FEAR AND LOATHING IN PSYCHOPATHS: A META-ANALYTIC INVESTIGATION OF THE FACIAL AFFECT RECOGNITION DEFICIT

KEVIN WILSON
MARCUS JUODIS
Dalhousie University

STEPHEN PORTER
University of British Columbia

Several studies have identified an association between psychopathy and deficits in facial affect recognition. Although this finding is widely seen as providing strong evidence for amygdala dysfunction in psychopaths, this interpretation is challenged by studies finding no recognition impairments. An alternative hypothesis predicts that recognition deficits are dynamic and are influenced by verbal processing demands. These competing hypotheses were tested via a meta-analysis of 22 investigations of psychopathy (N = 1,387 participants) using the facial affect recognition paradigm. Results indicated that studies entailing a verbal response style found larger recognition deficits for emotions processed by the left amygdala. The findings of this review offer an alternative to currently popular theories of psychopathy and suggest that future research should consider response style when investigating facial affect recognition deficits in this population.

Keywords: psychopathy; face recognition; emotion; affect; violence; aggression; meta-analysis

Psychopathy is a personality disorder whose importance in the justice system has become increasingly recognized (Häkkänen-Nyholm & Hare, 2009; Walsh & Walsh, 2006). With a prevalence of about 1% in the general population (Hare, 2003), psychopaths cause an enormous amount of suffering in society. There is a clear association between psychopathy and criminal recidivism (e.g., Leistico, Salekin, DeCoster, & Rogers, 2008; Porter, ten Brinke, & Wilson, 2009; Serin, 1996), institutional misconduct (Guy, Edens, Anthony, & Douglas, 2005), “cold blooded” aggression (Woodworth & Porter, 2002), and poor, possibly even negative, treatment outcomes (Seto & Barbaree, 1999; cf. Barbaree, 2005). These associations underscore the importance of generating a better understanding of the underpinnings of the disorder.

Many researchers believe that a profound affective impairment is at the core of psychopathy and that this contributes to its association with violence (see Blair, 2005; Hare, 1993). From this perspective, psychopaths may be unable—at the neurobiological level—to comprehend the emotions of others. The facial affect recognition paradigm, which requires participants to attempt to categorically sort presented faces by their emotional expressions, has generated inconsistent findings. For example, Blair, Mitchell, Peschardt, et al. (2004)
found large deficits in fear recognition in psychopaths, whereas Woodworth and Waschbusch (2008) reported that children with psychopathic traits were better at recognizing fear expressions. Finally, some studies have found a complete absence of affect recognition deficits in psychopaths (e.g., Glass & Newman, 2006). Given the central role of emotion recognition deficits in the conceptualization of psychopathic violence (Blair, Mitchell, & Blair, 2005), it is critical that we better understand the nature of psychopathy-related facial affect recognition deficits. After using attention cues in an attempt to manipulate affect recognition deficits and finding no impairments associated with psychopathy, Glass and Newman (2006) urged researchers to seek the reason behind the field’s variable findings and added that “the first step would be to contrast studies that have found deficits in face recognition with those that have not to identify procedural differences that could account for the discrepant findings” (p. 819).

This meta-analysis examines published and unpublished studies testing the relationship between psychopathy and deficits in facial affect recognition. Several methodological variables and sample characteristics of studies were compared in an attempt to account for the discrepancies observed in the literature. Results are discussed in relation to two relevant and competing neurobiological models of psychopathy: (a) the integrated emotion systems (IES) model (Blair, 2005) and (b) the left hemisphere activation (LHA) hypothesis (Kosson, 1998).

The IES model of psychopathy suggests that amygdala dysfunction is central to the disorder (Blair, 2005). This model is supported by evidence showing that psychopaths are impaired in passive avoidance learning (Blair, Mitchell, Leonard, et al., 2004b) and in reacting to aversive stimuli (Verona, Patrick, Curtin, Bradely, & Lang, 2004), both of which appear to rely on the amygdala (Angrilli et al., 1996; Labar, LeDoux, Spencer, & Phelps, 1995). This model has received considerable empirical support (e.g., in studies comparing the similarities of psychopaths and amygdala-damaged patients; Mitchell, Fine, et al., 2006) but is unable to account for evidence from cognitive paradigms. For example, Mayer, Kosson, and Bedrick (2006) found that moderate language processing affected selective attention in psychopaths more so than in nonpsychopaths. This, and similar findings (e.g., Kosson, 1998; Lorenz & Newman, 2002), cannot be readily explained by the IES model of psychopathy.

On the other hand, the LHA hypothesis suggests that psychopathy is associated with information-processing deficits only when the left hemisphere of the brain is taxed more than the right hemisphere (Kosson, 1998). This model has been tested primarily through the use of cognitive tasks with both psychopathic and nonpsychopathic individuals. The results have typically shown that whenever the left, but not right, hemisphere of the brain is preferentially required for the completion of a task (e.g., preferential use of the right hand, language processing), psychopaths perform worse than control participants do (e.g., Lopez, Kosson, & Weissman, 2007; Lorenz & Newman, 2002; Mayer et al., 2006). Whereas the LHA hypothesis accounts for cognitive findings not accommodated by other models, the extent to which the left hemisphere must be differentially activated in order to elicit processing deficits is highly ambiguous, making the generation of specific hypotheses somewhat difficult (see Blair et al., 2005).

A meta-analysis of studies using the facial affect recognition paradigm allows a test the predictions of these models. Each model makes multiple predictions regarding the pattern of impairment in emotion recognition. Specifically, the IES model predicts that deficits in facial affect recognition associated with psychopathy will be similar to those in patients with
circumscribed/focal amygdala damage (e.g., Adolphs & Tranel, 2004; Graham, Devinsky, & Labar, 2007). In particular, psychopathy should be associated with consistent deficits in the recognition of fear, anger, and sadness, although these deficits may occur with varying degrees of impairment (Adolphs et al., 1999). Further, the deficit in the recognition of fearful expressions should be ameliorated with the provision of explicit instructions to attend to the eyes of the target face, as is the case with amygdala-damaged patients (Adolphs et al., 2005).

The LHA hypothesis, by contrast, predicts that deficits in facial affect recognition associated with psychopathy should be dependent on left hemisphere activation (Kosson, 1998). Although the level of activation needed to cause deficits is unknown (Blair et al., 2005), it should be the case that, broadly, circumstances characterized by the highest left hemisphere activation should be associated with greater impairment than those characterized by less left hemisphere activation. Specifically, generating a verbal description while processing an emotion would be associated with worse recognition than when responding nonverbally, such as by pressing a button matched to a specific emotion. Despite the ambiguity of this theoretical model, it seems reasonable to predict that the deficits in affect recognition will occur across all emotions, as the impairments are linked to verbal processing rather than to emotionality itself. This model should further predict that psychopathy will be associated with poor recognition of ambiguous threatening facial expressions (i.e., those where the face is oriented away from the viewer), as these appear to require greater activation of left hemisphere resources than do unambiguous threat expressions (see Adams, Gordon, Baird, Ambady, & Kleck, 2003).

METHOD

LITERATURE SEARCH

We conducted searches of the psycINFO, PubMed, Social Work Abstracts, and ProQuest databases; Dr. Robert Hare’s website on psychopathy (hare.org/references); and Google (google.com), using combinations of the following keywords and their variants: psychopath, psychopathy, facial affect/expression, emotion recognition, and social information processing. In addition, reference sections of all papers located in this manner were reviewed for other relevant studies. Further, we collected all dissertations and theses that were identified through the above-mentioned search procedures. These methods revealed 25 (20 published, 5 unpublished) studies as of December 31, 2009.

INCLUSION AND EXCLUSION CRITERIA

Given the limited number of studies obtained from the literature search, we attempted to be as inclusive as possible while maintaining the validity of the analysis. To be included, studies were required to meet all of the following criteria: First, studies must have tested the association between psychopathy and facial affect recognition accuracy. Second, they must have presented sufficient statistical information in order to allow the calculation of effect size, namely, correlation coefficients. Third, an acceptable operational definition of psychopathy (and not simply Antisocial Personality Disorder) was required. Most of the included studies used common measures of psychopathy that are regularly used in research
and clinical settings as operational definitions of the construct (e.g., Psychopathy Checklist–Revised; Hare, 2003). In one study conducted in a community setting, the reported statistics represented only the callous emotional style associated with psychopathy (Dadds et al., 2006), whereas most other studies presented total psychopathy scores on their respective measures. We elected to include the effect sizes from this study, but we conducted analyses that both included and excluded this study (see the Results section).

Of the 25 studies retrieved through the search, 22 (23 independent effect sizes) were included in the meta-analytic component of this review article (marked in the Reference section by asterisks); 3 were excluded on the basis of violating at least one of the criteria detailed above. Haseley (2005) was excluded for its use of ambiguous sketches of human facial expressions and was considered to have not fulfilled the first criterion (i.e., did not test facial affect recognition per se). Hansen, Johnsen, Hart, Waage, and Thayer (2008) and Moore (2003) were excluded for not fulfilling the second criterion (i.e., reported statistics were not amenable to meta-analytic techniques). In an attempt to obtain the necessary statistics for our analyses, we contacted the corresponding authors of these papers, but we did not receive responses.

CODING OF METHODOLOGICAL VARIABLES

Studies were classified across three potential moderator variables. Response style was coded as either verbal or nonverbal. Studies in which participants responded by generating a verbal response (i.e., saying “fear” aloud) were coded as having used a verbal response style. Studies in which participants responded by pressing a button or circling options on paper were coded as having used a nonverbal response style. Studies were also coded for the nature of the sample (i.e., forensic or community). Participants in forensic samples typically were recruited in prisons or similar settings, whereas those in community samples were made up primarily of undergraduates.

Effect sizes are presented such that positive effect sizes indicate an affect recognition deficit, whereas negative effect sizes indicate an increased ability to recognize facial affect relative to control participants’ ability. All statistical analyses were conducted using the Comprehensive Meta-Analysis software (Version 2.0; Biostat, 2002). Analyses are weighted by the sample size associated with each individual effect size using weighted least squares regression. In recent years, random effects models have become viewed as generally more valid (Hunter & Schmidt, 2000); however, the relative benefits of using a random versus fixed effects model appear to break down when examining small numbers of studies (≤30), and the conservative nature of random effects models would make it difficult to discern specific patterns of moderators in a small meta-analysis (Schulze, 2007). For these reasons, we elected to use fixed effects models for our analyses.

RESULTS

ARE THERE RECOGNITION DEFICITS?

To test whether there is a consistent deficit in affect recognition in association with psychopathy across various emotions, we compared each point estimate effect size to zero.
These analyses revealed only very small positive correlations between psychopathy and affect recognition deficits for all emotions (i.e., fear, sadness, anger, surprise, disgust, and happiness), as shown in Table 1. All associations were significantly different from zero or approached significance in this regard. Correlations for fear ($r_w = .10$) and sadness ($r_w = .12$) were the largest observed deficits.

### Examination of Potential Moderators

We conducted a series of tests to examine the degree of heterogeneity of effect sizes present in the studies being examined. We used a common test, Cochran’s $Q$, to examine the extent to which effect sizes in the literature cluster around a single mean, with a positive test indicating significantly more heterogeneity of effect sizes than would be expected by chance alone. There was significant or marginally significant heterogeneity for the emotions fear, $Q(20) = 67.55$, $p < .001$, and anger, $Q(15) = 24.44$, $p < .06$. The tests were not significant for the other emotions examined; however, because we have specific hypotheses being tested and because this test is often viewed as underpowered (Schulze, 2007), we conducted our moderator analyses on all examined emotions.

To examine the effect of response style (verbal vs. nonverbal) on facial affect recognition deficits in psychopathy, we conducted a series of $Q$ tests, which act as analogues to analyses of variance in meta-analyses. As can be seen in Table 1, these tests revealed differences between effect sizes for studies using verbal and nonverbal response styles for the emotions fear, sadness, and anger. For all three emotions, studies using a verbal response style reported greater deficits in association with psychopathy than did studies using a nonverbal response style. For the other emotions, the $Q$ tests indicated no differences in effect size occurring as a function of response style.

Although not directly related to the predictions generated by the models being tested, we considered that other factors might act as moderators within this field. To examine this, we conducted $Q$ tests comparing forensic and community samples. These tests revealed no significant differences between the two sample sources in terms of psychopathy-related affect recognition deficits. Similarly, we used regression analyses to plot each study’s mean age against its weighted effect size for each emotion. These analyses revealed no association between the age of each sample and the reported effect sizes for any emotion. Together, these findings indicate that response style, but not sample source or age, is related to the

### TABLE 1: Weighted Effect Sizes ($r_w$) of the Recognition Deficit Association With Psychopathy Across Response Styles and Emotions

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Verbal</th>
<th>Nonverbal</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fear</td>
<td>.21**</td>
<td>.06*</td>
<td>.10** [Q(1) = 4.88, $p &lt; .05$]</td>
</tr>
<tr>
<td>Sadness</td>
<td>.22**</td>
<td>.09*</td>
<td>.12** [Q(1) = 2.99, $p = .09$]</td>
</tr>
<tr>
<td>Anger</td>
<td>.19**</td>
<td>.02</td>
<td>.06† [Q(1) = 5.08, $p &lt; .05$]</td>
</tr>
<tr>
<td>Disgust</td>
<td>.05</td>
<td>.11**</td>
<td>.09† [Q(1) = .47, $p = .49$]</td>
</tr>
<tr>
<td>Surprise</td>
<td>.08</td>
<td>.09</td>
<td>.09† [Q(1) = .01, $p = .94$]</td>
</tr>
<tr>
<td>Happiness</td>
<td>.00</td>
<td>.09*</td>
<td>.07* [Q(1) = .92, $p = .34$]</td>
</tr>
</tbody>
</table>

*Note. Cochran $Q$ values represent differences between studies using verbal and non-verbal response styles. For effect sizes different from zero: †$p < .10$, *$p < .05$, **$p < .01$.*
extent to which psychopathy is associated with impaired emotional processing, although
only for the emotions fear, sadness, and anger.

Two studies (Dadds et al., 2006; Gordon, Baird, & End, 2004) were individually entered
into and removed from the analyses above, as they provided effect sizes that were different
in some regards from others in the analyses (i.e., limited measure of psychopathy, modified
affect recognition method). The outcomes of the analyses were virtually identical to those
presented above. The only notable change in the pattern of findings was that the mean
weighted correlation between psychopathy and fear recognition accuracy in studies using
nonverbal response styles was no longer significantly greater than zero when both studies
were absent from the analyses.

**DISCUSSION**

Are psychopaths unable to comprehend emotion in the faces of others? Although evi-
dence for such a deficit has emerged from several studies over the past decade, others have
yielded opposing findings. We examined the possible association by conducting a meta-
analysis that considered response style, sample source, and age as potentially critical factors
influencing the relationship. The findings indicated that overall psychopathy was associ-
ated with very small deficits for all emotions. This pattern of findings is, at first glance,
inconsistent with the often-reported notion that individuals with psychopathy are unable to
process primarily negative emotions; however, a plausible explanation for this involves the
sizes of said deficits. Aside from the effect sizes for fear and sadness, overall deficits were
extremely small ($r < .10$), and most studies in this field would likely have insufficient
power to detect such limited effects.

With regard to the predictions being tested, we found that neither model precisely fits
the data. The IES model predicted that there would be deficits in the recognition of fear,
sadness, and anger across both response styles, whereas the LHA hypothesis predicted that
there would be deficits in the recognition of all emotions but only in studies where a verbal
response was required. In contrast to both predictions, we found that response style acted
as a moderator but only for the emotions fear, sadness, and anger.

Although there is an insufficient number of studies to test using meta-analysis, the models
generated other predictions as well. For example, the IES model predicted that psychopathy-
related fear recognition deficits might be corrected by instruction to attend to the eye region
of faces. This prediction has been confirmed by recent studies (e.g., Dadds et al., 2006).
Meanwhile, the LHA hypothesis predicted that ambiguous facial expressions would be
more difficult for psychopathic individuals to recognize. This finding also has been sup-
ported in the literature, with a study by Montagne et al. (2005) reporting that psychopathy
was associated with impaired processing of ambiguous fearful faces, whereas deficits for
nonambiguous expressions were less apparent. It would then appear that both hypotheses
are partially consistent with the available evidence but are unable to account for the con-
firmed predictions of the IES model.

One explanation for this pattern may be found in examining where in the brain such
emotional expressions are processed. There is evidence that the emotions fear, anger, and
sadness are processed preferentially by the left amygdala (Adams et al., 2003; Killgore &
Yurgelun-Todd, 2001; Morris, Ohman, & Dolan, 1998; cf. Blair, Morris, Frith, Perrett, & Dolan, 1999), particularly when processed verbally (see Markowitsch, 1998). Further, the processing of ambiguous facial expressions (Adams et al., 2003), as well as automatic processing information from the eye region of fearful faces, appears to require the left amygdala (Hardee, Thompson, & Puce, 2008). This suggests that the formerly disparate predictions of the LHA hypothesis and IES model might share a commonality within the left amygdala. Thus, it might be suggested that damage to the left amygdala can account for the collective predictions of the LHA and IES in the context of the facial affect recognition paradigm.

Of course, experimental work in psychopathy has not been limited to facial affect recognition, and such a perspective seems unable to account for findings outside of this paradigm. Currently, we are unaware of evidence linking the left amygdala to the pattern of cognitive deficits observed in psychopathic individuals (Kosson, 1998), and so damage to this region would not, on its own, account for all findings in the literature. An alternative position might suggest that the left amygdala is not itself functionally impaired but that its activation in some way contributes to whatever as-yet-unknown mechanism underlies the original LHA hypothesis. Such a refined LHA hypothesis might be able to account for the findings of this meta-analysis, as well as for past studies demonstrating left-hemisphere-specific cognitive deficits, although ultimately such a position requires empirical validation.

The fact that facial affect recognition deficits associated with psychopathy can be reduced or eliminated by instruction to focus on the eye region of faces (see Dadds et al., 2006), or possibly by reducing the need to use left hemisphere resources, opens up potential avenues for research within this paradigm. Specifically, it is currently believed that the inability of psychopathic individuals to process fear expressions strips them of an important, empathy-related protective factor against aggressive behavior (see Marsh & Blair, 2008). The possibility of influencing emotional processing in this population might offer an avenue for future treatment attempts, although it is currently unknown whether improving affect recognition will necessarily lead to increased empathy or allow psychopathic individuals to act on such information reliably. Moreover, recent studies using alternate paradigms to express emotion recognition have found that individuals with psychopathic traits have an enhanced ability to detect vulnerability in others (Book, Quinsey, & Langford, 2007; Wheeler, Book, & Costello, 2009; Wilson, Demetrioff, & Porter, 2008), which opens up the possibility that enhancing emotion recognition might actually be counterproductive in this population.

Some limitations to our review should be considered. First, there were a limited number of studies with which to conduct analyses. This limited our ability to test all probative variables, such as the lab of origin for each study or the measure of psychopathy used. Second, studies using nonverbal response styles were likely not entirely devoid of left hemisphere activation. Specifically, the majority of participants responding by tapping a key were likely to have used their right hands. While not relevant to the predictions of the IES model, the LHA hypothesis is entirely dependent on differential hemispheric processing. Previous research suggests that using either the left or right hand while responding can affect how psychopaths process emotions (e.g., Lorenz & Newman, 2002); however, within the facial affect recognition paradigm itself, evidence that responding with the right as opposed to the left hand increases recognition deficits in psychopathy is lacking. For example, Kosson, Suchy, Mayer, and Libby (2002) found that psychopathy was associated with impaired
recognition of disgust when responding with the left hand and with enhanced recognition of anger when responding with the right hand. These findings, if we assume that the majority of nonverbal responses in studies included in our analyses were done using the right hand, are inconsistent with the overall patterns seen in the current meta-analysis. Despite this, it must be noted that response hand is theoretically relevant to this topic and that it was not possible to account for this factor in the current article.

In conclusion, the findings of this review suggest that the emotional face-processing deficits in psychopathy are dynamic, depending on whether verbal processing is required in response. Our findings indicate that other factors, such as the age or origin of the sample (i.e., forensic vs. community), do not influence the association between psychopathy and affect recognition deficits; however, this pattern of results may change as more empirical work emerges. We recommend that, rather than testing whether a given finding is consistent with a single theory, future research should attempt to create differential tests of multiple theories of psychopathy.

REFERENCES

References marked with an asterisk indicate studies included in the meta-analysis.


Kevin Wilson is a research associate at Dalhousie University. His main interests include psychopathy, emotional professing, credibility assessments, and deception detection.

Marcus Juodis is a graduate student in the forensic stream of Dalhousie University’s clinical psychology PhD program. To date, his research has focused on homicide, assessment of risk for violence, psychopathy, and credibility assessment and deception detection.

Stephen Porter is a professor of psychology and the director of the Centre for the Advancement of Psychological Sciences and the Law at the University of British Columbia. His research focuses on psychopathy and violence, deception detection, and forensic aspects of memory.