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Throwing more light on the dark side of psychopathy: An extension of previous findings for the revised Reinforcement Sensitivity Theory

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ABSTRACT

Despite previous studies of psychopathy and the motivational systems of the Reinforcement Sensitivity Theory (RST) of personality, few have examined psychopathy in light of the revised RST model. In a large sample ($N = 779$) of young adults, we expand on Hughes, Moore, Morris, and Corr's (2012) preliminary findings relating primary/secondary psychopathy to revised RST's three systems: Flight-Flight-Freeze System (FFFS), Behavioral Inhibition System (BIS), and Behavioral Approach System (BAS). Converging results between Hughes et al. and the current study emphasize three major findings: (1) primary psychopathy is negatively related to the BIS as well as the FFFS; (2) primary psychopathy is positively related to goal-driven behavior of the BAS; and, (3) secondary psychopathy is positively related to impulsivity reflected in the BAS. The FFFS was incrementally predictive of primary but not secondary psychopathy. No evidence for a BAS × BIS interaction in psychopathy was found. Results are discussed in terms of future research directions.

1. Introduction

Researchers have differing opinions regarding the construct of psychopathy (e.g., the importance of criminality or antisociality, Hare & Neumann, 2010; the importance of fearlessness or social dominance, Lynam & Miller, 2012). Still, the distinction between primary and secondary psychopathy, though a debated issue, has long been considered to represent a basic dichotomy in the psychopathy literature. Originally proposed by Karpman (1941, 1948), this two-type model suggests separate etiologies, despite some similarities in behavioral expression. Primary psychopathy is believed to stem from genetic influences resulting in emotional deficits, whereas secondary psychopathy has been associated with environmental factors such as abuse (Lee & Salekin, 2010). Additionally, primary psychopathy is characterized by a lack of fear/anxiety (Lykken, 1995), whereas secondary psychopathy is thought to represent a greater vulnerability to experience higher levels of negative affect in general (Vassileva, Kosson, Abramowitz, & Conrad, 2005).

Reinforcement Sensitivity Theory (RST) is a model of motivation that is not only reflected in basic personality research (see Corr, 2008; Corr, DeYoung, & McNaughton, 2013), but has drawn the interest of psychopathology researchers as well. RST may help explain basic distinctions in personality disorders (see Ross, Keiser, Strong, & Webb, 2013), including psychopathy, which has been a particular focus. Because primary and secondary psychopathy have been theorized to be related to fearlessness and reckless behavior, respectively, researchers have recently revived interest (see Newman, MacCoon, Vaughn, & Sadeh, 2005; Ross et al., 2007) in original formulations by Lykken (1995) and Fowles (1980) for RST in underpinning psychopathy (Corr, 2008). Research based on Gray's (1975) original model of RST has focused on two primary motivational systems: the Behavioral Inhibition System (BIS) and the Behavioral Approach System (BAS). In the original RST formulation, the BIS is sensitive to cues of punishment and inhibits goal-directed behavior in the presence of such cues. Thus, high BIS activation is theorized to contribute to processes that, eventually, cause the experience of anxiety. In contrast, the BAS is sensitive to signals of reward, leading to increased goal-directed behavior in the presence of such cues. High BAS activation is theorized to be related to the trait of reward sensitivity and impulsivity (e.g., Carver & White, 1994). Although Gray (1987) originally posited the BIS and BAS as independently functioning systems (the separable subsystems hypothesis), Corr (2001) calls attention to the possibility that they have interdependent effects on inhibitory and appetitive motivation (the joint subsystems hypothesis). This position is consistent with a more nuanced understanding of reward and punishment effects, as contained in the Gray–Smith Arousal-Decision Model of behavior (Gray & Smith, 1969).

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Ross et al. (2007) investigated the relationship between the original RST model, focusing only on BIS (partly measured via measures of anxiety) and BAS, and primary and secondary psychopathy in an undergraduate sample. Using multiple measures of psychopathy, they found that both primary and secondary psychopathy were positively related to BAS activity, but only primary psychopathy was related (negatively) to BIS activity. These results support the conceptualization of primary psychopathy as being related to low anxiety. Subsequent studies have supported this initial finding (Hundt, Kimbrel, Mitchell, & Nelson-Gray, 2008; Kimbrel, Nelson-Gray, & Mitchell, 2007; Ross, Benning, Patrick, Thompson, & Thurston, 2009; Uzieblo, Verschuere, & Crombez, 2007).

While the results of these studies demonstrate an important feature of the relationship between psychopathy and RST, it is necessary to recognize the significant changes made to RST by Gray and McNaughton (2000), which have been largely ignored in psychopathy research. In their revision, they emphasize the role of the Fight-Flight-Freeze System (FFFS, relating to fear) and distinguish its role from that of the BIS (relating to anxiety). According to the revised RST, the FFFS mediates reactions to all aversive stimuli, leading to avoidance and escape behaviors, whereas the BIS is activated by conflicting stimuli and is responsible for resolving goal conflict. These changes to RST call for adjustments in interpretation of the relationship between RST and psychopathy, especially in the differentiation of FFFS-fear and BIS-anxiety that are conflated in previous studies of psychopathy and 'anxiety' (see Corr, 2010). In common with other studies, Ross et al. (2007) focused only on the BIS and BAS, without consideration of a separate FFFS. Specifically, in the case of Ross et al. their use of multiple measures of BIS included explicit measures of anxiety, which may have limited the construct comprehensiveness of their assessment of BIS.

In a recent study, Hughes, Moore, Morris, and Corr (2012) used an undergraduate sample to examine the relationships between psychopathy and the BAS, BIS, and FFFS using Heym, Ferguson, and Lawrence's (2008) revised scoring of Carver and White's (1994) BIS/BAS scales. In accordance with Corr (2010), they reported that both primary and secondary psychopathy, as measured by the Levenson Self-Report Psychopathy (LSRP) Scales (Levenson, Kiehl, & Fitzpatrick, 1995), exhibited a negative association with BIS activation. Primary psychopathy was also shown to be positively related to the BAS Reward Responsiveness and BAS Drive facets, and negatively related to BAS Fun-Seeking; and, also found was a negative correlation with FFFS-fear. In addition to a negative association with BIS, secondary psychopathy was positively related to Fun-Seeking (impulsivity) reflecting the non-planning and rapid responding of this psychopathy sub-type. Consistent with Gray and McNaughton's (2000) reformulation, the BIS represents a cognitive mechanism that detects and resolves goal conflict, and is not simply a measure of anxiety; as such it might be expected to be involved in all psychopathy sub-types.

These results are intriguing though not wholly consistent with previous studies for the BIS and BAS in relation to primary and secondary psychopathy; but, they do suggest dissociation between the FFFS and BIS, vis-à-vis psychopathy. Previous studies with the exception of Hughes et al. (2012) have ignored the distinction between FFFS-fear and BIS-anxiety. Similarly, few studies have focused their analyses on the separate factors of the BAS. When Hughes et al. parsed BAS into subcomponents, they found positive relationships of the BAS-Drive and Reward Responsiveness with primary, and BAS-Fun-Seeking (Impulsivity) with secondary psychopathy. Consistent with Hughes et al. we believe that BAS activation (see Ross et al., 2007) is common to both primary (predatory approach) and secondary (impulsive) psychopathy, and that BIS activity is negatively related to primary psychopathy. Rather than expecting a negative relationship for BIS activity with secondary psychopathy, however, recent findings suggest a null or possibly weak positive relationship (see Ross et al., 2009; Ross, Bye, Wrobel, & Horton, 2008; Vassileva et al., 2005) which would be consistent with Karpman's (1941, 1948) original, *neurotic* conceptualization of secondary psychopathy.

In the current study, we use the same design and measures as Hughes et al. (2012) to examine the relationship of primary and secondary psychopathy to RST constructs in the revised RST model. However, we examined the generalizability of these results using a much larger sample to mitigate the effects of sampling bias. Specifically, within the revised RST model, we sought to answer four questions. One, do RST measures distinguish between primary and secondary psychopathy? Two, does the FFFS provide incremental predictive validity beyond the BIS in assessing psychopathy? Three, which components of the BAS are linked to primary psychopathy and which to secondary psychopathy, after common psychopathy variance is accounted for? And, four, do BIS and BAS have interactive effects on psychopathy?

2. Method

2.1. Participants

The university student sample consisted of 779 participants (47.4% female and 52.6% male) with an average age of 19.73 (Sd = 2.77). The racial composition was American Indian (6.8%), African-American (5.6%), Caucasian (83.8%), and Asian or Pacific Islander (3.8%).

2.2. Materials

Behavioral Inhibition and Activation Scales (BIS/BAS; Carver & White, 1994): The BIS/BAS scales are a 20-item questionnaire designed to measure the sensitivity of these two motivational systems according to Gray's (1987) theory. The BIS scale consists of 7 items measuring apprehensive anticipation (e.g., "I worry about making mistakes"). Internal consistency of the BIS scale was .75. For analysis purposes, the BIS scale was divided into a 4-item BIS and a 3-item FFFS scale, consistent with Heym et al.'s (2008) suggestion and similar, independent findings by Poythress et al. (2008). The BIS and FFFS can be distinguished at the item level. For example, an item on the BIS would be "I feel worried when I think I have done poorly on something", whereas an item on the FFFS would be "Even if something bad is about to happen, I rarely experience fear or nervousness". Consistent with previous investigations (see Heym et al., Ross & Keiser, 2011), internal consistency for the revised BIS scale was .67; for the FFFS, it was .59. In addition, the BAS is composed of three subscales: BAS Drive (DR); BAS Fun-Seeking (FS); BAS Reward Responsiveness (RR). All items are Likert scaled (4 points) with anchors of "strongly agree" and "strongly disagree". Internal consistency was .78 for BAS total score, .70 for BAS RR, .71 for BAS DR, and .71 for BAS FS. In this study, we used a BAS total score, which is at the theoretical level of measurement indicative of an overall BAS construct. Although a global BAS index, in the absence of a subscale or facet analysis, may obscure relations between the BAS and related constructs (Corr & McNaughton, 2008; Corr et al., 2013), we report zero-order correlations for a BAS total (see Campbell-Sills, Liverant, & Brown, 2004) as well as subscale scores.

Levenson's Self-Report Psychopathy (LSRP) Scales (Levenson et al., 1995). The LSRP were used to assess psychopathic attitudes and beliefs via self-report. Twenty-six items comprise two subscales designed to measure both factors of the PCL-R in noninstitutionalized young adults. The primary psychopathy subscale consists of 16 items measuring an inclination to lie, lack of remorse, callousness, and manipulativeness, e.g., "For me, what's right is whatever

I can get away with." (agree) or "I enjoy manipulating other people's feelings" (agree). Coefficient alpha for the current sample was .85. The secondary psychopathy subscale consists of 10 items measuring impulsivity, intolerance of frustration, quick-temperedness, and lack of long-term goals, e.g., "I find myself in the same kinds of trouble, time after time" (agree) or "I have been in a lot of shouting matches with other people" (agree). Coefficient alpha in the current sample was .67. Good evidence has been found for the convergent and discriminant validity of their primary and secondary subscales (Brinkley, Schmitt, Smith, & Newman, 2001; Lynam, Whiteside, & Jones, 1999; Ross, Lutz, & Bailley, 2004).

2.3. Procedure

Carver and White's BIS/BAS scales and the LSRP were administered to participants in small groups or as take home packets, after being informed of their rights as a research participant and providing signed informed consent.

3. Results

Consistent with most studies, zero-order correlations revealed a negative relationship between BIS scores and primary psychopathy, whereas no relationship between BIS and secondary psychopathy was found (see Table 1). Likewise, the FFFS exhibited a negative correlation with primary psychopathy and no significant correlation with secondary psychopathy. When independent t-tests were used to compare the magnitude of correlations between Hughes et al.'s (2012; see original article) and the current sample, a number of comparisons were significantly different ($p < .05$). Most notable were ones reflecting differences in correlations with psychopathic dimensions and RST scales.

In the current study, BAS total scores exhibited a positive correlation with both primary and secondary psychopathy scores. At the BAS subscale level, RR was negatively correlated with primary and secondary psychopathy, whereas DR and FS demonstrated a positive correlation with both psychopathy subtypes. Consistent with Hughes et al. (2012), a difference in the magnitude of relationship between psychopathy dimensions and DR was significant ($p < .05$) using test for dependent correlations. In contrast to findings for Hughes et al. (2012), BAS RR was negatively, though weakly, correlated with both psychopathy dimensions in the current study.

In order to determine the likely generalizability of the current findings, we split the current sample into random halves and determined correlations among all variables for each half. The pattern of correlations between the two halves was identical. Pairwise comparison between independent correlations (see Hays, 1988) for the two halves was non-significant for all correlations. Correlations for the two halves were highly similar, with more than 80% of pair-wise differences being less than .03; no more than 5% of pair-wise comparisons between corresponding correlations exceeded .05. Consequently, the results for this large sample appear to be highly reliable.

Table 2
Partial correlations controlling for common psychopathy variance.

	Primary	Secondary
BIS	−.30**	.12*
FFFS	−.32**	.18*
BAS total	.18	.08
BAS RR	−.04	−.09
BAS DR	.38**	.04
BAS FS	.05	.20**

Note. *$p < .05$; **$p < .01$.

Consistent with previous suggestions by Patrick (2006) to control for common variance in psychopathy factors, we also conducted partial correlations between LSRP psychopathy scales, controlling for the other LSRP scale, and RST measures. As the results in Table 2 show, primary psychopathy remained negatively related to BIS and FFFS, and positively related to BAS total score and BAS DR. In contrast, when common variance between primary and secondary psychopathy was partialled out, secondary psychopathy was positively related to both BIS and FFFS, but positively related to BAS FS with a similar effect size ($r = .18$ for FFFS; $r = .20$ for BAS FS).

Because of the joint subsystems hypothesis in the revised RST, we also examined the interaction between BIS and BAS in multiple regression. After controlling for overall BAS ($\beta = .24$, $p < .001$) and BIS ($\beta = -.32$, $p < .001$), the interaction between BIS and BAS was not significant when added in the second step ($\beta = .23$, $p > .60$; $F\ \Delta\ (3, 771) = .41$, $p > .50$) in predicting primary psychopathy. Similarly, after controlling for BAS ($\beta = .15$, $p < .001$) and BIS ($\beta = -.01$, $p > .05$), the interaction between BIS and BAS was not significant when added ($\beta = .02$, $p > .05$; $F\ \Delta\ (3, 771) = 1.02$, $p > .30$) in predicting secondary psychopathy.

When the FFFS was added to the mix, after controlling for the effects of BAS and BIS, the FFFS significantly predicted primary ($\beta = -.17$; $F\ \Delta\ (3, 771) = 18.69$, $p < .001$) but not secondary psychopathy ($\beta = .08$; $F\ \Delta\ (3.\ 771) = 3.44$, $p > .05$). Due to the large sample size, we also tested for the interaction effect of gender × RST scale on psychopathy; after controlling for the main effects of gender and RST scale, however, no interaction remained significant.

4. Discussion

These findings are consistent with most studies suggesting that the BIS, as much as if not more so than the BAS, differentiates primary from secondary psychopathy. They clarify those of Hughes et al. (2012) regarding the BIS and show that the BIS may even be slightly overactivated in secondary psychopathy when common variance between primary and secondary psychopathy are par-

Table 1
Correlations of BIS subscales and LSRP primary and secondary psychopathy.

	Primary	Secondary	BIS	FFFS	BAS[2] Total	BAS DR	BAS RR	BAS FS
Primary	–	.38**	−.28**	−.27**	.22**	.42**	−.08*	.13**
Secondary		–	.00	.05	.15**	.19**	−.11**	.23**
BIS			–	.54**	.05	−.12**	.29**	−.03
FFFS				–	.02	−.10**	.25**	−.09*
BAS total					–	.74**	.71**	.75**
BAS DR						–	.28**	.31**
BAS RR							–	.31**
BAS FS								–

Note. *$p < .05$; **$p < .01$.
BIS = Behavioral Inhibition System; FFFS = Fight-Flight-Freeze System; BAS = Behavioral Activation System; DR = Drive; RR = Reward Responsiveness; FS = Fun-Seeking.

tialled out. This finding points to higher levels of anxiety and goal-conflict, consistent with Karpman's original formulation of secondary psychopathy as a neurotic variant. Consistent with Ross et al. (2007), BIS but not BAS seems to differentiate primary from secondary psychopathy, even using the revised BIS scale.

Although comparison of the magnitude of the correlations reported by Hughes et al. and those in the current study did produce a number of significant differences, the overall pattern of findings for the major constructs of interest remains fairly similar, with some exceptions. Despite differences between Hughes et al. and the current study, converging results emphasize three major findings: (1) primary psychopathy is negatively related to the BIS as well as the FFFS; (2) primary psychopathy is positively related to goal-driven behavior of the BAS; and, (3) secondary psychopathy is positively related to impulsivity reflected in the BAS.

Although current findings support the bulk of previous studies demonstrating that global BAS activation may not be a distinguishing feature of primary or secondary psychopathy, parsing the BAS into subcomponents seems to provide a more nuanced view of the relationship between the BAS and psychopathy as a whole. Whereas the global BAS scores positively correlate with both kinds of psychopathy in the current study and would appear to in Hughes et al. BAS RR demonstrates a weak but significant negative relationship with both psychopathy dimensions in the current study. These findings are in contrast not only with findings for Hughes et al. but also for those of Ross et al. (2009) who relied on the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996) dimensions to assess primary and secondary psychopathy. Current findings suggest that psychopathy—regardless of 'type'—is not especially sensitive to cues of future reward. Instead, psychopathic BAS activation—as measured by the LSRP—seems to consist of goal-driven (DR) and impulsive (FS) behaviors. Thus, it appears that impulsivity rather than reward salience is what characterizes heightened BAS functioning in psychopathy. As a caveat to these findings, however, it is worth noting two points. First, reward responsiveness is measured as a trait in the Carver and White scales but may only be fully evidenced in impulsive behavior that arises in response to state reward salience. Secondly, experimental studies showing the relationship of the gamblers fallacy to secondary over primary psychopathy suggest that reward sensitivity is high in secondary psychopathy and predicts extended game-play (impulsive and goal-driven behavior) in long-term losing situations (Dean et al., 2013).

Another goal of this study was to examine the relationship between psychopathy and the FFFS, due to the increased attention given to this system in recent revisions of the RST. Consistent with previous results for the BIS in psychopathy, the FFFS demonstrated similar relationships in both direction and magnitude as the BIS in Hughes et al. (with the exception of secondary psychopathy) and the current study. The FFFS was incremental in predicting primary but not secondary psychopathy, as well. These results are consistent with Lykken's (1995) conceptualization of the fearless (primary) psychopath. A weakened BIS and FFFS in primary psychopathy is consistent with impaired affective processing of conflicting goals. As Hughes et al. point out, goal conflict is less likely to be detected with a weakened BIS and, when detected, less likely to be effectively resolved owing to a weakened FFFS. These findings are consistent with one of the most replicable findings regarding emotional deficits in the psychopathy literature—impaired passive avoidance learning in low-anxious (or, more accurately, low-neurotic) psychopaths (Vitale et al., 2005).

Additionally, these findings suggest that the FFFS does, indeed, measure a construct (i.e., fear) that is different than that measured by Heym et al.'s (2008) revised BIS scale. The usefulness of the Carver and White FFFS scale in predicting LSRP primary psychopathy may be due, in part, to the differences in levels of Agreeableness represented on the FFFS and revised BIS scales, respectively (Keiser & Ross, 2011), as well as the importance of (low) Agreeableness in characterizing psychopathy (Ross et al., 2009).

A number of factors may be contributing to differences in results between Hughes et al. and the current study. Most differences may be attributed to sample size. Additionally, what appears to be greater between-study differences for secondary (compared to primary) psychopathy and RST may be due, in part, to the lower internal consistency for the LSRP secondary psychopathy scale. Studies almost universally report an alpha in the low .60-range. Other indicators suggest that findings for the current study may be relatively stable and generally representative. Unlike the Hughes et al. (2012) study, but consistent with previous studies (Lynam et al., 1999; Ross, Bye, Wrobel, & Horton, 2008; Ross et al., 2004; Wilson & McCarthy, 2011), LSRP primary and secondary psychopathy scales were moderately positively related in this study. Also, all BAS subscales were positively inter-correlated, which is also consistent with most studies using the Carver and White scales (see Campbell-Sills et al., 2004). Finally, when the sample was split into roughly equal but random halves, the correlation matrix remained essentially unchanged.

Overall, our findings indicate that the BIS and FFFS differentiate primary from secondary psychopathy. A major limitation of this study is the sole use of the LSRP in assessing primary and secondary psychopathy. Due to conceptual differences among the various psychopathy scales, future investigations should utilize multiple measures of psychopathy to further examine the relationship between the revised RST and primary and secondary psychopathy. Furthermore, it would be helpful to confirm these findings using a more recently constructed RST scale (Corr & Cooper, 2013), derived specifically to address the recent changes in RST proposed by Gray and McNaughton (2000). We conclude with the observation that, in future research, the neuropsychological bases of psychopathy, and its sub-types, need to be elaborated in terms of the multiple processes both within, as well as between, RST systems.

References

Brinkley, C. A., Schmitt, W. A., Smith, S. S., & Newman, J. P. (2001). Construct validation of a self-report psychopathy scale: Does Levenson's self-report psychopathy scale measure the same constructs as Hare's psychopathy checklist-revised? *Personality and Individual Differences, 31*, 1021–1038. http://dx.doi.org/10.1016/50191-8869(00)00178-1.

Campbell-Sills, L., Liverant, G. I., & Brown, T. A. (2004). Psychometric evaluation of the Behavioral Inhibition/Behavioral Activation Scales in a large sample of outpatients with anxiety and mood disorders. *Psychological Assessment, 16*, 244–254. http://dx.doi.org/10.1037/1040-3590.16.3.244.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67*, 319–334.

Corr, P. J. (2001). Testing problems in J. A. Gray's personality theory: A commentary on Matthews and Gilliland (1999). *Personality and Individual Differences, 30*, 333–352. http://dx.doi.org/10.1016/S0191-8869(00)00028-3.

Corr, P. J. (Ed.). (2008). *The Reinforcement Sensitivity Theory of Personality*. Cambridge: Cambridge University Press. doi:http://dx.doi.org/10.1017/CBO9780511819384.

Corr, P. J. (2010). The psychoticism–psychopathy continuum: A model of core neuropsychological deficits. *Personality and Individual Differences, 48*, 695–703. http://dx.doi.org/10.1016/j.paid.2009.12.023.

Corr, P. J., & Cooper, A. (2013). The Reinforcement Sensitivity Theory of Personality Questionnaire (RST-PQ): Development and validation, under review.

Corr, P. J., DeYoung, C. G., & McNaughton, N. (2013). Motivation and personality: A neuropsychological perspective. *Social and Personality Psychology Compass, 7*, 158–175.

Corr, P. J., & McNaughton, N. (2008). Reinforcement Sensitivity Theory and personality. In P. J. Corr (Ed.), *The Reinforcement Sensitivity Theory of personality* (pp. 155–187). Cambridge: Cambridge University Press. doi:http://dx.doi.org/10.1017/CBO9780511819384.006.

Dean, A. C., Altstein, L. L., Berman, M. E., Constans, J. I., Sugar, C. A., & McCloskey, M. S. (2013). Secondary, but not primary psychopathy, is associated with risky decision-making in noninstitutionalized young adults. *Personality and Individual Differences, 54*, 272–277. http://dx.doi.org/10.1016/j.paid.2012.09.009.

Fowles, D. C. (1980). The three arousal model: Implications of Gray's two-factor learning theory for heart rate, electrodermal activity, and psychopathy. *Psychophysiology, 17*, 87–104.
Gray, J. A. (1975). *Elements of a two-process theory of learning*. Oxford, England: Academic Press.
Gray, J. A. (1987). *The psychology of fear and stress*. New York: Cambridge University.
Gray, J. A., & McNaughton, N. (2000). *The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system*. Oxford: Oxford University Press.
Gray, J. A., & Smith, P. T. (1969). An arousal-decision model for partial reinforcement and discrimination learning. In R. Gilbert & N. S. Sutherland (Eds.), *Animal discrimination learning* (pp. 243–272). London: Academic Press.
Hare, R. D., & Neumann, C. S. (2010). The role of antisociality in the psychopathy construct: Comment on Skeem & Cooke. *Psychological Assessment, 22*, 446–454.
Hays, W. (1988). *Statistics* (4th ed.). Fort Worth, TX, England: Holt, Rinehart & Winston Inc..
Heym, N., Ferguson, E., & Lawrence, C. (2008). An evaluation of the relationship between Gray's revised RST and Eysenck's PEN: Distinguishing BIS and FFFS in Carver and White's BIS/BAS scales. *Personality and Individual Differences, 45*, 709–715. http://dx.doi.org/10.1016/j.paid.2008.07.013.
Hughes, K. A., Moore, R. A., Morris, P. H., & Corr, P. J. (2012). Throwing light on the dark side of personality: Reinforcement sensitivity theory and primary/secondary psychopathy in a student populations. *Personality and Individual Differences, 52*, 532–536. http://dx.doi.org/10.1016/j.paid.2011.11.010.
Hundt, N. E., Kimbrel, N. A., Mitchell, J. T., & Nelson-Gray, R. O. (2008). High BAS, but not low BIS, predicts externalizing symptoms in adults. *Personality and Individual Differences, 44*, 565–575. http://dx.doi.org/10.1016/j.paid.2007.09.018.
Karpman, B. (1941). On the need of separating psychopathy into two distinct clinical types: The symptomatic and the idiopathic. *Journal of Criminal Psychopathology, 3*, 112–137.
Karpman, B. (1948). The myth of the psychopathic personality. *The American Journal of Psychiatry, 104*, 523–534.
Keiser, H. N., & Ross, S. R. (2011). Carver and Whites' BIS/FFFS/BAS scales and domains and facets of the five factor model of personality. *Personality and Individual Differences, 51*, 39–44. http://dx.doi.org/10.1016/j.paid.2011.03.007.
Kimbrel, N. A., Nelson-Gray, R. O., & Mitchell, J. T. (2007). Reinforcement sensitivity and maternal style as predictors of psychopathology. *Personality and Individual Differences, 42*, 1139–1149. http://dx.doi.org/10.1016/j.paid.2006.06.028.
Lee, Z., & Salekin, R. T. (2010). Psychopathy in a noninstitutional sample: Differences in primary and secondary subtypes. *Personality Disorders: Theory, Research, and Treatment, 1*, 153–169. http://dx.doi.org/10.1037/a0019269.
Levenson, M. R., Kiehl, K. A., & Fitzpatrick, C. M. (1995). Assessing psychopathic attributes in a noninstitutional population. *Journal of Personality and Social Psychology, 68*, 151–158. http://dx.doi.org/10.1037/002-3514.68.1.151.
Lilienfeld, S. O., & Andrews, B. P. (1996). Development and preliminary validation of a self-report measure of psychopathic personality traits in noncriminal populations. *Journal of Personality Assessment, 66*, 488–524. http://dx.doi.org/10.1207/s15327752jpa6603_3.
Lykken, D. T. (1995). *The antisocial personalities*. Hillsdale, NJ, England: Lawrence Erlbaum Associates Inc..
Lynam, D. R., & Miller, J. D. (2012). Fearless dominance and psychopathy: A response to Lilienfeld et al.. *Personality Disorders: Theory, Research, and Treatment, 3*(3), 341–353.
Lynam, D. R., Whiteside, S., & Jones, S. (1999). Self-reported psychopathy: A validation study. *Journal of Personality Assessment, 73*, 110–132. http://dx.doi.org/10.1207/S1S3277S2JPA730108.
Newman, J. P., MacCoon, D. G., Vaughn, L. J., & Sadeh, N. (2005). Validating a distinction between primary and secondary psychopathy with measures of Gray's BIS and BAS constructs. *Journal of Abnormal Psychology, 114*, 319–323.
Patrick, C. J. (2006). Back to the future: Cleckley as a guide to the next generation of psychopathy research. In C. J. Patrick (Ed.), *Handbook of psychopathy* (pp. 605–617). New York: Guilford Press.
Poythress, N. G., Skeem, J. L., Weir, J., Lilienfeld, S. O., Douglas, K. S., Edens, J. F., et al. (2008). BIS/BAS scales in a large sample of offenders. *Personality and Individual Differences, 45*, 732–737. http://dx.doi.org/10.1016/j.paid.2008.07.021.
Ross, S. R., Benning, S. D., Patrick, C. J., Thompson, A., & Thurston, A. (2009). Factors of the psychopathic personality inventory: Criterion-related validity and relationship to the BIS/BAS and five-factor models of personality. *Assessment, 16*, 71–87. http://dx.doi.org/10.1177/1073191108322207.
Ross, S. R., Bye, K., Wrobel, T. A., & Horton, R. S. (2008). Primary and secondary psychopathic characteristics and the schedule for non-adaptive and adaptive personality (SNAP). *Personality and Individual Differences, 45*, 249–254. http://dx.doi.org/10.1016/j.paid.2008.04.007.
Ross, S. R., Keiser, H. N., Strong, J. V., & Webb, C. M. (2013). Reinforcement sensitivity theory and symptoms of personality disorder: Specificity of the BIS in Cluster C and BAS in Cluster B. *Personality and Individual Differences, 54*, 289–293.
Ross, S. R., Lutz, C. J., & Bailley, S. E. (2004). Psychopathy and the five factor model: A domain and facet level analysis. *Journal of Psychopathology and Behavioral Assessment, 26*, 213–222. http://dx.doi.org/10.1023/B:JOBA.0000045337.48535.a5.
Ross, S. R., Molto, J., Poy, R., Segarra, P., Pastor, M. C., & Montanes, S. (2007). Gray's model and psychopathy: BIS but not BAS differentiates primary from secondary psychopathy in noninstitutionalized young adults. *Personality and Individual Differences, 43*, 1644–1655. http://dx.doi.org/10.1016/j.paid.2007.04.020.
Uzieblo, K., Verschuere, B., & Crombez, G. (2007). The psychopathic personality inventory: Construct validity of the two-factor structure. *Personality and Individual Differences, 43*, 657–667. http://dx.doi.org/10.1016/j.paid.2007.01.008.
Vassileva, J., Kosson, D. S., Abramowitz, C., & Conrad, P. (2005). Psychopathy versus psychopathies in classifying criminal offenders. *Legal and Criminal Psychology, 10*, 27–43. http://dx.doi.org/10.1348/135532504X15376.
Vitale, J. E., Newman, J. P., Bates, J. P., Goodnight, J., Dodge, K. A., & Pettit, G. S. (2005). Deficient behavioral inhibition and anomalous selective attention in a community sample of adolescents with psychopathic and low-anxiety traits. *Journal of Abnormal Child Psychology, 33*, 461–470.
Wilson, M., & McCarthy, K. (2011). Greed is good? Student disciplinary choice and self-reported psychopathy. *Personality and Individual Differences, 51*, 873–876. http://dx.doi.org/10.1016/j.paid.2011.07.028.