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Psychopathic traits predict moral judgements in five moral domains: The mediating effect of unpleasantness

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Purpose. The relationship between psychopathic traits and moral judgements has evoked passionate debates among researchers. Psychopathic traits have been characterized as risk factors for immoral behaviours in both non-forensic and forensic populations; however, whether individuals with elevated psychopathic traits display atypical moral judgements has been controversial. Here, we aim to examine how psychopathic traits are related to moral judgements in five moral foundations (Care, Fairness, Loyalty, Authority, and Sanctity) and further explore how unpleasantness mediates the relationship in non-forensic and forensic samples.

Methods. Two hundred and twenty five college students and 219 detainees were recruited in two separate surveys. All the participants were asked to complete the moral judgement task in everyday moral scenarios, the unpleasantness ratings for the immoral behaviours and the Levenson Self-Report Psychopathy Scale (LSRP).

Results. Psychopathic traits predicted the binary moral distinction (moral vs. immoral category) in the Care foundation in the non-forensic sample. Moreover, psychopathic traits predicted moral acceptability ratings (continuous category) in all of the moral foundations in the non-forensic sample but only for the Care and Loyalty foundations in the forensic sample. Finally, unpleasantness fully mediated the relationship between psychopathic traits and moral judgements in both samples.

Conclusions. Our findings provide further evidence that individuals with elevated psychopathic traits have atypical moral judgements – emphasizing the role of unpleasantness in contributing to this phenomenon. Our study has implications for understanding and treating various deviant behaviours in psychopathic individuals.

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Highlights

- People with elevated psychopathic traits have atypical moral judgements.
- Psychopathic traits are more related to continuous moral judgements than binary ones.
- Psychopathic traits are most related to moral judgements in the Care foundation.
- Unpleasantness mediates how psychopathic traits affect moral judgements.

Background

Psychopathy has been characterized as dimensional personality traits that are continuously distributed among a wide range of populations (Benning, Patrick, & Iacono, 2005; Douglas, Nikolova, Kelley, & Edens, 2015; Hare & Neumann, 2008). Even those who are not clinically identified as psychopaths but have elevated psychopathic traits could exhibit typical psychopathic characteristics (e.g., lack of empathy, high-risk taking, utilitarian preferences, and pathological lying) (Brennan, Crowley, Wu, Mayes, & Baskin-Sommers, 2018; Djeriouat & Trémolière, 2014; Seara-Cardoso, Neumann, Roiser, McCrory, & Viding, 2012; Viding, Frick, & Plomin, 2007). One hallmark of psychopathic individuals is their disregard for social and moral norms contributing to increased engagement in various immoral behaviours, attracting the great interest of many researchers studying the relationship between psychopathic traits and moral judgements.

Two opposing views exist regarding the moral capacity of individuals with elevated psychopathic traits. Some researchers have argued that individuals with elevated psychopathic traits are morally deficient (Blair, 1995; Gao & Tang, 2013), whereas others have claimed that they have the intact capacity to differentiate right from wrong (Cima, Tonnaer, & Hauser, 2010; Gay, Vitacco, Hackney, Beussink, & Lilienfeld, 2018; Tassy, Deruelle, Mancini, Leistedt, & Wicker, 2013). Each of the two views is supported by evidence from three lines of research: (1) measures of sacrificial moral dilemmas – people must make moral decisions about whether they should sacrifice a small number of people to save a larger group (Bartels & Pizarro, 2011); (2) Kohlbergian measures of moral reasoning – people must offer justifications for their decisions in a set of moral dilemmas (Marshall, Watts, Frankel, & Lilienfeld, 2017); and (3) moral foundation measures – people complete the Moral Foundation Questionnaire (MFQ) to indicate the considerations that are most relevant to their moral judgements (Glenn, Iyer, Graham, Koleva, & Haidt, 2009a).

Mixed findings exist regarding the relationship between psychopathic traits and moral judgements. For measures of sacrificial moral dilemmas, some evidence has demonstrated significant associations between elevated psychopathic traits and increased sacrificial moral choices (Bartels & Pizarro, 2011; Gao & Tang, 2013; Koenigs, Kruepke, Zeier, & Newman, 2012). However, other evidence has shown that individuals with elevated psychopathic traits do not differ in moral judgements from those low on the traits (Cima et al., 2010; Gay et al., 2018; Pujol et al., 2012; Tassy et al., 2013). Research employing Kohlbergian measures of moral reasoning has also yielded inconsistent findings. Some studies have demonstrated that individuals with elevated psychopathic traits tend to emphasize self-interests over more ethical principles during their considerations of moral dilemmas (Campbell et al., 2009). However, other studies found no associations between psychopathic traits and moral reasoning (Lose, 1997; O'Kane, Fawcett, & Blackburn, 1996).

Unlike the two aforementioned measures, moral foundation theory (MFT) focuses on individual variations in moral preferences (Graham et al., 2011). Five moral foundations

have been widely presented as moral concerns of humans: (1) Care (related to preventing harm and protecting others); (2) Fairness (related to preserving fairness and punishing cheating); (3) Loyalty (related to practising loyalty to one's team and preventing betrayal); (4) Authority (related to respecting authority and maintaining social order); and (5) Sanctity (related to pursuing sanctity and preventing degradation) (Franks & Scherr, 2015; Graham et al., 2011, 2013; Graham, Haidt, & Nosek, 2009; Haidt & Graham, 2007, 2009). Psychopathic traits have been consistently found to be associated with moral preferences as measured with the MFQ. But these findings have been mixed regarding the moral foundations that are related to psychopathic traits. For example, psychopathic traits are negatively associated with concern about preventing harm and being fair (Aharoni, Antonenko, & Kiehl, 2011; Glenn, Raine, Schug, Young, & Hauser, 2009b). Another study showed that psychopathic traits significantly predicted individuals' concerns about not only Care and Fairness but also Purity (Efferson, Glenn, Remmel, & Iyer, 2017). A recent meta-analysis revealed a negative association between psychopathic traits and moral judgements – most pronounced in the Care, Fairness, and Authority foundations (Marshall, Watts, & Lilienfeld, 2018). Despite differences across these studies, people with elevated psychopathic traits, compared to those with lower psychopathic traits, have been commonly recognized to show fewer concerns about caring for others (Aharoni et al., 2011; Blair, 2007; Cardinale & Marsh, 2015).

Despite providing increasing evidence that psychopathic traits are associated with moral judgements, previous research has shown some limitations that must be addressed. First, hypothetical dilemmas widely used in measures of sacrificial moral dilemmas and Kohlberg's moral reasoning are far-fetched and unlikely to occur in daily life; therefore, they lack external validity, while items used in the MFQ are relatively abstract and difficult to understand (Clifford, Iyengar, Cabeza, & Sinnott-Armstrong, 2015; Haidt, 2012). Moreover, the MFQ only measures an individual's preferences in consideration of morality without being able to identify deficits in moral judgements. Externally valid measures that could more directly reflect an individual's moral values are needed to investigate the relationship between psychopathic traits and moral judgements. Using simple instances of daily immoral behaviours (e.g., whether cheating in a job promotion is wrong) might offer a more sensible alternative for measuring an individual's moral attitudes (Kahane, Everett, Earp, Farias, & Savulescu, 2015). Second, both binary (i.e., categorical 'yes' or 'no' answers) and continuous (i.e., continuous answers) moral judgements have been applied in previous studies (Pletti, Lotto, Buodo, & Sarlo, 2017; Simpson & Laham, 2015; Zhang, Kong, & Li, 2017). Despite being equally reliable and valid in terms of methodology, the forced binary scale is generally perceived to be less difficult than a continuous scale (Dolnicar, Grün, & Leisch, 2011). The psychological differences between these two measures might potentially yield differences in how psychopathic traits are associated with moral judgements. However, only a few studies have addressed this issue by discussing the mixed findings about the relationship between psychopathic traits and moral judgements. Finally, among those studies revealing an association between psychopathic traits and moral judgements, only a few have examined the factors that contribute to atypical moral judgements for individuals with elevated psychopathic traits (Djeriouat & Trémolière, 2014).

Emotion and reasoning are two essential components of moral judgements and decision making (Greene, 2007; Greene, Nystrom, Engell, Darley, & Cohen, 2004; Greene, Sommerville, Nystrom, Darley, & Cohen, 2001). Nevertheless, little evidence exists for atypical abstract moral reasoning of individuals with elevated psychopathic traits. Studies have consistently shown that individuals with elevated psychopathic traits have emotion

processing deficits (Blair, 2007; Cardinale & Marsh, 2015; Koenigs et al., 2012) and are characterized by shallow affect. Moreover, neurobiological studies have demonstrated that higher psychopathic scores are associated with dysfunction in the amygdala – a region typically engaged in emotion – during moral judgements (Glenn, Raine, et al., 2009b; Yoder, Harenski, Kiehl, & Decety, 2015). Therefore, we assume that reduced emotional responses regarding moral violations might be a reason for the atypical moral judgements of individuals with elevated psychopathic traits (Horberg, Oveis, & Keltner, 2011; Nichols, 2002).

In this study, we developed everyday moral scenarios guided by MFT, examined how psychopathic traits predict everyday moral judgements, and tested how unpleasantness (i.e., an index of valence of negative emotion which is defined as an unpleasant, often disruptive, emotional reaction) (Watson & Clark, 1984) mediated this relationship. We first investigated this relationship in a non-forensic sample (college students) (Survey 1) and then tested whether our findings for this sample could be verified in a forensic sample (detainees) (Survey 2). For both surveys, the participants first provided self-report measures about psychopathic traits, then completed binary and continuous moral judgements, and finally rated their emotional responses for various everyday immoral behaviours. We hypothesized that individuals with elevated psychopathic traits would consider immoral behaviours to be more morally acceptable and that the relationship between psychopathic traits and moral judgements would be mediated by unpleasantness. Furthermore, we predicted that this hypothesized relationship might be more distinct in continuous, compared to binary, moral judgements since the former requires more sensitive distinctions of the degree of immorality.

SURVEY 1: NON-FORENSIC SAMPLE

Methods

Participants

The non-forensic sample included 260 college students (89 males and 171 females, mean age = 19.17, *SD* = 1.04, age range from 18 to 25 years old) from a local university. Eighty-one percent of the participants majored in social sciences, and 19% majored in natural sciences. Informed consent was provided by the participants for the experimental protocol approved by the relevant university's ethics committee.

Materials

Everyday moral scenarios

Thirty moral scenarios were used as experimental stimuli. Each moral scenario was described in a short sentence describing a person conducting a moral violation in one of the five moral foundations, each containing six scenarios: Care (e.g., 'A man threw plastic bottles at animals in the zoo'); Fairness (e.g., 'A man deliberately jumped the queue in a canteen'); Loyalty (e.g., 'An employee sold his company's core secrets to a competing company'); Authority (e.g., 'An employee ate potato chips while a leader was assigning tasks'); and Sanctity (e.g., 'A man had sex with corpses in the morgue of a hospital'). Another six scenarios that violate conventional rules (e.g., 'A man was reading a newspaper upside down on a park bench') were added as control stimuli. Most of the scenarios were adapted from the Moral Foundation Vignettes – a standardized and validated collection of moral violating scenarios (Clifford et al., 2015). In contrast, others

were compiled by referring to immoral events reported in the media and the MFQ (see the supplementary materials for the detailed screening process).

Moral judgement and emotional rating task

The participants were asked to read the scenarios and to answer subsequent questions: (1) 'Do you think that the behaviour depicted in the scenario is morally wrong?' (binary answer: yes or no); (2) 'How much do you think the behaviour is morally unacceptable?' (continuous answer: 5-point Likert scale with 1 [not unacceptable] to 5 [completely unacceptable]); and (3) 'How unpleasant do you feel after reading about the behaviour?' (emotional rating: 5-point Likert scale with 1 [not unpleasant] to 5 [highly unpleasant]). Cronbach's alpha ranged from 0.67 to 0.78 for the moral acceptability ratings and from 0.70 to 0. 81 for the unpleasantness ratings (Santos, 1999).

Questionnaires

LSRP

Individuals' psychopathic traits were assessed with the LSRP containing two factors (Levenson, Kiehl, & Fitzpatrick, 1995) – primary psychopathy (factor 1) and secondary psychopathy (factor 2) – with higher LSRP scores indicating higher psychopathic traits. The LSRP consists of 26 items (16 for primary psychopathy and 10 for secondary psychopathy), each rated on a 4-point Likert scale (1 [strongly disagree] to 4 [strongly agree]). The reliability and validity of the scale have been well validated (Lynam et al., 1999; Wang et al., 2018). Cronbach's alpha of this scale was 0.78 in the non-forensic sample.

MFQ

The MFQ consists of 32 items, divided into two sections. The first section measures the moral relevance of 15 moral considerations on a six-point Likert scale ranging from 0 (not at all relevant) to 5 (extremely relevant). The second section measures the degree to which participants agreed or disagreed with moral views stated in sentences using a six-point Likert scale ranging from 0 (strongly disagree) to 5 (strongly agree). Cronbach's alpha ranged from 0.49 to 0.66 in the non-forensic sample. Note that the MFQ was used to identify whether the stimuli of the new moral judgement task were related to each of the MFQ foundations (see the supplementary materials for details).

Procedures

The participants were asked to complete the moral judgement task, the emotion rating task, the LSRP (Levenson et al., 1995), and the MFQ (Haidt, 2012) in a paper-and-pencil format in a public elective course. The order of these measures was counterbalanced. Each participant received some remuneration. The experiment took approximately 25–35 min in total. Thirty-five participants were excluded from data analyses because their rating scores of a single item or the whole task in the moral judgements or the emotion rating tasks exceeded three standard deviations from the mean values (Stevens, 1984), leaving 225 participants in the following data analyses (73 males, mean age = 19.19, SD = 1.07). All of the participants were told that their answers would be de-identified and kept confidential.

Statistical data analyses

Statistical data analyses were performed using SPSS software, version 23.0 (IBM Corp. Released 2015), with an alpha value of $p < .05$ (two tailed). Missing values (13% of the students did not respond to 1 to 5 items among a total of 166 items) in the data set were replaced by the series mean of each item. First, the number of scenarios that participants considered immoral, the average rating scores of moral acceptability, and the unpleasantness for each moral foundation were computed. Second, an ordered multiple logistic regression was applied to examine whether psychopathic traits predicted binary moral judgements (moral/immoral). Third, Pearson's correlation was computed between psychopathic traits and moral acceptability and unpleasantness (false discovery rate [FDR] corrected) (Benjamini & Hochberg, 1995; Yekutieli & Benjamini, 1999). Fourth, multiple linear regression analysis was performed using demographic variables (age, gender, and major) as control variables to examine whether psychopathic traits predicted moral acceptability ratings when constructing regression models. Finally, mediation analyses were performed to investigate the mediating role of unpleasantness in the relationship between psychopathic traits and moral acceptability. The bootstrapping process for SPSS was applied, for which bootstrap samples were set as 5,000, and the confidence level for confidence intervals was 95%.

Results

Descriptive statistics (means and standard deviations) for the variables (total scores of LSRP, the number of behaviours that were judged as immoral, the average rating scores of moral acceptability, and unpleasantness in all moral foundations) are presented in Table 1.

First, multivariate ordered logistic regression was used to examine whether the LSRP score could predict the numbers of behaviours considered immoral in each moral foundation and in conventional violations while controlling for other demographic variables. The regression model was significant for the Care and Loyalty (Care: χ^2 (4, 225) = 17.170, p = .003; Loyalty: χ^2 (4, 225) = 14.611, p = .006) but not for the Fairness, Authority and Sanctity (Fairness: χ^2 (4, 225) = 4.627, p = .328; Authority: χ^2 (4, 225) = 7.215, p = .125; Sanctity: χ^2 (4, 225) = 6.284, p = .179) foundations. Furthermore, the main effect of psychopathic traits was significant for the Care foundation (Care: $B = -.051$, SE = .0173, OR = .950, 95% CI = [0.919, 0.983], p = .003) but not the Loyalty foundation (Loyalty: $B = -.013$, SE = .0185, OR = .987, 95% CI = [0.952, 1.024], p = .485). For conventional violations, the regression model was not significant (χ^2 (4, 225) = 2.221, p = .695).

Next, the relationships among psychopathic traits, moral acceptability, and unpleasantness were analysed by applying pairwise Pearson's correlations and establishing regression models (see Table 2).

The LSRP score was negatively correlated with moral acceptability and unpleasantness ratings in all of the moral foundations. The regression analyses further showed that the LSRP score negatively predicted moral acceptability and unpleasantness ratings in all of the moral foundations after controlling for age, gender, and major. In addition, the LSRP score was not significantly related to moral acceptability and unpleasantness ratings for conventional violations.

Finally, mediation analyses were conducted to examine whether unpleasantness mediated the association between psychopathic traits and moral acceptability. For all five moral foundations, indirect effects of psychopathic traits through unpleasantness on

Table 1. Means and standard deviations for all the measured variables in the non-forensic sample (The Levenson Self-Report Psychopathy Scale (LSRP) score; yes-or-no binary moral judgements, moral acceptability, and unpleasantness ratings in all moral domains and conventional norm)

	Survey 1 Non-forensic sample (N = 225)		Survey 2 Forensic sample (N = 219)	
Measure	Mean	*SD*	Mean	*SD*
LSRP	52.51	7.66	50.75	8.82
Care_Y	5.26	0.85	2.76	0.43
Fairness_Y	5.35	0.84	2.63	0.63
Loyalty_Y	5.46	0.84	2.55	0.71
Authority_Y	3.34	1.80	1.77	1.17
Sanctity_Y	5.05	1.31	2.71	0.54
Convention_Y	0.14	0.35	0.65	0.97
Care_M	18.01	3.31	9.30	2.17
Fairness_M	15.81	3.81	7.68	2.59
Loyalty_M	15.88	3.12	8.65	2.34
Authority_M	11.33	4.19	5.93	3.10
Sanctity_M	18.37	3.81	9.41	2.13
Convention_M	1.44	1.90	2.39	2.47
Care_U	18.42	3.09	8.95	2.23
Fairness_U	16.15	3.87	7.59	2.45
Loyalty_U	16.14	3.10	8.88	2.37
Authority_U	13.29	4.33	6.22	3.06
Sanctity_U	17.78	4.02	8.89	2.44
Convention_U	2.52	2.60	2.64	2.54

Note. Care_Y, Care_M, Care_U, respectively, stands for the number of behaviours which was judged as immoral, the average moral acceptability and unpleasantness rating scores in the Care foundation (Y: number of behaviours which was judged as immoral; M: moral acceptability; U: unpleasantness). The same naming rules apply to other moral foundations and conventional norms.

moral acceptability were significant (Care: point estimate = −.010, 95% CI = [−0.153, −0.043]; Fairness: point estimate = −.097, 95% CI=[−0.161, −0.032]; Loyalty: point estimate = −.075, 95% CI = [−0.128, −0.022]; Authority: point estimate = −.097, 95% CI = [−0.168, −0.025]; Sanctity: point estimate = −.076, 95% CI = [−0.140, −0.013]), whereas the direct effects of psychopathic traits on moral acceptability were not significant when unpleasantness was included as a mediator (Care: point estimate = −.030; 95% CI = [−0.062, 0.002]; Fairness: point estimate = −.032; 95% CI = [−0.065, 0.002]; Loyalty: point estimate = −.013; 95% CI = [−0.046, 0.02]; Authority: point estimate = −.030; 95% CI = [−0.077, 0.015]; Sanctity: point estimate =−.001; 95% CI = [−0.041, 0.039]). The confidence intervals of the direct effects included zero, indicating that unpleasantness fully mediated the relationship between psychopathic traits and moral acceptability in all of the moral foundations (Figure 1).

Discussion

The results from Survey 1 showed that psychopathic traits predicted binary moral judgements in the Care foundation and continuous moral judgements in all five moral

Table 2. Pearson's correlation and regression coefficients for the Levenson Self-Report Psychopathy Scale (LSRP) score with moral acceptability and unpleasantness ratings in all moral domains for the non-forensic sample

LSRP score					
	r	β		*r*	β
Care_M	−.228**	−.227**	Care_U	−.194**	−.188**
Fairness_M	−.199**	−.194**	Fairness_U	−.152*	−.152**
Loyalty_M	−.186**	−.184**	Loyalty_U	−.192**	−.188**
Authority_M	−.180**	−.176**	Authority_U	−.161*	−.155**
Sanctity_M	−.160*	−.154*	Sanctity_U	−.199**	−.190**
Convention_M	.044	.047	Convention_U	−.018	−.025

Note. Care_M, Care_U, respectively, stands for the average moral acceptability and unpleasantness rating in the Care foundation (M: moral acceptability; U: unpleasantness). The same naming rules apply to other moral foundations and conventional norms. Correlation significance survived the FDR correction. *$p < .05$,; **$p < .01$,; ***$p < .001$.

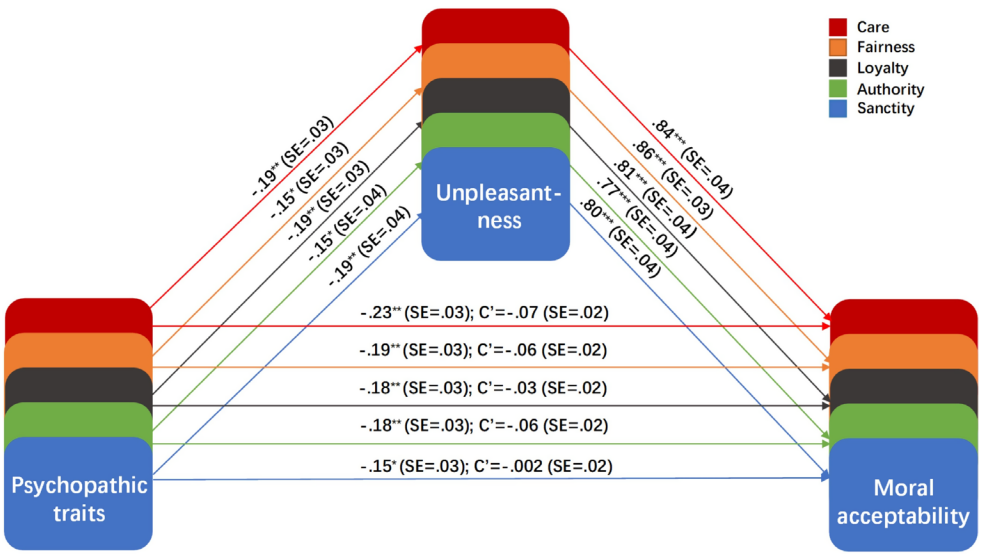

Figure 1. Mediation analyses on the role of unpleasantness in the relationship between psychopathic traits and moral acceptability ratings (Non-forensic sample). Unpleasantness fully and respectively mediated the association between psychopathic traits and moral acceptability in each of the five foundations. Standardized regression coefficients were presented. *$p < .05$, **$p < .01$, ***$p < .001$.

foundations in a non-forensic sample. Furthermore, unpleasantness fully mediated the relationship between psychopathic traits and moral acceptability ratings in all of the moral foundations. The moral capacity of individuals with elevated psychopathic traits has been disputed for the past decade (Marshall et al., 2018). Unlike the highly hypothetical moral dilemmas or abstract items in the MFQ, we used everyday moral scenarios that reflect more real-life conceptions of immorality. Using a more ecologically valid task, we revealed that individuals with elevated psychopathic traits showed atypical moral judgements in

everyday moral scenarios: individuals with higher psychopathic traits were more likely to permit deviant moral behaviours across all moral foundations.

Overall, our results are consistent with previous findings measured with the MFQ (Efferson et al., 2017; Marshall et al., 2018). More importantly, we revealed that the abnormal moral judgements of individuals with higher psychopathic traits were likely due to their insensitivity in emotional responses to immoral behaviours. Individuals with higher psychopathic traits are characterized by an over-reliance on cognitive efforts and a lack of aversive responses to harmful wrongdoing (Yoder et al., 2015). Therefore, when emotional processes are needed in making moral judgements, they seem to show abnormalities; otherwise, they seem to act normally. This fact might explain why associations between psychopathic traits and moral judgements were found in some studies (Bartels & Pizarro, 2011; Gao & Tang, 2013) but were absent in others (Gay et al., 2018; Tassy et al., 2013). Psychopathic traits are more prevalent in the forensic populations than in the non-forensic populations (Glenn, Kurzban, & Raine, 2011). How psychopathic traits are associated with moral judgements has been investigated in both non-forensic (i.e., college students or community) and forensic populations. A recent meta-analysis revealed that the relationship between psychopathic traits and moral judgements is the same for forensic and non-forensic samples (Marshall et al., 2018). To replicate the findings from Survey 1 in a forensic population, we investigated in Survey 2 the relationship between psychopathic traits and moral judgements in a sample of detainees from a detention centre.

SURVEY 2: FORENSIC SAMPLE

Methods

Participants

The forensic sample included 237 detainees (128 males and 109 females mean age = 35.53, *SD* = 10.04, aged from 16 to 66 years old) from a local detention centre. Various educational backgrounds were represented in the detainees: 38% received primary school or junior school educations, 46% received senior high school educations, and 16% received higher than senior high school educations. Regarding monthly income, 31% had low levels of income, 41% had middle levels, and 28% had relatively high levels of income before they were arrested. The participants were arrested for various minor offenses, such as fighting, gambling, prostitution, or illegal economic acts (most of the detainees were held in the detention centre on average for 7–15 days). The sample consisted of individuals who were arrested for once (83%), and the rest of the individuals were arrested more than once for breaking the law. Informed consent was provided by the participants for the experimental protocol approved by the relevant university's ethics committee.

Materials

Everyday moral scenarios were used in the forensic sample as well. However, considering that the forensic sample had a low level of education and a strict schedule, scenarios (a total of 18 of the original 36 scenarios from the non-forensic sample, three for each moral foundation and three for the conventional violations) that were more accessible to the forensic sample and could be completed within a limited time were selected (see the supplementary materials for details). The participants were asked to participate in moral

judgement and emotional rating tasks as in Survey 1. In the forensic sample, Cronbach's alpha ranged from 0.39 to 0.77 for the moral acceptability ratings and from 0.47 to 0.77 for the emotional ratings.

Questionnaires

The measures included in Survey 2 – the LSRP and the MFQ – were the same as those in Survey 1. Cronbach's alpha of the LSRP was 0.79, and Cronbach's alpha of the MFQ ranged from 0.42 to 0.56 in the forensic sample.

Procedures

The participants were instructed to participate in the experiment in a paper-and-pencil format at the detention centre for approximately 20–30 min. As in Survey 1, they were asked to complete the moral judgement task, the emotion rating task, and the questionnaires (LSRP, MFQ) in a counterbalanced order. Eighteen participants were excluded from data analyses because the rating scores of a single item or the whole task in the moral judgements or the emotion rating tasks exceeded three standard deviations from the mean values (Stevens, 1984), leaving 219 participants (112 males, mean age = 35.44, SD = 10.18) for the final data analyses. All of the participants were told that their answers would be de-identified and kept confidential.

Statistical data analyses

The performed statistical analyses were the same as in Survey 1 except that the demographic variables used as control variables for the regression models were age, gender, education level, monthly income, and recidivism for the forensic sample. Among a total of 112 items in Survey 2, 14% of the detainees did not respond to 1 to 2 items, and those missing values were replaced by the series mean of each item.

Results

Descriptive statistics (means and standard deviations) for the variables (total scores of LSRP, the number of behaviours judged as immoral, the average rating scores of moral acceptability, and unpleasantness in all moral foundations) are presented in Table 1.

Multivariate ordered logistic regression was used to examine whether the LSRP score could predict the numbers of behaviours considered immoral in each moral foundation and conventional violations while controlling for other demographic variables. The regression model was significant for the Care and Authority (Care: χ^2 (8, 219) = 19.667, p = .012; Authority: χ^2 (8, 219) = 22.418, p = .004) but not for the Fairness, Loyalty, and Sanctity (Fairness: χ^2 (8, 219) = 6.684, p =.571; Loyalty: χ^2 (8, 219) = 7.735, p = .460; p = .004; Sanctity: χ^2 (8, 219) = 13.855, p = .086) foundations. Furthermore, the main effect of psychopathic traits was not significant for the Care foundation (Care: B = −.035, SE = .0206, OR = .966, 95% CI = [0.927, 1.005], p = .090) and only marginally significant for the Authority foundation (Authority: B = −.030, SE = .0153, OR = .970, 95% CI = [0.942, 1.000], p = .049). For conventional violations, the regression model was not significant (χ^2 (8, 219) =10.581, p = .284).

Next, the relationships between psychopathic traits, moral acceptability, and unpleasantness were analysed by applying pairwise Pearson's correlation and establishing regression models (see Table 3).

The LSRP score was negatively correlated with moral acceptability and unpleasantness ratings in all of the moral foundations. The regression analyses further showed that the LSRP score negatively predicted moral acceptability ratings in the Care and Loyalty foundations and unpleasantness in the Care, Loyalty, and Sanctity foundations after controlling for the demographic variables. Additionally, the LSRP score was not significantly related to moral acceptability and unpleasantness for conventional violations.

Finally, mediation analyses were conducted to examine whether unpleasantness mediated the association between psychopathic traits and moral acceptability ratings. For the Care and Loyalty foundations, indirect effects of psychopathic traits through unpleasantness on moral acceptability (Care: point estimate = −.054; 95% CI = [−0.090, −0.018]; Loyalty: point estimate = −.051; 95% CI = [−0.088, −0.015]) were significant. However, direct effects of psychopathic traits on moral acceptability ratings were not significant when unpleasantness was included as a mediator (Care: point estimate = −.001; 95% CI = [−0.016, 0.018]; Loyalty: point estimate = −.004; 95% CI = [−0.022, 0.014]). The confidence intervals of the direct effects included zero, indicating that unpleasantness fully mediated the relationship between psychopathic traits and moral acceptability (Figure 2).

Discussion

In Survey 2, we partly replicated the findings obtained from the non-forensic sample in the forensic sample. Although psychopathic traits were not associated with binary moral judgements, they could negatively predict moral acceptability in the Care and Loyalty foundations: individuals with higher psychopathic traits were more likely to permit immoral behaviours related to harm and betrayal. In addition, the relationship between psychopathic traits and moral judgements in the Care and Loyalty foundations was fully mediated by unpleasantness, as in Survey 1.

Table 3. Pearson's correlation and regression coefficients for the Levenson Self-Report Psychopathy Scale (LSRP) score with moral acceptability and unpleasantness ratings in all moral domains for the forensic sample

LSRP score					
	r	β		*r*	β
Care_M	−.224**	−.211**	Care_U	−.263***	−.231**
Fairness_M	−.137*	−.114	Fairness_U	−.130	−.105
Loyalty_M	−.242**	−.203**	Loyalty_U	−.242**	−.201**
Authority_M	−.144*	−.100	Authority_U	−.182**	−.112
Sanctity_M	−.188**	−.123	Sanctity_U	−.215**	−.150*
Convention_M	.088	.094	Convention_U	.045	.058

Note. Care_M, Care_U, respectively, stands for the average moral acceptability and unpleasantness rating in the Care foundation (M: moral acceptability; U: unpleasantness). The same naming rules apply to other moral foundations and conventional norms. Correlation significance survived the FDR correction. *$p < .05$,; **$p < .01$,; ***$p < .001$.

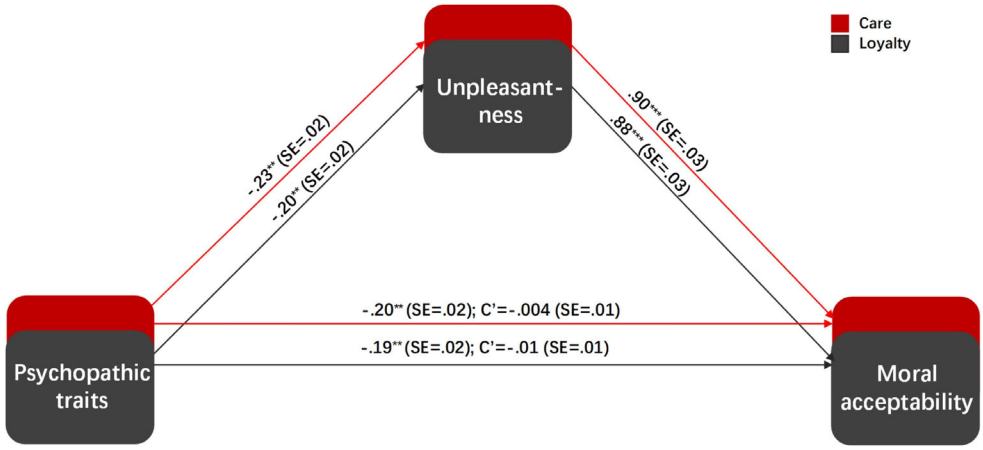

Figure 2. Mediation analyses on the role of unpleasantness in the relationship between psychopathic traits and moral acceptability ratings (forensic sample). Unpleasantness fully and respectively mediated the association between psychopathic traits and moral acceptability in the Care and Loyalty foundations. Standardized regression coefficients were presented. *$p < .05$, **$p < .01$, ***$p < .001$.

However, it seems that the effects of psychopathic traits on moral judgements were less pronounced and existed in a narrower range of moral foundations in the forensic sample than in the non-forensic sample. Similarly, Glenn, Iyer, et al. (2009a) reported that psychopathic traits predict moral concerns in the Care, Fairness, Loyalty, and Sanctity foundations in a non-forensic sample, whereas Aharoni et al. (2011) only found an association in the Care and Fairness foundations in a forensic sample. One possible interpretation of the differences between the two samples might be due to the greater social desirability that the forensic samples have than normal samples since they are motivated to be released quickly (Milla, Hudiyana, & Arifin, 2019). It is worth noting that the forensic sample demonstrated significantly lower psychopathic traits and higher endorsement for the Care and Authority foundations than college students. This finding is surprising since forensic samples usually demonstrate higher psychopathic traits and are more permissive in response to moral transgressions than non-forensic samples (Malterer, Lilienfeld, Neumann, & Newman, 2010). We assume that the forensic samples in the current study might tend to hide some of their real values and present themselves favourably in the self-reported tasks and questionnaires.

GENERAL DISCUSSION

In this study, we used everyday moral scenarios to examine whether psychopathic traits predict moral judgements in five moral foundations in a non-forensic sample (college students) and further replicated the findings in a forensic sample (detainees). Our results showed that the non-forensic sample with high psychopathic traits more often considered morally wrong behaviours to be morally right in the Care foundation. The psychopathic traits predicted moral acceptability ratings in all of the moral foundations in the non-forensic sample and the Care and Loyalty foundations in the forensic sample. Moreover, unpleasantness fully mediated the relationship between psychopathic traits and moral

judgements for both samples. Our findings provide new evidence for the view that psychopathic traits do have an impact on moral judgements.

The set of moral scenarios used in our study describes moral violations, which are commonly seen in daily lives and are a new, useful tool to investigate the associations between psychopathic traits and moral judgements. Using these materials, we confirmed that individuals with elevated psychopathic traits not only more often perceived morally wrong behaviours as morally right but also considered morally wrong behaviours to be more permissible. The predictability of psychopathic traits regarding moral judgements was especially pronounced in the Care foundation, in line with findings from previous studies that elevated psychopathic traits are associated with a greater propensity to endorse acts causing harm to others (Aharoni et al., 2011; Djeriouat & Trémolière, 2014; Efferson et al., 2017; Glenn, Iyer, et al., 2009a; Marshall et al., 2018). Higher psychopathic traits have been recognized to be associated with an increased risk of antisocial and aggressive behaviour (Hare, 2006; Hare & Neumann, 2008; Kimonis, Frick, Fazekas, & Loney, 2006). This finding might occur partly because individuals with elevated psychopathic traits have atypical evaluative processing of immoral behaviours involving harm (Blair, 2007, 2013). In addition, the effects of psychopathic traits on moral judgements were only significant in primary psychopathy (not in secondary psychopathy) (see the supplementary results). Primary psychopathy encompasses interpersonal and emotional features, whereas secondary psychopathy encompasses impulsive and antisocial lifestyles (Lee & Salekin, 2010). It is likely the emotional deficits mainly associated with primary psychopathy that lead to atypical moral judgements in different moral foundations. However, since the discriminant validity between primary and secondary psychopathy has been called into question for the LSRP scale, further investigation is needed to assess the relative roles of the two subtypes of psychopathic traits in predicting moral judgements in the five moral foundations (Yildirim & Derksen, 2015). Given that the three-factor model (Egocentricity, Callousness, Antisocial) of the LSRP has been recently shown to fits the data better than the two-factor model (Christian & Sellbom, 2016; Garofalo, Note born, Sellbom, & Bogaerts, 2019), we also examined the relationship between psychopathic traits and moral judgement using the three-factor model of the LSRP. The results showed that the effects of psychopathic traits on moral judgements were most pronounced in Egocentricity and Callousness. No significant results were obtained for Antisocial (see the supplementary results). The findings in the current study were only exploratory. In addition, only a few studies have validated the three-factor model. Therefore, more studies are needed in the future to validate our results.

Importantly, our results showed that unpleasantness fully mediated the relationship between psychopathic traits and continuous moral judgements. Emotion is commonly recognized to play an essential role in moral judgements (Greene et al., 2001, 2004; Moll, Zahn, de Oliveira-Souza, Krueger, & Grafman, 2005). Many studies have shown that emotion is necessary and sufficient for moral judgements (Decety, Michalska, & Kinzler, 2012; Haidt, Bjorklund, & Murphy, 2000; Nichols, 2002; Prinz, 2006; Schein & Gray, 2018). For example, patients with a damaged ventromedial prefrontal cortex – a crucial brain region in generating emotion – showed uncommonly more utilitarian moral choices (Koenigs et al., 2007). Emotion regulation difficulties significantly predict immoral ratings, suggesting that emotional dysfunction can lead to atypical moral judgements (Zhang et al., 2017). At the same time, psychopathic individuals are well known to have emotional defects (Blair, 2007; Blair & Mitchell, 2009; Hare, 2006; Hare & Neumann, 2008). Neural evidence has demonstrated that the amygdala – a key region in emotional

processing – malfunctions in both youths and adults with elevated psychopathic traits (Anderson & Kiehl, 2012; Blair, 2013). We demonstrated that individuals with elevated psychopathic traits were less emotionally disturbed by moral violations, likely leading to biased intuitive moral judgements. Therefore, this study revealed the mechanism of the atypical moral cognitions of psychopathic individuals.

In addition, our results demonstrated that the relationship between psychopathic traits and moral judgements was affected by how the judgements were made. As we demonstrated, psychopathic traits were more closely related to continuous, rather than binary, moral judgements, which require simple distinctions between right and wrong and therefore could be made based on simple moral rules. However, continuous moral judgements require more sensitive considerations and are not able to be made by referring to specific moral rules. Instead, they reflect more of the intuitive processing of moral issues (Greene et al., 2001; Haidt, 2001; Inbar, Pizarro, Knobe, & Bloom, 2009). Our findings likely suggest that individuals with higher psychopathic traits have more difficulties in making intuitive moral judgements despite perhaps being capable of distinguishing right from wrong in a binary manner.

A few limitations should be noted. First, our study did not include the Liberty foundation, which was recently validated as a new moral foundation (Graham et al., 2016). Extended research on the new moral foundation could enable a more comprehensive understanding of the effects of psychopathic traits on moral judgements. Second, we only investigated the mediating role of unpleasantness in the relationship between psychopathic traits and moral judgements. Unpleasantness is used to evaluate the valence of negative emotion (Roy, Peretz, & Rainville, 2008; Szekely & Miu, 2015). In the future, it would be interesting to determine whether arousal also mediates the relationship between psychopathic traits and moral judgements. In addition, although psychopathic traits are widely associated with shallow affect, it remains unknown whether distinct moral emotions might mediate the relationship between psychopathic traits and moral judgements differently. Third, social desirability might have biased the self-reported scores in the moral judgement task and the psychopathic trait measurements. Forensic samples and individuals with elevated psychopathic traits have been demonstrated to show social desirability in self-reported tasks (Mills & Kroner, 2006; Tann & Grace, 2008). Future studies should consider social desirability when investigating the relationship between psychopathic traits and moral judgements. Fourth, we used fewer moral scenarios in the detainees, which might have reduced the power of detecting the significance of the relationship between psychopathic traits and moral judgements. In the future, a larger number of moral scenarios accessible to the criminal samples should be compiled and tested. Finally, unlike those who have committed serious crimes, the detainees in the current study were arrested for relatively minor offenses, such as fighting, gambling, prostitution, or illegal economic acts. They were held in the detention centre for a relatively short time (on average 7–15 days). It is possible that levels of psychopathic traits might be lower in the current forensic sample than in other forensic samples. Our results should be verified in other forensic samples, including the use of clinical measures of psychopathy like the PCL-R, in the future. Despite these limitations, our study sheds new light on how psychopathic traits are related to moral judgements. Individuals high on psychopathic traits do have atypical moral judgements in at least some of the moral foundations, if not in all of them.

Conclusion

In summary, for the non-forensic sample, psychopathic traits reliably predicted binary moral judgements in the Care foundation and continuous moral judgements in all of the moral foundations. For the forensic sample, psychopathic traits predicted continuous moral judgements in the Care and Loyalty foundations. The relationship between psychopathic traits and continuous moral judgements in both samples was fully mediated by unpleasantness. Our findings directly contradict a popular view among laypersons and researchers that individuals with higher psychopathic traits have an intact moral capacity (Marshall et al., 2018). These findings also raise the possibility that various morally deviant behaviours for individuals with higher psychopathic traits might be related to their atypical moral judgements. In conclusion, our findings deepen our understanding and encourage future research to further explore the relationship between moral judgements and moral behaviours for individuals with elevated psychopathic traits.

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Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author contributions

SY: data curation, methodology, formal analysis, software, writing – original draft, visualization; QY: conceptualization, project administration, supervision, Writing – review and editing, funding acquisition; TL: data curation, formal analysis; YW: conceptualization; BZ: data curation; YD: data curation; FK: supervision, writing – review and editing. All the authors have read the final version of the manuscript and approved of its publication.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Supporting Information

The following supporting information may be found in the online edition of the article:

Supplementary Material Supplementary Materials.
Supplementary Material Supplementary Results.