Utilitarian moral judgment in psychopathy

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Psychopathic behavior is characteristically amoral, but to date research studies have largely failed to identify any systematic differences in moral judgment capability between psychopaths and non-psychopaths. In this study, we investigate whether significant differences in moral judgment emerge when taking into account the phenotypic heterogeneity of the disorder through a well-validated distinction between psychopathic subtypes. Three groups of incarcerated participants [low-anxious psychopaths ($n = 12$), high-anxious psychopaths ($n = 12$) and non-psychopaths ($n = 24$)] completed a moral judgment test involving hypothetical dilemmas. The moral dilemmas featured 'personal' (i.e. involving direct physical harm) or 'impersonal' (i.e. involving indirect or remote harm) actions. Compared to non-psychopaths, both groups of psychopaths were significantly more likely to endorse the impersonal actions. However, only the low-anxious psychopaths were significantly more likely to endorse the personal harms when commission of the harm would maximize aggregate welfare—the 'utilitarian' choice. High-anxious psychopaths and non-psychopaths did not significantly differ in their personal moral judgments. These results provide novel laboratory evidence of abnormal moral judgment in psychopaths, as well as additional support for the importance of considering psychopathic subtypes.

INTRODUCTION

Psychopaths are notorious for their amoral behavior. The question of whether or not psychopaths know right from wrong (in other words, whether or not they possess the capacity for normal moral judgment) has long intrigued psychopathy researchers. For example, in his seminal clinical descriptions of the disorder, Cleckley questions whether psychopaths are in fact 'moral imbeciles' (Cleckley, 1941). Despite the long-standing interest in this topic, there is limited experimental data on the psychopath's ability to formulate normal moral judgments. The initial research in this area focused exclusively on assessing psychopaths' developmental level of moral reasoning as per Kohlberg's influential six-stage model, which postulated a progression from lower egocentric levels to higher levels reflecting proper socialization and an appreciation of universal ethical principles (Kohlberg, 1969). Results from these studies were mixed, with some indicating lower levels of moral reasoning among psychopaths relative to non-psychopaths (Fodor, 1973; Jurkovic and Prentice, 1977), some indicating higher levels (Link et al., 1977) and some indicating no significant difference (Lee and Prentice, 1988; Trevathan and Walker, 1989).

A subsequent study examined the ability of psychopaths to distinguish 'moral' transgressions from 'conventional'

transgressions (Blair, 1995). In this study, 'moral' transgressions were defined as acts that violate the welfare of others (e.g. a child hitting another child), whereas 'conventional' transgressions were defined as acts that violate rules or social convention but do not directly affect the welfare of others (e.g. a male child wearing a skirt). Non-psychopaths rated the moral transgressions as significantly less permissible, significantly more serious and significantly less dependent on authority than the conventional transgressions. Psychopaths, on the other hand, failed to distinguish between moral and conventional transgressions on any of these ratings. However, this effect was driven by the psychopaths' abnormally severe judgments of the conventional transgressions; psychopaths rated the moral transgressions normally.

In more recent years, a moral decision-making test that distinguishes between 'personal' and 'impersonal' harms (Greene et al., 2001, 2004) has been used to explore the psychological and neurobiological processes underlying moral judgment. In this test, the subject decides whether or not it is hypothetically appropriate to commit some type of harm or violation in order to achieve a particular favorable outcome. The 'personal' harms involve direct, intimate, physical contact (e.g. pushing one person off a bridge to stop a runaway train car from hitting five people), whereas 'impersonal' harms involve more indirect or remote actions (e.g. pulling a switch to divert a runaway train car from hitting five people) or rule violations (i.e. lying on income taxes to save money). A subset of the personal scenarios feature the choice of whether or not to commit a direct physical harm to a single individual in order to preserve the

welfare of a larger number of individuals. For these 'high-conflict' scenarios, the choice to sacrifice one for the greater welfare of others is considered a 'utilitarian' response, reflecting greater concern for the mathematically rational ends than the emotionally aversive means (Greene et al., 2004, 2008; Koenigs et al., 2007). Dilemmas of this nature have been used to demonstrate abnormally utilitarian moral judgment in clinical populations with known deficits in social/emotional processing, such as patients with lesions involving ventromedial prefrontal cortex (vmPFC) (Ciaramelli et al., 2007; Koenigs et al., 2007; Moretto et al., 2010) and patients with frontotemporal dementia (FTD) (Mendez et al., 2005). The utilitarian response pattern in these clinical populations thus appears to reflect the reduced influence of affective processes that serve to qualify the more 'rational' aspect of moral decision-making (Greene, 2007; Koenigs et al., 2007). Given the striking social/emotional deficits observed in psychopaths, one might expect to find similarly utilitarian patterns of moral judgment. However, a recent study testing this hypothesis found no differences in utilitarian moral judgment between psychopaths and non-psychopaths (Cima et al., 2010).

One possible explanation for the ostensibly normal levels of utilitarian moral judgment among psychopaths is the heterogeneity of the disorder. For decades, psychopathy researchers have distinguished psychopaths with low levels of trait anxiety from those with high levels of trait anxiety (Lykken, 1957; Schmauk, 1970; Blackburn, 1975; Cleckley, 1976; Fagan and Lira, 1980; Newman et al., 1990; Newman et al., 1992; Arnett et al., 1993, 1997; Brinkley et al., 2004; Hiatt et al., 2004). This distinction is based on the theoretical perspective that in some cases psychopathy may reflect an innate affective and inhibitory deficit (the low-anxious or 'primary' subtype), whereas in other cases psychopathy may arise as an indirect consequence of other temperament-related traits—most commonly involving excessive emotionality or neurotic anxiety (the high-anxious or 'secondary' subtype) (Karpman, 1946, 1948; Cleckley, 1976; Lykken, 1995; Porter, 1996; Skeem et al., 2007; Blackburn et al., 2008). In a recent study using economic decision-making tests, we found that low-anxious psychopaths differed in their degree of 'rational' decision-making compared to non-psychopaths and high-anxious psychopaths (Koenigs et al., 2010). Moreover, consistent with the theoretical distinction between primary and secondary psychopathy, the low-anxious (but not high-anxious) psychopathic group's performance was remarkably similar to that of neurological patients with affective deficits due to vmPFC brain lesions.

In the present study, we seek to determine whether the low- and high-anxious subtypes of psychopath differ in their moral judgment. Using the personal/impersonal moral judgment task described above (Greene et al., 2001, 2004), we test the hypothesis that low-anxious psychopaths, but not high-anxious psychopaths, will exhibit abnormally utilitarian personal moral judgment.

METHODS

Participants

Participants were male inmates recruited from a medium security Wisconsin correctional institution. Inmates were eligible if they met the following criteria: under 45 years of age, IQ greater than 70, no history of psychosis or bipolar disorder, and not currently taking psychotropic medications. A total of 64 inmates met the inclusion criteria and participated in all study procedures. Informed consent was obtained both orally and in writing.

The Psychopathy Checklist-Revised (PCL-R) (Hare, 2003) was used to assess psychopathy. The PCL-R assessment involves a 60–90 min interview and file review to obtain information used to rate 20 psychopathy-related items as 0, 1 or 2, depending on the degree to which each trait characterizes the individual. A substantial literature supports the reliability and validity of PCL-R assessments with incarcerated offenders (Hare, 2003). To evaluate interrater reliability, a second rater who was present during interviews provided independent PCL-R ratings for eight inmates. The intraclass correlation coefficient was 0.85. PCL-R factors 1 and 2 scores were computed following procedures outlined in the PCL-R manual (Hare, 2003).

Participant groups

Participants were classified as psychopathic, if their PCL-R scores were 30 or greater ($n = 24$) and non-psychopathic if their PCL-R scores were 20 or less ($n = 24$) (Hare, 2003). Participants with intermediate PCL-R scores of 21–29 ($n = 16$) were not assigned to either group, and are omitted from the main analyses below. Following the convention of previous studies identifying psychopathic subtypes (Arnett et al., 1997; Newman et al., 1997; Schmitt et al., 1999; Lorenz and Newman, 2002; Brinkley et al., 2004; Hiatt et al., 2004; Koenigs et al., 2010), psychopaths were subdivided based on a median split of Welsh Anxiety Scale (WAS) scores (Welsh, 1956). Thus, in our sample low-anxious psychopathy was defined as having a PCL-R score of 30 or greater and a WAS score of 13 or less ($n = 12$), while high-anxious psychopathy was defined as having a PCL-R score of 30 or greater and a WAS score of 14 or greater ($n = 12$). The three participant groups (low-anxious psychopaths, high-anxious psychopaths and non-psychopaths; Table 1) did not significantly differ with respect to age or estimated IQ. Low-anxious psychopaths and high-anxious psychopaths did not significantly differ in terms of PCL-R total score, PCL-R Factor 1 score or PCL-R Factor 2 score.

Testing procedure

Participants made judgments on a series of 24 hypothetical moral scenarios, which were selected from a previously published set (Greene et al., 2001, 2004; Koenigs et al., 2007). In some cases, the original scenario language was modified so as to be more easily understood by inmates with limited reading skills. Each scenario was presented on a single sheet of

Table 1 Participant group characteristics

	Age	Est IQ	PCL-R total	WAS	PCL-R F1	PCL-R F2
Low-anxious psychopaths ($n = 12$)	35.0 (6.2)	97.1 (12.4)	32.1 (1.5)	5.7 (3.7)	12.6 (2.1)	16.5 (1.3)
High-anxious psychopaths ($n = 12$)	31.8 (6.3)	98.2 (11.2)	31.2 (1.7)	21.2 (6.8)	11.3 (1.4)	17.1 (1.5)
Non-psychopaths ($n = 24$)	33.6 (6.4)	104.2 (11.2)	14.2 (4.1)	12.7 (8.2)	4.7 (2.4)	7.7 (3.0)

Est IQ, estimated IQ based on the Shipley Institute of Living Scale (Zachary, 1986). WAS, Welsh Anxiety Scale; F1, Factor 1; F2, Factor 2. For each group, means are presented with standard deviations in parentheses. The three participant groups did not significantly differ with respect to age ($F = 0.76$, $P = 0.48$) or estimated IQ ($F = 0.99$, $P = 0.38$). The non-psychopaths had significantly lower PCL-R scores than both the low-anxious psychopaths ($t = -14.5$, $P < 0.001$) and high-anxious psychopaths ($t = -13.7$, $P < 0.001$). Low-anxious and high-anxious psychopaths did not significantly differ in terms of PCL-R total score ($t = 1.3$, $P = 0.20$), PCL-R Factor 1 score ($t = 1.8$, $P = 0.08$), or PCL-R Factor 2 score ($t = 1.0$, $P = 0.32$). The low-anxious psychopaths had significantly lower anxiety scores than the non-psychopaths ($t = -2.8$, $P = 0.008$) and high-anxious psychopaths ($t = -7.0$, $P < 0.001$). The high-anxious psychopaths had significantly higher anxiety scores than the non-psychopaths ($t = 3.1$, $P = 0.004$).

paper, followed by a question about a hypothetical action related to the scenario ('Would you ... in order to ...?'). This question format follows previous clinical and prison studies (Koenigs *et al.*, 2007; Cima *et al.*, 2010). Participants circled 'yes' or 'no' to indicate their responses. 'Yes' responses always indicated commission of the proposed action. There was no time limit for reading the scenario description or responding to the question. Following previous studies using this test (Greene *et al.*, 2001, 2004; Ciaramelli *et al.*, 2007; Koenigs *et al.*, 2007; Moretto *et al.*, 2010), we used two classes of moral scenarios. 'Personal' moral scenarios ($n = 14$) involved committing direct, intimate physical harm to another (i.e. pushing one person off a bridge to stop a runaway train car from hitting five people), whereas 'impersonal' moral scenarios ($n = 10$) involved more indirect or remote harm (i.e. pulling a switch to divert a runaway boxcar from hitting five people) or rule violations (i.e. lying on income taxes). The personal actions have been rated as significantly more emotionally aversive than the impersonal actions (Koenigs *et al.*, 2007).

STATISTICAL ANALYSIS

Our hypothesis pertains to specific between-group differences in moral judgment (i.e. low-anxious psychopaths will differ from non-psychopaths in personal moral judgment, whereas high-anxious psychopaths will not differ from non-psychopaths). To compare moral judgment between groups for a particular class of scenarios, we (i) computed the proportion of 'yes' responses for that class of scenario for each individual, (ii) computed the mean proportion of 'yes' responses across all individuals in each group and (iii) compared groups in pairwise fashion with planned *t*-tests, with the key test of interest being low-anxious psychopaths *vs* non-psychopaths for personal moral scenarios.

RESULTS

We first report the moral judgment data from the non-psychopaths and the entire group of psychopaths (Figure 1). Across all 24 moral scenarios, the psychopaths endorsed a significantly greater proportion of the proposed actions ($M = 0.63$, s.d. $= 0.18$) than did the non-psychopaths
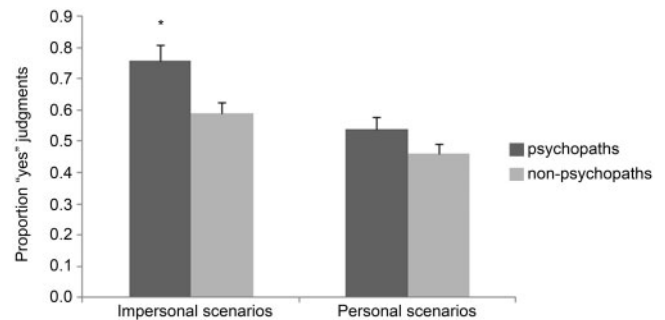

Fig. 1 Moral judgment data for psychopaths and non-psychopaths (with SE bars).

($M = 0.51$, s.d. $= 0.12$) ($t = 2.6$, $P = 0.01$). This effect was more pronounced for the impersonal than the personal scenarios. For the 10 impersonal moral scenarios, the psychopaths endorsed a significantly greater proportion of the proposed actions ($M = 0.76$, s.d. $= 0.24$) than did the non-psychopaths ($M = 0.59$, s.d. $= 0.18$) ($t = 2.9$, $P = 0.006$). For the 14 personal moral scenarios, the psychopaths endorsed a slightly (but not significantly) greater proportion of the proposed actions ($M = 0.54$, s.d. $= 0.19$) than did the non-psychopaths ($M = 0.46$, s.d. $= 0.15$) ($t = 1.6$, $P = 0.12$).

We next address the main hypothesis of this study—that low-anxious psychopaths, but not high-anxious psychopaths, would endorse a significantly greater proportion of the personal moral actions than would the non-psychopaths. The results confirm this prediction (Figures 2 and 3). The low-anxious psychopaths endorsed a significantly greater proportion of the personal moral actions ($M = 0.58$, s.d. $= 0.16$) than did the non-psychopaths ($M = 0.46$, s.d. $= 0.15$) ($t = 2.3$, $P = 0.03$), whereas the high-anxious psychopaths ($M = 0.49$, s.d. $= 0.21$) did not significantly differ from non-psychopaths in their personal moral judgment ($t = 0.5$, $P = 0.60$). This pattern of results held for the subset of 10 'high-conflict' personal moral dilemmas (Koenigs *et al.*, 2007; Greene *et al.*, 2008), in which the 'utilitarian' choice (Greene *et al.*, 2004, 2008) is essentially to kill one person in order to save a number of others. On this subset of 'high-conflict' scenarios, the low-anxious psychopaths endorsed a significantly greater proportion of the utilitarian
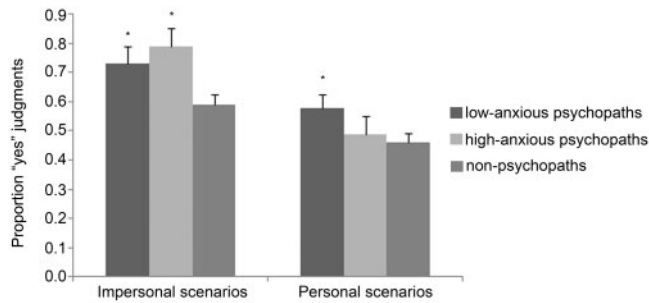
M. Koenigs *et al*.

Fig. 2 Moral judgment data for low-anxious psychopaths, high-anxious psychopaths and non-psychopaths (with SE bars). Asterisks indicate significantly greater means than the non-psychopaths.
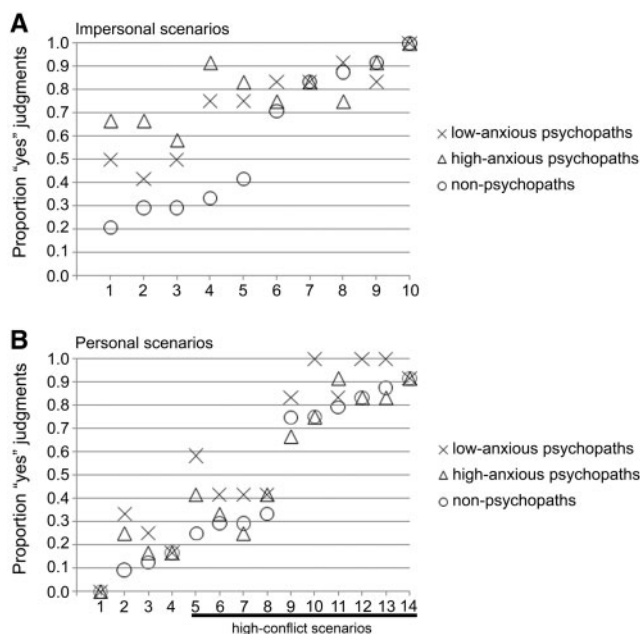

Fig. 3 Moral judgment data for individual scenarios. Proportions of 'yes' judgments given by the subject groups for each of the impersonal and personal moral scenarios. (**A**) Individual impersonal scenarios (numbered 1–10 on the *x*-axis) are ordered on the basis of increasing proportion of 'yes' judgments by the non-psychopaths and (**B**) individual personal scenarios (numbered 1–14 on the *x*-axis) are ordered on the basis of increasing proportion of 'yes' judgments by the non-psychopaths. Among the three groups of inmates, the low-anxious psychopaths made the highest proportion of utilitarian judgments on nearly all of the personal moral scenarios.

actions ($M = 0.74$, s.d. $= 0.19$) than did the non-psychopaths ($M = 0.61$, s.d. $= 0.19$) ($t = 2.0$, $P = 0.05$), whereas the high-anxious psychopaths ($M = 0.63$, s.d. $= 0.27$) did not significantly differ from non-psychopaths ($t = 0.3$, $P = 0.75$).

A different pattern of results was observed for impersonal moral judgment (Figures 2 and 3). On these scenarios, both the low-anxious psychopaths ($M = 0.73$, s.d. $= 0.20$) and the high-anxious psychopaths ($M = 0.79$, s.d. $= 0.21$) endorsed a significantly greater proportion of impersonal actions than did the non-psychopaths ($M = 0.59$, s.d. $= 0.18$) ($t = 2.2$, $P = 0.03$ and $t = 2.7$, $P = 0.01$, respectively). Taken together,

this combination of results indicates distinct patterns of moral judgment for the low- and high-anxious subtypes of psychopathy. Whereas both psychopathic subgroups endorsed significantly higher proportions of impersonal actions, only the low-anxious psychopathic subgroup also endorsed significantly higher proportions of personal actions.

This result raises the question of whether the observed group differences in personal moral judgment may be due to strict group differences in anxiety, rather than due to distinct subtypes of psychopathy. In other words, lower levels of anxiety may be associated with greater endorsement of personal moral actions, regardless of the degree of psychopathy. To examine this possibility, we divided the group of non-psychopaths (those participants with PCL-R of 20 or less) into high-anxious and low-anxious subgroups based on a median split of WAS scores, exactly as we did for the psychopathic sample. With these criteria, we obtained $n = 14$ low-anxious non-psychopaths and $n = 10$ high-anxious non-psychopaths. As expected, WAS scores in the high-anxious non-psychopaths were significantly greater than in the low-anxious non-psychopaths ($t = 6.3$, $P < 0.001$), while PCL-R total scores were similar ($t = 0.6$, $P = 0.58$). Importantly, the difference in mean anxiety scores between the high-anxious and low-anxious non-psychopaths (20.3 *vs* 7.2) was similar to the difference in mean anxiety scores between the high- and low-anxious psychopaths (21.2 *vs* 5.7).

For the personal moral scenarios, the low-anxious and high-anxious non-psychopathic subgroups performed nearly identically ($M = 0.46$, s.d. $= 0.13$ and $M = 0.46$, $SD = 0.18$, respectively) ($t = 0.1$, $P = 0.94$). Moreover, the low-anxious psychopaths endorsed a significantly greater proportion of personal moral actions than did the low-anxious non-psychopaths ($t = 2.2$, $P = 0.04$). These data indicate that low anxiety, in and of itself, is not a strong determinant of responses on the personal moral scenarios. Instead, it appears that exceptionally utilitarian personal moral judgment is a relatively specific characteristic of the low-anxious psychopaths.

Next, we provide follow-up analyses to address several additional questions raised by the main study results. One apparent limitation of the results reported in the main analysis is that although the low-anxious psychopaths did significantly differ from non-psychopaths on the high-conflict personal scenarios (whereas the high-anxious psychopaths did not), low- and high-anxious psychopaths did not significantly differ from each other. Clearly, a significant difference between these two subgroups in a direct statistical comparison would bolster the claim that subtyping based on anxiety is indeed an important consideration regarding the moral judgment capacity of psychopaths. Here, we consider this issue in greater detail. The statistical test we used in the initial analysis was parametric (*t*-test), which is not the most powerful way to compare two groups with relatively small sample sizes ($n = 12$ for both psychopathic subgroups). If instead we conduct a non-parametric χ^2-test to compare the frequency

of utilitarian responses between the two psychopathic sub-groups, we obtain a result that approaches significance ($\chi^2 = 3.3$, $P = 0.07$).

Moreover, we observe that across the entire group of psychopaths, anxiety score has a moderate negative correlation with utilitarian judgments ($r = -0.40$, $P = 0.06$) (Figure 4). No such relationship is observed in the non-psychopaths ($r = -0.08$, $P = 0.71$). In our initial analysis, we defined the low- and high-anxious psychopathic subgroups based on a median split of anxiety score. Thus, given the observed moderate negative linear correlation between anxiety score and utilitarian judgment among psychopaths, group differences could be muddled by the subset of psychopaths with anxiety scores near the median (on either side). In other words, a median split may not afford sufficient separation of subgroups based on anxiety score. To explore this possibility, we subdivided the psychopaths into thirds, rather than halves, based on anxiety score (Figure 4). The lowest third ($n = 8$) had anxiety scores between 1 and 7 ($M = 3.4$); the middle third ($n = 8$) had anxiety scores between 10 and 16 ($M = 12.5$); and the highest third ($n = 8$) had anxiety scores between 19 and 36 ($M = 24.4$). A χ^2 test comparing the frequency of utilitarian responses between the lowest third and highest third indicates a statistically significant difference ($\chi^2 = 6.6$, $P = 0.01$), with the lowest third making a significantly greater proportion of utilitarian responses (0.79 to 0.60). As expected, the middle third made an intermediate proportion of utilitarian responses (0.68), which did not significantly differ from either the lowest third ($\chi^2 = 2.6$, $P = 0.11$) or the highest third ($\chi^2 = 1.0$, $P = 0.32$). This pattern was clearly not present among non-psychopaths; the lowest, middle and the highest third of non-psychopaths' anxiety scores made nearly identical proportions of utilitarian moral judgments (0.60, 0.63 and 0.60, respectively). These follo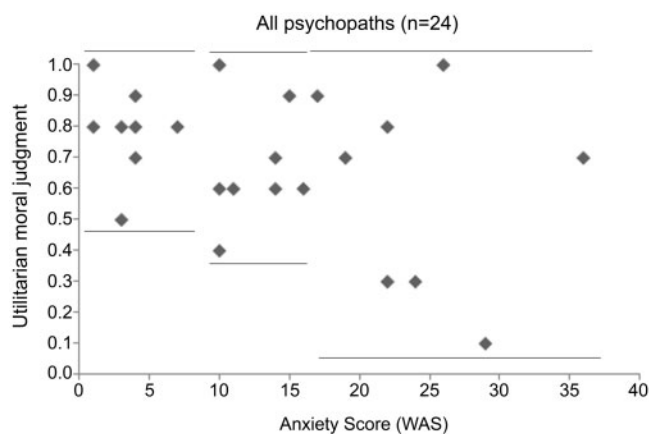w-up analyses provide further support for the inference of abnormally utilitarian moral judgment among low-anxious psychopaths.

In addition to these predicted results regarding personal moral judgment, we found the somewhat unexpected result that psychopaths overall endorsed a significantly greater proportion of impersonal moral actions than did non-psychopaths—a pattern that was shared by both low- and high-anxious subgroups. Cima et al. previously found no significant differences between psychopaths and non-psychopaths on judgments for impersonal moral scenarios (Cima et al., 2010). The lack of significant differences in the Cima et al. study could be due to a combination of two factors: (i) smaller sample size ($n = 14$ psychopaths in the Cima et al. study vs $n = 24$ psychopaths in our study) and (ii) more lenient criteria for classifying subjects as 'psychopaths' (PCL-R score ≥26 in the Cima et al. study vs PCL-R score ≥30 in our study). Indeed, when we analyze subjects in our sample with PCL-R scores of 26–29 ($n = 10$, none of whom were included in the previous analyses), we find that their mean proportion of endorsement for the impersonal actions (0.59) was identical to that of non-psychopaths (0.59), and well below that of either subtype of psychopath (0.73 and 0.79 for low- and high-anxious psychopaths, respectively). Thus the null finding in the Cima et al. study is very likely due to their lenient criteria for identifying psychopaths. Similarly, a recent study of a community sample found no significant correlation between psychopathy score and responses to these moral scenarios (Glenn et al., 2009). Again, we suspect that this null finding is due to the fact that the majority of subjects in that study were not actually psychopaths, as per the recommended PCL-R cutoff score for psychopathy (Hare, 2003).

DISCUSSION

In this study, we investigated moral judgment in distinct psychopathic subtypes. In particular, we tested the hypothesis that low-anxious (primary) psychopaths, but not high-anxious (secondary) psychopaths, would exhibit abnormally utilitarian personal moral judgment. The data support this prediction. Low-anxious, but not high-anxious, psychopaths endorsed a significantly greater proportion of the personal moral actions than did non-psychopaths. Importantly, this effect held for the subset of high-conflict personal scenarios, as well as in a comparison with the subset of non-psychopaths with similarly low levels of anxiety.

Although our results challenge previous reports of normal moral judgment in psychopathy (Glenn et al., 2009; Cima et al., 2010), given the rigor with which we characterized subjects in this study, we view our results as the most definitive to date regarding the moral judgment capacities of psychopaths. The present results suggest that, as a whole, psychopaths are generally more willing than non-psychopaths to endorse impersonal harms or rule violations in order to achieve certain beneficial outcomes. We suppose that this reflects the general proclivity toward antisocial behavior

Fig. 4 Scatterplot showing utilitarian moral judgment (y-axis; proportion of 'yes' responses to high-conflict personal moral dilemmas) as a function of anxiety score (WAS) for the entire group of psychopaths ($n = 24$). Overall there was a moderate negative correlation ($r = -0.40$). The horizontal line segments on the plot indicate subjects belonging to each third ($n = 8$) of the total sample, based on anxiety score.

that is shared by psychopaths, regardless of anxiety level. However, only the low-anxious psychopaths are more willing to endorse the personal (and ostensibly more emotionally averse) harms as a means to achieving their ends, which may reflect a particular social/emotional deficit that is *not* necessarily shared between psychopathic subtypes.

Our predicted finding of abnormally utilitarian personal moral judgment among low-anxious psychopaths warrants further discussion. As mentioned in the introduction, neurological patients with focal lesions involving vmPFC also exhibit a pattern of abnormally utilitarian personal moral judgment on this task (Ciaramelli *et al.*, 2007; Koenigs *et al.*, 2007; Moretto *et al.*, 2010) (although it is important to note that vmPFC lesion patients do not also exhibit heightened endorsement of impersonal actions, nor do they exhibit anywhere near the same degree of antisocial behavior in their daily lives). Nonetheless, this pattern of personal moral judgment findings (i.e. similar decision-making profiles between vmPFC lesion patients and low-anxious psychopaths) mirrors a recent study of economic decision-making (Koenigs *et al.*, 2010). In that study, we found that low-anxious, but not high-anxious, psychopaths performed similar to vmPFC lesion patients on the Ultimatum and Dictator Games. Since both the personal moral dilemmas and the Ultimatum/Dictator Games are presumed to index the degree to which social/affective *vs* cognitive/rational considerations influence decision-making (Greene et al., 2001, 2004, 2008; van't Wout *et al.*, 2006; Koenigs and Tranel, 2007; Moretto *et al.*, 2010), the remarkably convergent findings between vmPFC lesion patients and low-anxious psychopaths could tentatively be interpreted as evidence for a similarly disrupted integration of cognitive and affective factors underlying decision-making. Interestingly, the opposite pattern of behavior (decreased Ultimatum Game rejections and decreased utilitarian personal harm endorsement during moral judgment) has recently been observed in neurologically healthy adults following the pharmacological enhancement of serotonin transmission in the brain (Crockett *et al.*, 2010). Taken together, these results provide intriguing clues about the neuroanatomical and neurochemical systems that mediate prosocial behavior, and hence, the neural substrates that may be defective in psychopathy.

In sum, the results presented here are broadly consistent with the theoretical perspective that low-anxious (primary) psychopathy may entail a particular affective/inhibitory deficit that is not necessarily present in high-anxious (secondary) psychopathy (Karpman, 1946; Karpman, 1948; Cleckley, 1976; Lykken, 1995; Porter, 1996; Skeem *et al.*, 2007; Blackburn *et al.*, 2008). An aim of future research will be to specify the exact nature of the decision-making impairments—and the accompanying neurobiological dysfunction—which plague these individuals.

Conflict of Interest
None declared.

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