



Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Review

Problems with the BIS/BAS scales or Lykken's model of primary psychopathy? A reply to Poythress et al. (2008)

Joseph P. Newman*, Melanie B. Malterer

University of Wisconsin-Madison, 1202 W. Johnson St., Madison, Wisconsin 53706, United States

ARTICLE INFO

Article history:

Received 23 September 2008

Received in revised form 19 January 2009

Accepted 27 January 2009

Available online 27 February 2009

ABSTRACT

Citing a dearth of research on the Carver and White (1994) BIS scale in offender samples, its limited coverage of the psychological functions attributed to the BIS construct, and the fact that the BIS scale has a stronger association with measures of negative emotionality than with fear sensitivity, Poythress et al. (2008) “recommend a moratorium on the use of the BIS scale to test Lykken’s theory of primary psychopathy” (p. 269). In this response, we: (1) present evidence that supports the reliability and validity of the BIS scale in a large offender sample involving multiple prison sites, (2) challenge unfounded assertions regarding the inadequate coverage of the BIS, (3) propose that the problems cited by Poythress et al. are as much a function of Lykken’s model as Carver and White’s measure, and (4) conclude that further research is needed to clarify the distinction between primary and secondary psychopathy and that the BIS/BAS scales may play a valuable role in this regard.

© 2009 Elsevier Ltd. All rights reserved.

In response to perceived problems with the Carver and White (1994) BIS scale, Poythress et al. (2008) “recommend a moratorium on the use of the BIS scale to test Lykken’s theory of primary psychopathy” (p. 269). In this response, we: (1) present evidence that supports the reliability and validity of the BIS scale in a large offender sample involving multiple prison sites, (2) challenge unfounded assertions regarding the inadequate coverage of the BIS, (3) propose that the problems cited by Poythress et al. are as much a function of Lykken’s model as Carver and White’s measure, and (4) conclude that further research is needed to clarify the distinction between primary and secondary psychopathy and that the BIS/BAS scales may play a valuable role in this regard. For the sake of clarity, the outline of this response employs the headings used by Poythress et al. in their original order, beginning with their Section 3. “Critique of the BIS scale”.

1. Psychometric issues

According to Poythress et al. (2008) “a general concern regarding use of the BIS scale ...is that the psychometric properties of the BIS/BAS scales have not been thoroughly examined in offender samples” (p. 270). To address this concern, we examined internal consistency of the BIS scale in a sample of 1112 male offenders. Cronbach’s alpha exceeded .75 and was similar to results for undergraduate samples. Item-to-total correlations ranged from .335 to .577. In light of the fact that the one problematic study cited by Poythress et al. involved a much smaller sample and a Dutch

version of the BIS/BAS scales, we believe that concerns about the psychometric properties of the BIS in offender samples may have been overstated.

2. Poor domain coverage of the BIS scale

Poythress et al. claim that the BIS scale contains only two items related to fear whereas the other items “relate mainly to general anxiety or worry” (p. 270) and “the content of the BIS items does not appear to adequately capture behavioral inhibition system functions relevant to other RST-models of psychopathy” (p. 271), such as “the information processing functions critical to Newman’s theory of psychopathy (Hiatt & Newman, 2006...)” (p. 271).

Because subjective evaluation of scale items can be misleading, especially in the absence of statistical evidence, we believe that construct validity is more meaningfully evaluated using the nomological net of findings that address hypothesized associations. Toward this end, we report evidence regarding the association between the BIS scale and performance on one of the information processing tasks referred to by Poythress and colleagues. Later, we present additional evidence on the BIS scale’s association with another measure of Gray’s BIS construct and measures of fearlessness.

Using the same selection criteria employed by Hiatt, Schmitt, and Newman (2004), we identified a sample of 126 male offenders who performed a version of a picture-word task described by Hiatt and Newman (2006). The task measures the extent to which participants select a response more slowly in the presence of incongruent versus neutral peripheral information. Monetary incentives are provided for fast and accurate responding. In

* Corresponding author. Tel.: +1 608 262 3810.
E-mail address: jnewman@wisc.edu (J.P. Newman).

contrast to other participants, the incongruent information produces significantly less interference in psychopathic offenders than controls (see Hiatt & Newman, 2006). Contrary to Poythress et al.'s assumption, low BIS scorers also displayed significantly lower levels of interference, $r(126) = .235$, $p = .008$. Here too, criticisms about the coverage of the BIS scale, specifically its relation to the attentional components of Gray's (1982) model appear to be overstated (see also Mathews, Yiend, & Lawrence, 2004).

3. The BIS scale as a measure of negative emotionality

Highlighting their central concern about the BIS scale, Poythress and colleagues claim that "the BIS/BAS literature is rife with criticisms of the BIS scale as indexing merely, or at least primarily, negative emotionality..." (p. 271). Among other evidence, they report that the BIS scale correlated .51 with the Trait Anxiety index from the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970), .55 with an index of anxiety derived from the Eysenck Personality Questionnaire (EPQ, Eysenck & Eysenck, 1975), and .62 with the Neuroticism scale of the EPQ. Nevertheless, when we evaluated their claim that "the BIS scale is largely a measure of NE" (p. 272), we found that the association between the BIS scale and the NE factor of the MPQ in two samples of male offenders was not very high, $r(850) = .217$ and $r(524) = .159$.

Contrary to evidence presented by Poythress et al. we also found that the BIS scale is more strongly correlated with Torrubia, Ávila, Moltó, and Caseras's (2001) Sensitivity to Punishment (SP) Scale (i.e., another measure of BIS) than traditional anxiety scales (Newman, MacCoon, Vaughn, & Sadeh, 2005). To address this question more specifically for present purposes, we examined the correlation between BIS and SP after partialling out the effects of WAS (i.e., anxiety). The correlation dropped from $r(527) = .547$ to a partial correlation of .427 but remained significant, $p < .001$. Similarly, when we controlled for the effects of neuroticism in a sample of 403 offenders, the correlation between BIS and SP dropped from .514 to .274, but remained significant, $p < .001$. Finally, when we examined this association after controlling for the MPQ NE factor in 508 offenders, the correlation changed only from .555 to .534. Clearly, the BIS scale captures unique variance in SP beyond that associated with anxiety, neuroticism, and NE.

When evaluating Poythress and colleagues' disparaging comments regarding the association between Carver and White's (1994) BIS scale and measures of trait anxiety and neuroticism, it is also important to consider Gray's characterization of the BIS and its association with personality dimensions. Gray (1982, 1991) characterized his BIS construct as a measure of anxiety rather than fear which he regarded as more specific. In 1981 Gray, proposed that individual differences in BIS functioning extend from the neurotic introvert to the stable extravert quadrant of Eysenck's model and involve a 45° rotation of Eysenck's introversion–extraversion (I–E) and neuroticism (N) dimensions. In 1987, Gray noted that the anchor point for high BIS functioning was closer to N than originally postulated and located BIS functioning closer to N than to I. Indeed, as noted elsewhere (Newman & Brinkley, 1997), Gray (1987) regarded his BIS dimension as loading more heavily on neuroticism (approximately .66) than introversion (approximately .33) and, moreover, linked the BIS dimension to the Taylor anxiety scale which like the WAS is regarded as a measure of neurotic anxiety (pp. 350–351). In light of Gray's characterization of his BIS construct, the moderately high correlation between the BIS scale and measures of trait anxiety and neuroticism appears to support rather than undermine the validity of the BIS scale.

Overall, we find Poythress and colleagues' criticism of the BIS scale as merely an index of NE less than compelling. Their concerns appear to reflect Lykken's peculiar views of anxiety (i.e., that it

represents fearlessness as measured by Tellegen and Waller's (1992) Harmavoidance scale) rather than discrepancies with Gray's view of his BIS construct. To our knowledge, Gray never endorsed the MPQ Harmavoidance scale as a superior measure of his BIS construct.

4. Limitations of the BIS scale for testing Lykken's model of primary psychopathy

Poythress and colleagues criticize use of "the BIS scale as a dependent measure to test the validity of putative psychopathic subgroups" and note specifically that "a study by Newman et al. (2005) illustrates our concern" (p. 273). The problem with this study is that the "independent variable (WAS-defined primary psychopathy group) and the dependent variable (BIS scale) were substantially operationalized using measures highly related to NE, and no plausible index of either fear sensitivity or of other BIS functions (e.g., inhibitory behavior) appears on either side of the 'equation'" (p. 273).

This critique is unjust for three reasons. First, as we clarify below, the Newman et al. (2005) study follows directly from Lykken's proposals and represents a straight-forward test of his hypotheses. Second, we disagree with the assertion that a test of Lykken's claims regarding primary and secondary psychopathy require a specific measure of fear sensitivity. Third, Poythress et al.'s call for a moratorium on research like the Newman et al. (2005) study is wrong headed, especially given the substance of their critique. Each point is addressed in turn below.

4.1. Was the Newman et al. study an inappropriate test of Lykken's hypothesis?

In response to Lykken's (1995) criticisms regarding the use of the WAS to parse psychopathy into primary and secondary types, Newman and Brinkley (1997) published a rigorous defense of this method (see also Newman & Schmitt, 1998; Schmitt & Newman, 1999). However, to address his concerns more specifically, Newman et al. (2005) evaluated this application of the WAS using the precise criteria spelled out by Lykken (1995). Specifically, Lykken wrote: "persons with a relatively weak BIS might show poor passive avoidance, low general anxiety, and other characteristics of the primary psychopath. This formulation will be seen to be quite similar to my low fear hypothesis". By contrast, the secondary psychopath is "characterized by a strong BAS but a normal BIS" (p. 122). "Unlike the primary psychopath, the secondary psychopath should show high scores on negative emotionality or neuroticism, because the lure of temptation would be likely to cause him to select a stressful and disquieting lifestyle" (p. 122).

Given Lykken's characterization of primary and secondary psychopathy, our lab set out to evaluate it using Carver and White's (1994) BIS/BAS scales and Torrubia et al.'s (2001) Sensitivity to Reward/Sensitivity to Punishment Scales as dependent measures. Moreover, the logic of the study seemed extremely straight-forward. Because the goal of the study was to evaluate the ability of the Welsh Anxiety Scale (WAS; Welsh, 1956) to distinguish primary and secondary psychopathy, the authors used the WAS along with the PCL-R to distinguish primary and secondary psychopathy groups. The choice of dependent variables was equally obvious. Lykken (1995) proposed that individuals with primary psychopathy would be characterized by a weak BIS and normal BAS. Thus, the authors followed Lykken's prescription quite literally by selecting two widely used and well validated measures of Gray's BIS and BAS constructs to evaluate this use of the WAS.

Poythress et al. object to the fact that the independent (WAS-defined primary psychopathy) and dependent (BIS scores)

variables were both highly related to NE. Such overlap may be problematic when a study is evaluating a theory-based prediction, but Newman et al. (2005) were not testing theory. Rather, they were investigating whether psychopathic subtypes identified by the WAS manifested personality traits that others regard as core features of primary and secondary psychopathy. Such tests of concurrent validity are a common and well-accepted method for evaluating diagnostic criteria. For instance, when validating a self-report measure of psychopathy, investigators commonly include other measures of psychopathy and a range of self-report measures known to be associated with the construct (e.g., interpersonal callousness, shallow affect, impulsivity, antisocial behavior). Such studies are not regarded as circular but as demonstrating expected relationships that support the validity of the assessment method. We agree with Poythress et al. that these findings were not surprising. Indeed, given the theoretical association between WAS and Gray's BIS construct (Gray, 1987), we have long been at a loss to understand Lykken's objections to the use of the WAS to distinguish primary and secondary psychopathy subtypes while endorsing the association between BIS and primary psychopathy (Newman & Brinkley, 1997).

Furthermore, the claim that the WAS and BIS scales are measuring the same construct seems overstated. The correlation between the WAS and BIS scales in correctional samples is approximately .40, reflecting only 16% shared variance (Newman, 2008; unpublished data). As kindly noted by Poythress and colleagues "To their credit, Newman et al. at p. 322, noted that WAS and BIS correlated $r = .35$ and conducted additional analyses that controlled for anxiety" (p. 273). Indeed, Newman et al. found that the BIS scores of primary psychopaths were lower than those of the other groups even after controlling for the effects of WAS anxiety – a finding that refutes the possibility that the association reflected nothing more than shared variance. Given the much lower correlation between NE and BIS, it is also unlikely that the association between primary psychopathy and BIS reflects nothing more than NE.

4.2. On the need to include a measure of fear sensitivity

Before addressing this issue directly, it is important to place the matter in historical and theoretical context. Following his famous doctoral dissertation entitled "A study of anxiety in the sociopathic personality" (Lykken, 1957), Lykken drew a sharp distinction between fear and anxiety and became adamant that tests of his low fear hypothesis employ measures of fearfulness (e.g., Harmavoidance) rather than anxiety. Lykken's dissertation was designed to test the hypothesis that psychopathic individuals were characterized by low levels of anxiety. Toward this end, he employed the Welsh and Taylor Manifest Anxiety Scales as dependent variables. The study employed three groups: inmates who fit Cleckley's description of primary psychopathy, inmates who resembled Cleckley's description of neurotic/dissocial psychopathy, and a non-institutionalized normal control group. The distinction between the first two groups was achieved by educating institution psychologists about the nature of primary and secondary psychopathy and then seeking nominations.

A propos to the current question, Lykken (1957) found that the Welsh and Taylor scales successfully distinguished his primary and neurotic groups, but did not distinguish primary psychopaths from the normal control group. However, Lykken's own Anxiety scale which was "not loaded on neuroticism and only negligibly correlated with the Taylor scale or the AI (*i.e.*, *Welsh Anxiety*), separated the groups in a different order". Using his scale, Lykken found that primary psychopaths reported significantly less anxiety than normal controls and that his neurotic/dissocial group fell in between. Lykken noted that this latter set of findings supported his hypothesis "that the subset of primary sociopaths show

abnormally little manifest anxiety" (Lykken, 1957, p. 8). Lykken's so-called Anxiety scale eventually gave rise to the Activities Preference Questionnaire (APQ; Lykken, Tellegen, & Katzenmeyer, 1973) and Harmavoidance Scale which are statistically independent of the Welsh, Taylor, and other trait anxiety scales (Watson & Clark, 1984) and commonly referred to as measures of fearfulness.

Lykken's findings provided a rationale for his insistence that investigators use fearfulness rather than anxiety measures when testing his low fear hypothesis. However, this rationale pertains to the selection of a dependent measure to operationalize fear as opposed to measures to operationalize primary and secondary psychopathy. We agree that it would be unfair to test whether primary psychopaths are fearless using WAS to operationalize the fearlessness construct. Nevertheless, it does seem fair to use measures of the BIS construct as dependent variables when evaluating Lykken's assertion that primary psychopathy is associated with weak BIS functioning.

Lykken also advocated using the Harmavoidance scale rather than the WAS to identify primary psychopathy (cf. Lilienfeld, 1994). However, in contrast to the selection of dependent measures to test his theory, the best method of identifying psychopathic subtypes is an empirical question and need not conform to Lykken's theoretical biases. According to Lykken (1995) the best method for identifying primary psychopaths would be to identify "persons scoring high on the Hare's (2003) Psychopathy Checklist Factor 1 and low on the MPQ Harmavoidance scale" (p. 127). Lykken's rationale for this assertion appears to be that this method would identify fearless individuals. However, such logic presumes that the best method of classifying psychopathic individuals is one that supports his theory. As noted when discussing Poythress and colleagues' concerns about overlapping dependent and independent variables, building in such overlap is problematic when testing theory. If the goal is to evaluate the low fear hypothesis, an investigator should not "load the deck" by supplementing the diagnostic assessment with a measure of fearlessness. This would be circular.

With this background in mind, we now revisit the question concerning the need to assess fear sensitivity when evaluating Lykken's characterization of primary and secondary psychopathy. We acknowledge that Lykken (1995) would not have advocated a test of his BIS prediction that used the WAS to subtype the psychopathic groups. In 1995, he wrote: "Newman and colleagues at Wisconsin have sometimes employed one of these neuroticism measures (the Welsh Anxiety Scale) together with Hare's PCL, treating the subgroup of 'low anxious psychopaths' (prisoners high on the PCL but low on neuroticism) as if they were a purified group of 'real' psychopaths...there is no clear theoretical justification for this practice" (p. 128). However, the goal of the Newman et al. study was to evaluate the use of WAS for distinguishing primary and secondary psychopathy groups. To the extent that weak BIS functioning represents a valid indicator of primary psychopathy, it affords a relatively objective opportunity to evaluate this diagnostic strategy. Although Lykken's endorsement of BIS functioning as an important correlate of primary psychopathy dictated the dependent variable, his particular biases need not dictate the independent variable.

Regarding the claim that the Newman et al. study included no other BIS functions (e.g., inhibitory behavior), it should be noted that Newman and colleagues have published numerous papers showing that offenders characterized by a combination of low WAS and high PCL scores are deficient in passive avoidance learning – a core aspect of BIS functioning emphasized by Lykken (1995). Moreover, in a direct comparison of using the MPQ Harmavoidance rather than WAS to distinguish a group of offenders with primary psychopathy, Newman and Schmitt (1998) found that the

WAS was more successful in identifying a subgroup of psychopathic offenders who displayed deficient passive avoidance learning.

Beyond the logical problems with the assertion that Newman et al. (2005) should have included “a plausible index of fear sensitivity”, we believe that the tendency to characterize measures like the BIS as measures of neuroticism versus fearlessness based on their correlations with anxiety and Harmavoidance is problematic. This is especially true because the evidence establishing Harmavoidance as a gold standard assessment of fearlessness simply does not exist. In the interest of broadening the inquiry regarding the nature of Carver and White’s (1994) BIS scale we examined its association with other measures that have been linked to fearlessness using data from two separate prison projects. Although BIS scores were only weakly correlated with [$r(850) = .190$] or unrelated to [$r(524) = .057$] MPQ Harmavoidance scores, they were moderately correlated with the MPQ Fearless Dominance dimension (Benning, Patrick, & Iacono, 2005; $r(850) = -.436$ and $r(524) = -.448$). Moreover, these correlations with Fearless Dominance equaled or exceeded correlations for the MPQ Harmavoidance scale, $r(877) = -.410$ and $r(542) = -.428$. Although PCL-R Factor 1 scores cannot be equated with fearlessness, a variety of investigators have linked these two variables both theoretically and empirically (Lykken, 1995; Patrick, 2007). In this context then, it is worth noting that BIS scores were significantly correlated with PCL-R Factor 1 scores [$r(904) = -.168$], PCL-SV Factor 1 scores [$r(976) = -.155$], and Factor 1 of the PPI-short version, $r(300) = -.445$. Correlations for the Harmavoidance scale were similar though uniformly smaller, $r(877) = -.132$, $r(541) = -.045$, and $r(216) = -.355$. Thus, the BIS scale performs as well as the Harmavoidance scale in predicting other psychopathy-related variables that have been associated with fearlessness.

4.3. Is a research moratorium justified?

Based on their concerns, Poythress and colleagues called for a “moratorium on the use of the BIS scale to test Lykken’s theory of primary psychopathy” (p. 269). As researchers, we believe that collecting data to clarify relationships and test hypotheses is a valuable endeavor. Thus, recommending a “moratorium” on a particular type of research seems to us extreme. Such a declaration may be warranted when participants in a medical trial develop life threatening consequences, but not when you disagree with someone’s interpretation of a measure or it threatens your view of a clinical phenomenon. While the BIS scale may not tap Lykken’s construct of fearlessness as operationalized by the APQ and Harmavoidance scales, concerns about using the BIS scale to evaluate Lykken’s model are more appropriately aimed at Lykken’s claims regarding the link between his fearlessness construct and Gray’s (1987) model than the Carver and White (1994) scale.

In our view, much of the confusion surrounding these issues stems from the assertion that Harmavoidance is a pure measure of fearlessness and that it is the only acceptable method for identifying primary psychopathy. Although Lykken (1995), Lilienfeld (1994), and Poythress et al. all identify the MPQ Harmavoidance scale as a superior measure of Lykken’s fearlessness construct, this measure is not without limitations. As noted by Poythress et al., one problem is that “several MPQ-HA items juxtapose a risky option (e.g., ‘Riding a long stretch of rapids in a canoe’) with one that is boring and tedious (e.g., ‘Waiting for someone who’s late’). Indeed, it seems paradoxical that critics of traditional anxiety measures have touted the Harmavoidance scale as a pure measure of fearlessness when its items tap diverse motivational priorities that appear to transcend fear. It seems to us a large and unwarranted leap to interpret preference for risky versus boring choices as a precise measure of fearlessness or trait-like differences in BIS

activation. Given the nature of the items, it seems likely that a person’s responses to them would be influenced by a variety of other variables, including thrill seeking, impulsivity, optimism regarding risks, poor reflectivity, and low boredom tolerance. Although Poythress and colleagues expressed concern about the lack of evidence supporting the validity of the BIS scale in prisoners, they presented no evidence to support the superior coverage and specificity of the Harmavoidance scale, other than its association with the highly related APQ.

To address this concern, we conducted hierarchical multiple regression analyses to examine the Harmavoidance scale’s association with Gray’s BIS and BAS constructs using both the Carver and White (1994) and Torrubia et al. (2001) measures of these constructs. After standardizing the measures, we entered the BIS and BAS related scales at Step 1 and their interaction at Step 2. Neither interaction approached significance. In both analyses, the zero-order and partial correlations were quite similar. For the Carver and White scales ($N = 826$), the standardized Beta coefficients for the BIS and BAS scales were $+.213$ and $-.279$, respectively. For the Torrubia et al. measures ($N = 516$), these Beta coefficients were $+.159$ and $-.141$, respectively. Thus, across measures, the Harmavoidance scale appears to reflect an equal balance of BIS and BAS related influences. This pattern of results lends substance to the potential limitations cited by Poythress and colleagues and suggests that any disinhibited behavior associated with low Harmavoidance scores probably reflects a combination of approach and avoidance influences rather than fear or BIS alone. Thus, it appears that using the Harmavoidance scale, as opposed to anxiety or the Carver and White BIS scale, is no guarantee that one is truly measuring individual differences in fearlessness or Gray’s BIS construct.

For some, a major advantage of the Harmavoidance scale over traditional anxiety scales is that it is sometimes associated with measures of psychopathy (e.g., Lilienfeld, 1994) and may distinguish Cleckley psychopaths from non-prison controls (e.g., Lykken, 1957). Given the nature of its items and its association with measures of BIS and BAS, we reasoned that such associations with psychopathy are likely to reflect the impulsive/antisocial lifestyle component rather than the affective/interpersonal features that distinguish psychopathy from normal impulsivity and antisocial personality disorder. Consistent with this view, the MPQ Harmavoidance scale correlated well with the impulsive antisociality dimension identified by Benning et al. (2005; $r(542) = -.225$), the impulsive/erratic lifestyle dimension of the Self-Report Psychopathy Scale-III (Paulhus, Hemphill, & Hare, in press; $r(213) = -.392$), and Factor 2 of the PCL-R ($r(843) = -.218$). When we examined the specific items of Hare’s PCL-R, we found that Harmavoidance was most strongly associated with Item 3 (Proneness to boredom/need for stimulation, $r(875) = -.310$) and Item 14 (Impulsivity, $r(876) = -.214$). It was most strongly associated with Item 7 (Impulsive) of the PCL-SV, $r(540) = -.240$. These and other analyses are consistent with the view that Harmavoidance is significantly related to behavioral approach and impulsivity and there is little or no evidence that this association is mediated by fear in particular. To the extent that Harmavoidance is equally associated with BIS and BAS, it is unlikely to be very useful in distinguishing between primary and secondary psychopathy (i.e., those whose antisocial conduct reflects insensitivity to punishment cues as opposed to hypersensitivity to reward cues). We strongly encourage proponents of the Harmavoidance scale as a superior measure of fearlessness to document the validity, and especially the discriminant validity of this scale as a measure of fearlessness and primary psychopathy.

In summary, we propose that the problems associated with using the BIS/BAS scales to address psychopathy are overstated and potentially misleading. Rather than proposing a moratorium on such research, we believe that more research is needed to

evaluate the oft-repeated but largely unsubstantiated conclusions that have led to confusion in this area.

Acknowledgements

Research described in this manuscript was supported by the National Institute of Mental Health. We gratefully acknowledge the outstanding cooperation of inmates, prison staff, and administrative officials from the Wisconsin Correctional System.

References

- Benning, S. D., Patrick, C. J., & Iacono, G. W. (2005). Psychopathy, startle blink modulation, and electrodermal reactivity in twin men. *Psychophysiology*, *42*, 753–762.
- 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*, 319–333.
- Cleckley, H. M. (1941). *The mask of sanity: An attempt to reinterpret the so-called psychopathic personality*. St. Louis: The C.V. Mosby Company.
- Eysenck, H. J., & Eysenck, S. B. G. (1975). *Manual of the Eysenck personality questionnaire (adult)*. London: Hodder & Stoughton.
- Gray, J. A. (1981). A critique of Eysenck's theory of personality. In H. J. Eysenck (Ed.), *A model for personality* (pp. 246–276). New York: Springer.
- Gray, J. A. (1982). *The neuropsychology of anxiety*. New York: Oxford University Press.
- Gray, J. A. (1987). *The psychology of fear and stress*. New York: Cambridge University Press.
- Gray, J. A. (1991). Fear, panic, and anxiety: What's in a name? *Psychological Inquiry*, *2*, 77–78.
- Hare, R. D. (2003). *The hare psychopathy checklist-revised* (2nd ed.). Toronto, ON: Multi Health Systems.
- Hiatt, K. D., & Newman, J. P. (2006). Understanding psychopathy: The cognitive side. In C. J. Patrick (Ed.), *Handbook of psychopathy* (pp. 334–352). New York, NY: Guilford Press.
- Hiatt, K. D., Schmitt, W. A., & Newman, J. P. (2004). Stroop tasks reveal abnormal selective attention among psychopathic offenders. *Neuropsychology*, *18*(1), 50–59.
- Lilienfeld, S. O. (1994). Conceptual problems in the assessment of psychopathy. *Clinical Psychology Review*, *14*, 17–38.
- Lykken, D. T. (1957). A study of anxiety in the sociopathic personality. *Journal of Abnormal and Social Psychology*, *9*, 6–10.
- Lykken, D. T. (1995). *The antisocial personalities*. Hillsdale, NJ, England: Lawrence Erlbaum.
- Lykken, D. T., Tellegen, A., & Katzenmeyer, C. (1973). *Manual for the activity preference questionnaire*. Minneapolis: University of Minnesota.
- Mathews, A., Yiend, J., & Lawrence, A. D. (2004). Individual differences in the modulation of fear-related brain activation by attentional control. *Journal of Cognitive Neuroscience*, *16*, 1683–1694.
- Newman, J. P. (2008). Personality correlates of the BIS/BAS scales. Unpublished data.
- Newman, J. P., & Brinkley, C. A. (1997). Reconsidering the low-fear explanation for primary psychopathy. *Psychological Inquiry*, *8*, 236–244.
- 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*(2), 319–323.
- Newman, J. P., & Schmitt, W. A. (1998). Passive avoidance in psychopathic offenders: A replication and extension. *Journal of Abnormal Psychology*, *107*(3), 527–532.
- Patrick, C. J. (2007). Getting to the heart of psychopathy. In H. Hervé & J. C. Yuille (Eds.), *The psychopath: Theory, research, and practice* (pp. 207–252). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.
- Paulhus, D. L., Hemphill, J. D., & Hare, R. D. (in press). *Manual for the self-report psychopathy scale*. Toronto: Multi-Health Systems.
- Poythress, N. G., Edens, J. F., Landfield, K., Lilienfeld, S. O., Skeem, J. L., & Douglas, K. S. (2008). A critique of behavioral inhibition scale (BIS) for investigating theory of primary psychopathy. *Personality and Individual Differences*, *45*, 269–275.
- Schmitt, W. A., & Newman, J. P. (1999). Are all psychopathic individuals low-anxious? *Journal of Abnormal Psychology*, *108*, 353–358.
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the state-trait anxiety inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Tellegen, A., & Waller, N. G. (1992). *Exploring personality through test construction: Development of the Multi-dimensional Personality Questionnaire (MPQ)*. Unpublished manuscript. Department of Psychology, University of Minnesota.
- Torrubia, R., Ávila, C., Moltó, J., & Caseras, X. (2001). The sensitivity to punishment and sensitivity to reward questionnaire (SPSRQ) as a measure of Gray's anxiety and impulsivity dimensions. *Personality and Individual Differences*, *31*, 837–862.
- Watson, D., & Clark, L. A. (1984). Negative affectivity: The disposition to experience aversive emotional states. *Psychological Bulletin*, *96*, 465–490.
- Welsh, G. (1956). Factor dimensions A and R. In G. S. Welsh & W. G. Dahlstrom (Eds.), *Basic readings on the MMPI in psychology and medicine* (pp. 264–281). Minneapolis: University of Minnesota Press.