI Factors, MPQ-B Factors, and ACS in the total sample ($n = 842$).

	1	2	3	4	5	6	7
1. PCL-R Factor 1 (interpersonal–affective)	–						
2. PCL-R Factor 2 (impulsive–antisocial)	.44**	–					
3. PPI Factor 1	.11*	.08	–				
4. PPI Factor 2	.16**	.41**	−.15**	–			
5. Fearless Dominance	.25**	.17**	.67**	−.06	–		
6. Impulsive Antisociality	.16**	.37**	−.14**	.70**	−.20**	–	
7. Attentional Control Scale	.12**	−.10*	.48**	−.41**	.41**	−.34**	–
Mean	8.07	11.38	.02	.002	0.00	0.00	54.78
SD	3.22	3.13	.68	.60	.59	.65	9.48
N	551	551	473	473	769	769	842

* $p < .05$.
** $p < .01$.

to be significant predictors of attentional control ($r_{partial.PCL\text{-}R} = .18$; $r_{partial.PPI\text{-}S} = .46$; $r_{partial.MPQ\text{-}B} = .37$, respectively). Furthermore, the unique variance of PCL-R Factor 2, PPI Factor 2, and IA also significantly predicted attentional control ($r_{partial.PCL\text{-}R} = -.17$; $r_{partial.PPI\text{-}S} = -.39$; $r_{partial.MPQ\text{-}B} = -.29$, respectively).

3.3. Supplementary analysis: anxiety

This study has provided unambiguous evidence that Factor 1 is associated with superior attentional control, whereas Factor 2 is associated with inferior attentional control. Of concern, however, Derryberry and Reed (2002) reported that attentional control is strongly related to trait anxiety and there is also evidence that trait anxiety relates to Factors 1 and 2 in opposite ways (Patrick, 1994). Such findings raise the possibility that anxiety, rather than attentional processes per se, may be mediating the association between attentional control and the psychopathy-related factors. Thus, we repeated the above analyses after partialling the effects of anxiety as measured by the Welsh anxiety scale (WAS; Welsh, 1956). WAS was strongly related to attention control and partially mediated the association between the attention control and the factors in all three sets of analyses. Despite these effects, all findings reported above remained significant (see Table 2).

Table 2
Hierarchical regression of attentional control.

	Unstandardized beta	*t*	*p*-value	$r_{partial}$
Welsh, PCL-R, and ACS (n = 550)				
Model 1				
Welsh	−.59	−15.84	<.001	−.56
Model 2				
Welsh	−.57	−15.45	<.001	−.55
Factor 1	.44	3.84	<.001	.16
Factor 2	−.29	−3.53	<.001	−.11
Welsh, PPI-S, and ACS (n = 472)				
Model 1				
Welsh	−.61	−15.28	<.001	−.58
Model 2				
Welsh	−.36	−7.05	<.001	−.31
Factor 1	3.97	6.94	<.001	.31
Factor 2	−2.75	−4.07	<.001	−.19
Welsh, MPQ-B, and ACS (n = 651)				
Model 1				
Welsh	−.58	−16.91	<.001	−.55
Model 2				
Welsh	−.43	−9.85	<.001	−.32
FD	3.35	5.82	<.001	.41
IA	−1.48	−2.75	=.006	−.11

4. Discussion

Across all three measures, the results of this study indicate that the two factors reflect differing attentional profiles. First, based on the dual-deficit model that relates Factor 2 to inferior executive control (e.g., Patrick, 2007), we predicted that Factor 2 would be associated with lower ACS scores. This hypothesis received clear and consistent support.

Contrary to expectation, Factor 1 was associated with superior attentional control. This finding suggests that Factor 1 is associated with a tendency to report superior focus and less shifting of attention to secondary stimuli. This finding appears inconsistent with the dual-deficit model which distinguishes between Factor 1 and Factor 2 by positing emotion deficits for the former and cognitive deficits for the latter. In light of the observed association between Factor 1 and superior self-reported attention control, it is relevant to ask whether Factor 1 is also associated with important individual differences in attention that might modulate encoding of emotion stimuli (Vuilleumier & Driver, 2007). Alternatively, the superior attention control associated with high Factor 1 individuals may be secondary to reduced emotional reactivity or distractibility (e.g., MacCoon, Wallace, & Newman, 2004).

In light of the superior attention control reported by high Factor 1 participants, it is relevant to consider the response modulation theory of psychopathy (MacCoon et al., 2004; Newman & Lorenz, 2003). Although the response modulation deficit was originally proposed as a psychological mechanism for processing deficits associated with the unitary construct of psychopathy (e.g., Patterson & Newman, 1993 examine primary psychopathy), there is increasing evidence that the postulated attentional effects are related to the unique variance associated with the Factors as well as to the more general syndrome. This theory holds that the inhibitory and affective deficits associated with psychopathy reflect a failure to allocate attention to such information rather than a core inhibitory or affective deficit. According to the response modulation model, psychopathic offenders are less likely to suspend an established focus of attention to process peripheral information. Consequently, they are less responsive to affective, inhibitory, and even motivationally-neutral information unless it is an integral aspect of their pre-potent focus of attention. Though this insensitivity to peripheral information is associated with inhibitory deficits, paradoxically a deficit in response modulation may be associated with superior attention control because it entails less responsivity to peripheral information once a person is engaged in goal-directed behavior (see Hiatt & Newman, 2007; Hiatt, Schmitt, & Newman, 2004).

A recent study by Dvorak-Bertsch, Curtin, Rubinstein, and Newman (2009) provides evidence that the superior selective

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attention of psychopathic individuals may relate specifically to Factor 1 scores. The authors assessed undergraduates using a measure of Fearless Dominance (the MPQ-B proxy for PCL-R Factor 1; see Benning, Patrick, Salekin, & Leistico, 2005) and then measured fear-potentiated startle (FPS) as participants performed a task under three conditions that placed different demands on attention and working memory. When participants were instructed to respond based on the threat-relevant aspect of the stimuli, Fearless Dominance was not associated with reduced FPS. However, when participants were instructed to respond to a threat-irrelevant aspect of the stimuli so that the emotion cues became secondary to the primary task, high Fearless Dominance individuals displayed a significant drop in FPS from the condition in which they had to focus on the emotion cue. Thus, Fearless Dominance was not associated with weak emotion processing per se. Additionally, as predicted by the response modulation model, attentional focus was found to moderate the effect of Fearless Dominance on emotion processing. In light of the dual-deficit model, the authors also predicted that Impulsive Antisociality, related to Factor 2 of the PCL-R (see Benning et al., 2005), would be associated with weak fear responses, specifically under conditions of high cognitive load. However, Dvorak-Bertsch et al. found no support for this prediction or evidence of a fear deficit in any of the conditions.

Related to findings reported by Dvorak-Bertsch et al. (2009), Malterer, Glass, and Newman (2008) found that PCL-R Factor 1 was associated with a facility for ignoring emotion-related information as assessed by a self-report measure of emotional intelligence. Conversely, individuals with high Factor 2 scores reported problems shifting attention away from a dominant emotional state in order to regulate their mood. Overall, these data appear to indicate that PCL-R Factor 1 is associated with a tendency to ignore distracting information, whereas PCL-R Factor 2 involves an inability to adopt an alternative perspective once attention is focused. The authors interpret their findings as an indication of deficient response modulation. Though, the authors also noted that it was difficult to distinguish this possibility from the mechanism postulated by Patrick, Hicks, Krueger, and Lang (2005).

In light of evidence from previous research and in conjunction with the current study an attentional mechanism may be associated with the affective and inhibition problems related to Factor 1 and Factor 2, respectively. Although the response modulation model has been used to explain both the affective and inhibitory symptoms associated with psychopathy (Newman & Lorenz, 2003), the model does not yield a priori hypotheses regarding the psychopathy Factors. In contrast to dual-deficit models of psychopathy (e.g., Patrick, 2007), the response modulation model posits a single (i.e., unitary) processing deficit. Thus, the current speculation regarding its potential implications for the attention control correlates of Factor 1 and Factor 2 are necessarily post-hoc. However, to the extent that the goal of the dual-deficit model is to clarify the distinct correlates of the psychopathy Factors, the response modulation model may be useful for specifying important attentional processes that distinguish the factors. In this respect, these models may be complementary. Future research is needed to determine whether deficient response modulation may contribute to one, both, or neither of the dual-deficits identified by Patrick (2007).

The reverse association of Factor 1 and Factor 2 to attentional control is notable and may be crucial for understanding these symptom clusters. Previous research on the ACS has revealed a strong association with measures of anxiety (Derryberry & Reed, 2002) and anxiety has been found to discriminate between Factors 1 and 2 (Hicks & Patrick, 2006). Thus, it seemed possible that anxiety rather than attention control was mediating these opposing associations. However, as demonstrated in our supplementary analyses, the association between the psychopathy-related factors and attention control remained significant, even after controlling for trait anxiety as measured by the Welsh anxiety scale. This increases confidence that the differential associations obtained in this study do, in fact, reflect meaningful differences in attentional control.

Another goal of this research was to evaluate the external validity of three commonly used measures for assessing psychopathy. We found the same pattern of results for all three different measures of the psychopathy-related factors. Regardless of whether the factors were characterized using the PCL-R, the PPI-S, or the MPQ-B, in all cases Factor 1 was associated with greater attention control whereas Factor 2 was associated with weaker attention control. Increasingly, investigators are using alternative measures of the psychopathy-related factors to investigate etiologically-relevant correlates of these dimensions. However, it seems important to evaluate rather than assume the equivalence of these alternative measures in order to clarify the domains in which they are actually tapping similar underlying constructs. This study provides preliminary evidence that three widely used measures of the psychopathy factors identify the same distinct associations with self-reported attentional control.

This study provides new evidence that attention-related processes play an important role in psychopathy and that the importance of these processes for the interpersonal/affective versus impulsive/antisocial components of psychopathy may differ. The dual-deficit models elaborated by Fowles and Dindo (2006) and Patrick (2007) make no specific predictions concerning attentional control for Factor 1 but suggest that Factor 2 traits may be associated with relatively poor attentional control. On the other hand, the response modulation hypothesis holds that psychopathy may be associated with superior attention control and there is evidence that this association may relate specifically to Factor 1 traits. The weak attention control associated with high Factor 2 scores is less easily explained by a deficit in response modulation. The response modulation deficits of psychopathic individuals have been related to poor inhibition of pre-potent responses (e.g., Newman & Kosson, 1986), but presumably this is because psychopathic individuals are less sensitive to the cues that initiate self-regulation (Patterson & Newman, 1993). However, it is possible that some individuals interpret the difficulty inhibiting pre-potent behavioral and emotion responses as deficits in attention control. And, that this tendency may explain the association between Factor 2 and self-reported attention control deficits.

Additional research is needed to verify the attentional control profiles observed in this study using experimental methods, particularly because the current findings are restricted to self-report measures. Although the ACS has been linked to attentional processes in a number of ways (e.g., sustained attention), we did not actually manipulate or measure attention directly in this study. Thus, our findings are only as accurate as participants' perceptions of their own attentional processes. In addition, the generally higher correlations of attention control with the self-report psychopathy scales, versus the PCL-R (see Table 1), may relate to shared method (i.e., self-report) variance. Additional research is also needed to evaluate the proposal that a single processing deficit involving response modulation can account for the divergent attention profiles associated with Factors 1 and 2.

In this study, we examined the relationship between attentional control and the two major factors of psychopathy. We found that Factor 1 and Factor 2 were differentially associated with self-reported attentional control. This supports the view that Factor 1 and Factor 2 tap distinct functions and may have unique effects on behavior. Although Factor 1 and Factor 2 are associated with separate etiological mechanisms, the present findings suggest that attention control may contribute to the symptoms associated with both Factors. Furthermore, the differential association of Factor 1

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and Factor 2 with attention control provides a meaningful target for clinical intervention and; highlights the potential importance of distinguishing diverse attentional processes when treating Factor 1 versus Factor 2 symptoms. However, further research is needed to (a) determine whether the divergent attention profiles of the two Factors correspond to the overall unitary attentional style associated with psychopathy and (b) clarify the contributions of attentional control to the self-regulatory and affective deficits that define psychopathy.

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