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Original citation: Broerman, R. L., Ross, S. & Corr, P. J. (2014). Throwing more light on the dark side of psychopathy: An extension of previous findings for the revised Reinforcement Sensitivity Theory. *Personality and Individual Differences*, 68, pp. 165-169. doi: 10.1016/j.paid.2014.04.024

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Throwing More Light on the Dark Side of Personality: A Re-examination of Reinforcement
Sensitivity Theory in Primary and Secondary Psychopathy Scales

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Introduction

Due to researchers' differing opinions regarding the construct of psychopathy, the distinction between primary and secondary psychopathy, though it has long been recognized to exist, has yet to be fully understood. This distinction, originally proposed by Karpman (1941, 1948), suggests two separate etiologies leading to psychopathy. Whereas primary psychopathy stems from genetic influences resulting in emotional deficits, secondary psychopathy is associated with environmental factors such as abuse (Lee & Salekin, 2010). Additionally, primary psychopathy is characterized by lack of fear/anxiety, secondary psychopathy is thought more to represent a vulnerability to experience higher levels of negative affect in general (Vassileva, Kosson, Abramowitz, & Conrad, 2005).

For the reason that primary and secondary psychopathy have been theorized to be related to fearlessness and reckless behavior, respectively, researchers have begun to investigate the relationship between psychopathy and the Reinforcement Sensitivity Theory (RST) of personality (Corr, 2008). Research based on Gray's (1970, 1987) original model of RST has focused on two primary motivational systems: the behavioral inhibition system (BIS) and the behavioral approach system (BAS). In original RST, the BIS is sensitive to cues of punishment and inhibits goal-directed behavior in the presence of such cues. Thus, high BIS activation has been 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 has been 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) highlights the possibility that the BIS and BAS have

interdependent effects on inhibitory and appetitive motivation (the joint subsystems hypothesis) – this position is consistent a more nuanced understanding of BIS/BAS effects (as suggested, for example, by the Gray-Smith Arousal-Decision Model; Gray & Smith, 1969).

Ross et al. (2007) investigated the relationship between the original two-factor model of RST 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, indicating that primary and secondary psychopathy can be differentiated in terms of the relative magnitude of their relationship to the BIS, support the conceptualization of primary psychopathy as being low-anxious. A host of subsequent studies have supported this initial finding (Kimbrel, Nelson-Gray, & Mitchell, 2007; Uzieblo, Verschuere, & Crombez, 2007; Hundt, Kimbrel, Mitchell, & Nelson-Gray, 2008; Ross, Benning, Patrick, Thompson, & Thurston, 2009).

While the results of these studies demonstrate an important feature of the relationship between psychopathy and RST, it is necessary to recognize the changes made to RST in 2000, which have been largely ignored in psychopathy research. Gray and McNaughton (2000) made revisions to the theory, emphasizing the role of the fight-flight-freeze system (FFFS, relating to fear) and distinguishing its role from that of the BIS (relating to anxiety). According to 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 may call for adjustments in interpretation of the relationship between RST and psychopathy, especially in the differentiation of FFFS-fear and BIS-anxiety which are conflated in previous studies of psychopathy and ‘anxiety’. (see Corr, 2010).

In their study, Hughes, Moore, Morris, and Corr (2012) used an undergraduate sample to test the relationships between psychopathy the BAS, BIS, and FFFS. In accordance with Corr (2010), they reported that both primary and secondary psychopathy, as measured by the Levenson's 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 Sensitivity and BAS -Drive facets, and negatively related to BAS Fun-Seeking; and in addition, it was related to FFFS-fear. In contrast, in addition to an association with BIS, secondary psychopathy was positively related to Fun-Seeking (impulsivity). In both cases, the BIS can be seen as a cognitive mechanism that detects and resolves goal conflict, and is not simply a measure of anxiety.

These results are intriguing but are inconsistent with a number of studies that demonstrate a positive relationship between BAS sensitivity and both primary and secondary psychopathy, originally reported by Ross et al. (2007). Comment: your 2007 paper does not differentiate FFFS-fear and BIS-anxiety, and nor does it separate out factors of the BAS, so these data are not comparable with the Hughes et al study. Both studies did different things, so the following statement is probably not valid: Consequently, the findings for Hughes et al. (2012) are surprising. I think this part of the study needs to be reframed to highlight the differences between the studies in terms of procedures as well as results, and then these differences can be used to reframe this study.

We believe that these findings may be due to lack of sample representation that sometimes occurs in smaller samples (e.g., N = 192 for Hughes et al.) obtained from convenience sampling procedures common in psychological studies. Maybe, maybe not; this consideration is nowhere near as important as the above considerations. In the current investigation, we use the

same 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 obviate or mitigate the effects of sampling bias in smaller samples. Consistent with the majority of previous studies, we believe that BAS activation is common to both primary and secondary psychopathy as did Hughes et al, but that BIS and FFFS activity differentiate primary from secondary psychopathy as did Hughes et al., as previous studies have largely shown.

It is important not to see the BIS as simply a measure of anxiety. For example, primary psychopaths could have a defective BIS but not be anxious as such – this paper is not the place to go into these details, but this is worth bearing in mind.

Method

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%).

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 (1980) 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. 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". 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; BAS Fun-Seeking; BAS Reward Responsiveness. 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 Reward Responsiveness, .71 for BAS Drive, and .71 for BAS Fun-Seeking. In this study, we used a BAS total score, which is at the theoretical level of measurement indicative of an overall BAS construct. Although Ross et al. (2002) suggested examination at the subscale level, a more comprehensive assessment of the BAS total and subscales by Campbell-Sills, Liverant, and Brown (2004) suggested that analysis using the BAS total score was appropriate. We now have data to show that taking this composite measure is a very bad idea – these three factors need to be analysed separately.

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 manipulateness, 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 et al., 1999; Ross et al., 2004).

Procedure

Carver and White’s BIS/BAS scales and the LSRP were administered to participants in small groups, after being informed of their rights as a research participant.

Results

Consistent with the majority of the past research, zero-order correlations revealed a negative relationship between BIS scores and primary psychopathy, whereas no relationship between BIS and secondary psychopathy was found. 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) and the current sample, 11 of 21 comparisons were significantly different ($p < .05$) (see Table 1). Most notable were ones reflecting differences in correlations with psychopathic dimensions and RST scales. In indirect contrast to the findings of Hughes et al. (2012), BAS total scores exhibited a positive correlation with both primary and secondary psychopathy scores. Whereas RR was negatively correlated with primary and secondary psychopathy, 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 Steiger's (1980) test for dependent correlations. In contrast to findings for Hughes et al. (2012), BAS RR was negatively correlated with both psychopathy dimensions in the current study.

Because of the joint subsystems hypothesis in the revised RST, we also examined the interaction between BIS and BAS in multiple regression. The analysis revealed that the interaction between BIS and BAS did not predict (β 's = .27 and .39, respectively, $p > .05$) psychopathy scores after controlling for BAS ($\beta = .24$, $p < .001$) and BIS ($\beta = -.29$, $p < .001$) scores in predicting primary psychopathy, or BAS ($\beta = .15$, $p < .001$) and BIS ($\beta = -.01$, $p > .05$) 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 ($\beta = -.17$, $p < .001$) but not secondary psychopathy ($\beta = .08$, $p > .05$)

Discussion

As expected, our results were consistent with most studies suggesting that the BIS, and not the BAS, differentiates primary from secondary psychopathy. Hughes et al. (2012) challenged the view that low anxiety is associated with primary but not secondary psychopathy by providing results showing a negative relationship between BIS scores and both primary and secondary psychopathy. However, the results of the current study show that while the BIS is negatively related to primary psychopathy, there is no relationship between the BIS and secondary psychopathy. In addition, the results of Hughes et al. (2012) showed that primary psychopathy was positively related to BAS - Drive and BAS - Reward Responsiveness and negatively related to BAS - Fun-Seeking, whereas secondary psychopathy exhibited a positive relationship with BAS - Fun-Seeking. Although Ross et al. (2007) did not examine the three scales of the BAS, they found that BAS total scores were positively related to both primary and

secondary psychopathy. Although the joint subsystems hypothesis would suggest an interaction between the BIS and BAS for some aspects of motivation and behavior, we found no evidence for this interaction—above and beyond main effects for the BIS and BAS—in predicting either primary or secondary psychopathy.

Although current findings supported the bulk of previous studies demonstrating that BAS activation is not a distinguishing feature of primary or secondary psychopathy, dividing the BAS into its three subscales seems to provide a more nuanced view of the relationship between the BAS and psychopathy as a whole. In the current study, we found that primary and secondary psychopathy exhibited a negative relationship with the RR subscale and positive relationships with the DR and FS subscales. These findings demonstrate consistencies and some inconsistencies with Hughes et al. (2012). Consistent with Hughes et al. (2012), while both primary and secondary psychopathy relate with BAS DR in a positive direction, the relationship seems to be stronger for primary psychopathy. Thus, although it is not a distinguishing feature, primary psychopathy may be more strongly related to goal-driven behaviors compared to secondary psychopathy.

However, this larger sample also revealed differences when dividing the BAS into the three subsystems. Whereas the global BAS scores positively correlate with both kinds of psychopathy in the current study and in Hughes et al., BAS RR demonstrates a weak but significant negative relationship with **both** psychopathy dimensions in the current study, in contrast to findings for Hughes et al. Current findings suggest that psychopathy—regardless of ‘type’—is insensitive 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.

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 RST research. Consistent with previous results for the BIS in primary but not secondary psychopathy, the FFFS contributed to prediction of primary but not secondary psychopathy, as well. These results are consistent with the conceptualization of the fearless psychopath (e.g., Lykken, 1995). Furthermore, multiple regression analyses showed that the FFFS is still significant in predicting primary psychopathy, even after controlling for BAS and BIS scores. This suggests 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 Agreeableness in characterizing psychopathy (see Ross et al., 2009).

Overall, our findings indicate that the BIS and FFFS differentiate primary from secondary psychopathy. In contrast to that of Hughes et al. (2012), our results suggest that BAS activation is largely common to both psychopathy subtypes. 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 would 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, derived specifically to address the recent changes in RST proposed by Gray and McNaughton (2000). As Smillie, Pickering, and Jackson (2006) suggest, current measures of BIS activity are likely to contain a mixture of fear and anxiety and

may not fully represent goal conflict. Therefore, revised measures of the BIS and FFFS may be necessary to clearly distinguish the roles of these two systems.

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