Psychopathy and Moral Decision Making: A Data Reanalysis Exploration

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Abstract

Previous research found that people with higher level of psychopathy trait would endorse more to the harmful but beneficial action in traditional moral dilemmas. Three possibilities for this effect were confounded: People with higher psychopathy trait, 1) care more about the beneficial consequences; 2) care less about the "no harm" norms; 3) just prefer action irrespective of consequences and norms. A multinomial processing tree model named "CNI" was developed and claimed to dissociated these three possibilities. Four studies have applied CNI model to study the psychopathy-moral decision relationship. However, the CNI model presupposes the agent sequentially processes consequences-norms-generalized inaction/action preferences, which makes the estimated parameters biased and untenable. More recently, an alternative algorithm named "CAN" was developed based on the same data structure to overcome the limitations of CNI model. We applied CAN algorithm and reanalyzed the raw data of the four studies on psychopathy-moral decision relationship. The results demonstrated that people with higher psychopathy trait have weaker consequences and norms sensitivities, stronger overall action preferences, stronger inaction/action preferences irrespective of norms and consequences, and weaker moral principles obedience. Furthermore, the mediation and moderation reanalysis explorations demonstrated that instrumental harm and moral identity partly mediate the psychopathy-moral decision relationship and that perceived societal standards rather than personal standards when making moral decisions can alleviate the positive effects of psychopathy on overall action preference and action preference irrespective of norms and consequences. Present reanalysis exploration study clarified and deepened our insights on the relationship between psychopathy and moral decisions. Theoretical and methodological implications were also discussed.

Full Text

Preamble

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Psychopathy and Moral Decision Making: A Data Reanalysis Exploration

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Abstract

Previous research found that individuals with higher levels of psychopathic traits endorse harmful-but-beneficial actions more frequently in traditional moral dilemmas. However, three possible explanations for this effect were confounded: (1) such individuals care more about beneficial consequences; (2) they care less about "no harm" norms; or (3) they simply prefer action irrespective of consequences and norms. A multinomial processing tree model called the "CNI" model was developed to dissociate these possibilities, and four studies have applied it to examine the psychopathy-moral decision relationship. Nevertheless, the CNI model presupposes that agents sequentially process consequences, norms, and generalized inaction/action preferences, which biases the estimated parameters and renders them untenable. More recently, an alternative algorithm called "CAN" was developed based on the same data structure to overcome the CNI model' s limitations. We applied the CAN algorithm to reanalyze the raw data from these four studies on the psychopathy-moral decision relationship. Our results demonstrate that individuals with higher psychopathy traits exhibit weaker sensitivity to consequences and norms, stronger overall action preferences, stronger inaction/action preferences irrespective of norms and consequences, and weaker moral principle obedience. Furthermore, mediation and moderation reanalyses reveal that instrumental harm and moral identity partially mediate the psychopathy-moral decision

relationship, and that making moral decisions based on perceived societal standards rather than personal standards can alleviate the positive effects of psychopathy on overall action preference and action preference irrespective of norms and consequences. This reanalysis exploration clarifies and deepens our understanding of the relationship between psychopathy and moral decisions, with theoretical and methodological implications discussed.

Keywords: psychopathy; moral dilemma; CAN algorithm; CNI model; moral decision-making

Introduction

The relationship between subclinical psychopathy traits and moral dilemma decision-making has long been debated. Bartels and Pizarro (2011) found that individuals scoring higher on psychopathy scales tend to endorse harmful-yet-beneficial action proposals more frequently (Bartels & Pizarro, 2011). In the trolley problem, for example, where an uncontrollable trolley threatens five workers on the main track but could be diverted to a side track where it would kill one worker, more psychopathic individuals are more likely to approve pressing the button that sacrifices one to save five. This effect has been conceptually replicated in numerous subsequent studies (Djeriouat & Tremoliere, 2014; Gao & Tang, 2013; Koenigs et al., 2012; Patil, 2015; Seara-Cardoso et al., 2013; S. Tassy et al., 2013).

In traditional moral dilemma research, endorsing harmful-but-beneficial actions has been treated as utilitarian judgment because it maximizes overall wellbeing (Bentham, 1996; Mill, 1872), while disapproving such actions has been treated as deontological judgment because harmful actions violate moral norms (Kant & Gregor, 1997). However, research on psychopathy and moral decision-making raises a critical question: Do more psychopathic individuals genuinely care more about overall human welfare?

Several scholars have attempted to address this question. Tassy et al. (2013) found that individuals with higher psychopathic traits, particularly those related to affective deficits, gave more utilitarian responses under choice perspective but not under judgment perspective (S. Tassy et al., 2013). This suggests that psychopathic individuals know moral rules but do not care about them (Cima et al., 2010) due to affective deficits. Patil (2015) found that this effect was partly mediated by reduced aversion to carrying out harmful actions (Patil, 2015).

While some researchers sought explanations for the psychopathy-utilitarianism effect, others questioned the effect itself and the methodological paradigm. Kahane argued that sacrificial judgments in hypothetical dilemmas bear little relation to genuine utilitarian ethics (Kahane et al., 2015). Furthermore, they developed a two-dimensional scale to dissociate instrumental harm from impartial concern in utilitarian psychology, finding that subclinical psychopathy correlates with instrumental harm but not with impartial concern, which is more essential to utilitarianism (Kahane et al., 2018).

Despite Kahane' s critique, researchers continued addressing limitations of the traditional moral dilemma paradigm. Gawronski proposed that three possibilities are confounded when people endorse harmful-but-beneficial actions (Gawronski & Beer, 2017): (1) they care more about consequences and find sacrificing one to save five beneficial; (2) they care less about moral norms and are less averse to harmful actions; or (3) they do not care about consequences or norms at all and simply have a generalized preference for endorsing action proposals. To dissociate these possibilities, they applied multinomial processing tree modeling to develop the CNI model, which quantifies individuals' Consequence sensitivity, Norm sensitivity, and generalized Inaction/action preferences (Gawronski et al., 2017).

Unlike traditional moral dilemmas, the CNI model considers four comprehensive scenario types. In traditional dilemmas, the proposed action is prohibited by moral norms and benefits outweigh costs. Gawronski et al. (2017) used a factorial design to vary norms and consequences across four editions: (1) action prohibited by norms with benefits greater than costs (traditional dilemma); (2) action prohibited by norms with benefits smaller than costs; (3) action advocated by norms with benefits greater than costs; and (4) action advocated by norms with benefits smaller than costs [Figure 1: see original paper]. Participants decided whether each scenario' s action was morally acceptable (judgment framing) or whether they would perform it (choice framing).

The CNI model expands moral scenario types to include both proscriptive and prescriptive norms, two facets of moral regulation emphasized by previous researchers (Janoff-Bulman et al., 2009). The C parameter reflects the extent to which agents base decisions on action consequences, the N parameter reflects reliance on moral norms, and the I parameter reflects general inaction/action preferences irrespective of norms and consequences.

Four studies have examined the psychopathy-moral decision relationship using the CNI model. Gawronski et al. (2017) found that higher psychopathy was associated with weaker consequence sensitivity, weaker norm sensitivity, and weaker general preference for inaction. An individual-differences study confirmed these relationships using individual-level correlations (Korner et al., 2020). Moreover, personal and perceived societal standards played different roles in relationships between psychopathy and moral judgment determinants (Luke & Gawronski, 2020). These studies suggested that individuals with higher psychopathy traits care less about moral action consequences despite endorsing utilitarian proposals in traditional dilemmas. A Chinese study using the CNI model found that high psychopathy traits were associated with weaker norm sensitivity but no significant differences in consequence sensitivity or generalized inaction/action preferences (Li et al., 2020), suggesting possible cultural differences.

While the CNI model made outstanding theoretical contributions by expanding moral dilemma types and quantifying decision determinants, limitations remain, including criticism regarding omission bias (Baron & Goodwin, 2020). The most serious limitation is its presupposition that agents sequentially consider conse-

quences, norms, and generalized inaction/action preferences (Liu & Liao, 2021). Although Gawronski emphasized that the hierarchical structure reflects conditional parameter relations rather than temporal order (Gawronski et al., 2020), this limitation remains fatal. As Liu and Liao (2021) analyzed, the sequential processing assumption systematically overestimates the N parameter (norm sensitivity) and renders the I parameter (general inaction/action preferences) untenable.

Given these issues with the CNI model' s N and I parameters, empirical results from the four psychopathy-moral decision studies should be re-examined. Liu and Liao (2021) proposed the CAN algorithm to arithmetically quantify agents' Consequence sensitivity, Norm sensitivity, and overall Action/inaction preferences.

[Figure 1: see original paper] shows the CNI model' s dilemma factorial design, where p1, p2, p3, and p4 represent the probabilities of approving action proposals in each scenario type. These four empirically observed probabilities serve as input for the CAN algorithm.

The CAN algorithm computes parameters based on the same empirical data as the CNI model:

C = (p1 -p2 + p3 -p4)/2
N = (p3 -p1 + p4 -p2)/2
A = (p1 + p2 + p3 + p4)/4

The C parameter depicts consequence sensitivity, quantifying the extent to which agents base moral decisions on whether consequences are beneficial. The N parameter depicts norm sensitivity, quantifying reliance on whether the action proposal is allowed by moral norms. The A parameter depicts overall action versus inaction preferences across the four moral scenario types, quantifying the extent to which agents generally prefer action or inaction. Additionally, three new parameters can be derived from the CAN algorithm.

Liu and Liao (2021) proposed that the probability of generalized inaction preference irrespective of moral norms and consequences can be represented by (1 -p3). Similarly, the probability of generalized action preference irrespective of norms and consequences can be represented by p2. Moreover, (p3 -p2) represents the extent to which agents follow moral principles. If agents exactly follow moral principles, p3 would approach 1 (since both norms and consequences advocate action) and p2 would approach 0 (since both oppose action). Therefore, (p3 - p2) varies between 0 and 1, representing moral principle obedience. We term these three parameters IrrespectiveI, IrrespectiveA, and Moral obedience.

In the present research, we used the CAN algorithm to reanalyze raw data from previous psychopathy-moral decision studies. We pre-registered our research plan at https://osf.io/pgw2b. This data reanalysis exploration benefited from the Open Science Framework (OSF), with all datasets downloaded using hyperlinks provided in the original papers. The research was approved by the

Institutional Review Board of the Psychology Department at Tsinghua University.

In Reanalysis Study 1, we examined the raw data from Gawronski et al.' s (2017) Studies 4a and 4b to explore relationships between psychopathy traits and moral decision parameters. In Reanalysis Study 2, we reanalyzed Korner et al.' s (2020) data, re-examining these relationships and exploring potential mediation processes. In Reanalysis Study 3, we investigated the moderating roles of personal versus perceived societal standards (Luke & Gawronski, 2020). In Reanalysis Study 4, we examined correlations between psychopathy traits and moral decision parameters in Chinese culture (Li et al., 2020).

Reanalysis Study 1: Correlations Between Psychopathy Trait and Moral Decision Parameters

Method

Participants and Measurement. Gawronski et al.' s (2017) Study 4a recruited 184 valid participants (175 males, 9 females; aged 18-73, M = 35.05, SD = 12.24) via Amazon' s MTurk who completed all measures and passed instructional attention checks. Psychopathy was measured using Paulhus, Neumann, and Hare' s (2009) 30-item SRP-III Scale (Paulhus et al., 2009). In the first session, 503 MTurk workers completed all measures. Based on their psychopathy scores, 121 participants in the lowest quartile and 122 in the highest quartile were selected for the second session. Participants read six moral dilemmas, each with four variants (as shown in Figure 1), totaling 24 scenario presentations. After each scenario, they answered a moral choice question: "Would you perform the described action?" After filtering invalid responses, 184 participants remained in the final sample.

To address replication concerns, Gawronski et al. (2017) conceptually replicated their studies. Study 4b recruited 198 valid participants (195 males, 3 females; aged 19-69, M = 33.35, SD = 11.11) via MTurk who completed all measures and passed attention checks. Using the same sampling strategy, 504 participants completed the first psychopathy evaluation session. For the second session, 138 participants with lowest-quartile psychopathy scores and 139 with highest-quartile scores were invited. Psychopathy was measured using Levenson' s 16-item Primary Psychopathy Scale (Levenson et al., 1995), and participants completed the same moral dilemma tasks as in Study 4a.

Procedure. We downloaded raw data from https://osf.io/xt66w/, computed the six parameters arithmetically, and conducted correlation analyses between psychopathy and these parameters. As previous research demonstrated gender differences in moral dilemma decisions (Friesdorf et al., 2015), we controlled for gender in all analyses.

Results

As shown in Table 1 , correlation analyses revealed that individuals with higher psychopathy traits care less about moral consequences, care less about moral norms underlying proposed actions, have stronger inclinations toward both inaction and action irrespective of moral norms and consequences, and exhibit weaker moral obedience to principles.

Table 1. Partial correlations between psychopathy and moral decision parameters (controlling for gender) in Gawronski et al.' s (2017) Study 4a (n = 184) and Study 4b (n = 198).

Gawronski et al. (2017) artificially divided participants into high and low psychopathy conditions based on scores, then conducted between-condition contrasts of moral decision parameters. We also performed MANOVA analyses using our algorithm-derived parameters as dependent variables, condition as a fixed factor, and gender as a control variable.

For Study 4a: C parameters did not differ significantly between low (M = 0.247, SD = 0.202) and high (M = 0.199, SD = 0.216) psychopathy conditions, F(1, 181) = 2.48, p = .117, p^2 = 0.014. The N parameter was marginally greater in the low (M = 0.190, SD = 0.352) versus high (M = 0.097, SD = 0.313) psychopathy condition, F(1, 181) = 3.60, p = .059, p^2 = 0.020. A parameters did not differ between low (M = 0.458, SD = 0.097) and high (M = 0.477, SD = 0.106) psychopathy conditions, F(1, 181) = 1.45, p = .231, p^2 = 0.008. IrrespectiveI parameters showed no significant difference between low (M = 0.163, SD = 0.119) and high (M = 0.190, SD = 0.110) psychopathy conditions, F(1, 181) = 2.60, p = .108, p^2 = 0.014. However, the IrrespectiveA parameter was significantly smaller in the low (M = 0.237, SD = 0.221) versus high (M = 0.324, SD = 0.252) psychopathy condition, F(1, 181) = 6.27, p = .013, p^2 = 0.033. Moral obedience was significantly greater in the low (M = 0.437, SD = 0.404) versus high (M = 0.296, SD = 0.403) psychopathy condition, F(1, 181) = 5.70, p = .018, p^2 = 0.031.

For Study 4b: The C parameter was significantly greater in the low (M = 0.265, SD = 0.208) versus high (M = 0.131, SD = 0.219) psychopathy condition, F(1, 195) = 18.00, p < .001, p^2 = 0.084. The N parameter was significantly greater in the low (M = 0.267, SD = 0.318) versus high (M = -0.008, SD = 0.307) psychopathy condition, F(1, 195) = 35.49, p < .001, p^2 = 0.154. A parameters did not differ between low (M = 0.456, SD = 0.091) and high (M = 0.477, SD = 0.134) psychopathy conditions, F(1, 195) = 1.15, p = .286, p^2 = 0.006. The IrrespectiveI parameter was significantly smaller in the low (M = 0.140, SD = 0.109) versus high (M = 0.230, SD = 0.114) psychopathy condition, F(1, 195) = 31.76, p < .001, p^2 = 0.140. The IrrespectiveA parameter was significantly smaller in the low (M = 0.188, SD = 0.194) versus high (M = 0.416, SD = 0.264) psychopathy condition, F(1, 195) = 44.99, p < .001, p^2 = 0.187. Moral obedience was significantly greater in the low (M = 0.532, SD = 0.363) versus high (M = 0.124, SD = 0.361) psychopathy condition, F(1, 195) = 58.80, p <

.001, $p^2 = 0.232$.

Discussion

In Gawronski' s original CNI model analyses, they compared C, N, and I parameters between artificially divided high and low psychopathy conditions, finding that high psychopathy traits were associated with weaker consequence sensitivity, weaker norm sensitivity, and lower generalized inaction preferences. However, three methodological concerns arise. First, the samples were predominantly male. Although we controlled for gender, this sampling bias affects result reliability. Researchers have noted that psychopathy research has focused predominantly on White male samples (Horan et al., 2015); future studies need more female participants and diverse cultural backgrounds. Second, artificial dichotomization may produce biased results (Altman & Royston, 2006; Austin & Brunner, 2004). For instance, in Gawronski' s Study 4a, the C parameter was marginally negatively correlated with psychopathy scores but showed no significant between-group difference. Third, as Liu and Liao (2021) analyzed, the CNI model' s N parameter is overestimated and the I parameter untenable. Our analyses show that psychopathy scores are marginally (Study 4a) and significantly (Study 4b) positively correlated with the IrrespectiveI parameter, suggesting that higher psychopathy individuals tend toward more inaction choices even when moral norms and consequences advocate action—opposite to the CNI model' s conclusion.

Empirically, the IrrespectiveI parameter depicts the probability of choosing inaction when both moral norms and consequences principles demand action. This parameter more accurately describes generalized inaction preference irrespective of moral norms and consequences than the CNI model' s I parameter.

In summary, reanalyzing Gawronski' s Studies 4a and 4b demonstrates that individuals with higher psychopathy traits have weaker moral consequence sensitivity, weaker moral norm sensitivity, stronger inaction and action preferences irrespective of norms and consequences, and weaker moral obedience. These conclusions will be retested in subsequent reanalysis studies addressing sampling bias limitations.

Reanalysis Study 2: Mediation Process Between Psychopathy Trait and Moral Decision Parameters

The original CNI model does not provide individual-level parameter estimates because 24 trials are insufficient for unbiased estimation (Gawronski et al., 2017). Gawronski' s team expanded the dilemma set to 12 scenarios, each with four versions based on the factorial design (2 [norms: proscriptive/prescriptive] × 2 [consequences: benefits greater/smaller than costs]), yielding 48 scenarios for individual-level estimation (Korner et al., 2020). However, they did not address the sequential processing limitation, so the N parameter remains overestimated and the I parameter untenable.

Reanalysis Study 2 had two aims: (1) re-examine relationships between psychopathy traits and moral decision parameters, and (2) explore mediating processes, as Korner et al. (2020) measured empathic concern (Gleichgerrcht & Young, 2013), need for cognition (Conway & Gawronski, 2013), Oxford Utilitarianism Scale (Kahane et al., 2018), behavioral inhibition/activation (Moore et al., 2011; van den Bos et al., 2011), self-importance of moral identity (Glenn et al., 2010), and religiosity (Szekely et al., 2015)—variables previously implicated in moral judgment.

Method

Participants. Korner et al. (2020) conducted four studies examining individual differences in moral decisions, recruiting 161, 177, 196, and 189 valid participants for Studies 1a, 1b, 2a, and 2b, respectively. In response to the replication crisis, Study 1b exactly replicated Study 1a, and Study 2b exactly replicated Study 2a. The only difference was that participants in Studies 1a/1b responded to judgment framing questions ("Is it morally acceptable to perform the described action?") while those in Studies 2a/2b responded to choice framing questions ("Would you perform the described action?"). Evidence shows people respond differently to these question types (Francis et al., 2016; Patil et al., 2014; Pletti et al., 2017; S. Tassy et al., 2013).

Given these similarities and differences, we combined Studies 1a and 1b (n = 338; 137 female, 189 male, 2 other, 4 prefer not to respond, 6 missing; aged 18-71, M = 34.77, SD = 10.39) and Studies 2a and 2b (n = 385; 192 female, 189 male, 2 other, 1 prefer not to respond, 1 missing; aged 19-72, M = 34.55, SD = 9.87).

Procedure. We downloaded Korner et al.' s (2020) raw data from https://osf.io/ndf4w/, computed six moral decision parameters using the CAN algorithm, and conducted two sets of analyses: (1) rechecking relationships between psychopathy and moral decision parameters, and (2) exploring potential mediating processes.

Results

Part 1: Correlations Between Psychopathy and Moral Decision Parameters. As shown in Table 2 , correlation analyses generally supported Reanalysis Study 1' s findings. Individuals with higher psychopathy traits exhibit weaker consequence sensitivity, weaker norm sensitivity, stronger inaction and action preferences irrespective of moral norms and consequences, and weaker moral obedience. Additionally, they show stronger overall action preferences.

Table 2. Partial correlations between psychopathy trait and moral decision parameters (controlling for gender) in Korner et al.' s (2020) Study 1 (left, n = 338) and Study 2 (right, n = 385).

Part 2: Possible Mediating Processes Between Psychopathy and

Moral Decision Parameters. We conducted mediation analyses using the PROCESS 3.4 plug-in (Hayes, 2013) with Model 4 and 5000 bootstraps. Psychopathy scores served as the independent variable; empathic concern, need for cognition, Oxford Utilitarianism Scale: Instrumental Harm (OUSIH), Oxford Utilitarianism Scale: Impartial Beneficence (OUSIB), behavioral inhibition (BIS), behavioral activation (BAS), moral identity, and religiosity served as parallel mediators; and the six moral decision parameters served as dependent variables, analyzed separately. Because Studies 1 and 2 used different question frames (judgment vs. choice), we conducted mediation analyses independently, yielding 12 total models. To be rigorous, we classified mediating paths as reliable only if significant in both judgment and choice conditions.

Figure 2 [**Figure 2: see original paper**] shows mediation processes for the C parameter. Only OUSIH showed a partial mediating role in both judgment (indirect effect = 0.033, 95% CI [0.011, 0.053]) and choice perspectives (indirect effect = 0.026, 95% CI [0.008, 0.046]), indicating that higher psychopathy traits increase instrumental harm inclinations, which in turn reduce consequence sensitivity.

Figure 3 [**Figure 3: see original paper**] shows mediation processes for the N parameter. Only OUSIH showed a partial mediating role in both judgment (indirect effect = -0.066, 95% CI [-0.096, -0.038]) and choice perspectives (indirect effect = -0.069, 95% CI [-0.096, -0.045]), indicating that higher psychopathy traits increase instrumental harm inclinations, reducing norm sensitivity.

Figure 4 [**Figure 4: see original paper**] shows mediation processes for the A parameter. Both OUSIH (judgment: indirect effect = 0.017, 95% CI [0.006, 0.029]; choice: indirect effect = 0.009, 95% CI [0.001, 0.019]) and moral identity (judgment: indirect effect = 0.019, 95% CI [0.003, 0.037]; choice: indirect effect = 0.020, 95% CI [0.003, 0.040]) showed partial mediating roles in both perspectives, indicating that higher psychopathy traits increase instrumental harm inclinations and weaken moral identity, leading to greater overall action preferences.

Figure 5 [**Figure 5: see original paper**] shows mediation processes for the IrrespectiveI parameter. No significant mediating paths emerged in both perspectives, leaving the mediating processes between psychopathy and generalized inaction preferences unclear.

Figure 6 [**Figure 6: see original paper**] shows mediation processes for the IrrespectiveA parameter. Both OUSIH (judgment: indirect effect = 0.031, 95% CI [0.010, 0.052]; choice: indirect effect = 0.031, 95% CI [0.015, 0.048]) and moral identity (judgment: indirect effect = 0.052, 95% CI [0.025, 0.085]; choice: indirect effect = 0.047, 95% CI [0.018, 0.078]) showed partial mediating roles in both perspectives, indicating that higher psychopathy traits increase instrumental harm inclinations and weaken moral identity, leading to greater action preferences irrespective of norms and consequences.

Figure 7 [**Figure 7: see original paper**] shows mediation processes for

the Moral obedience parameter. Both OUSIH (judgment: indirect effect = -0.033, 95% CI [-0.067, -0.002]; choice: indirect effect = -0.043, 95% CI [-0.070, -0.018]) and moral identity (judgment: indirect effect = -0.068, 95% CI [-0.110, -0.032]; choice: indirect effect = -0.058, 95% CI [-0.104, -0.012]) showed partial mediating roles in both perspectives, indicating that higher psychopathy traits increase instrumental harm inclinations and weaken moral identity, reducing moral obedience.

Discussion

Reanalysis Study 2 replicated Reanalysis Study 1' s main findings, confirming that higher psychopathy is associated with reduced concern for moral action consequences and underlying norms, plus stronger inclinations toward action and inaction irrespective of norms and consequences. Additionally, we found that higher psychopathy correlates with stronger overall action preferences. Mediation analyses revealed that instrumental harm and moral identity partially mediate relationships between psychopathy and some moral decision parameters. Notably, instrumental harm mediated nearly all relationships except with IrrespectiveI, consistent with Kahane' s studies (Kahane et al., 2018) and deepening our understanding of psychopathy-moral decision relationships.

Another important question concerns boundary conditions for the psychopathy-moral decision relationship to inform intervention strategies. Luke and Gawronski (2020) found that personal versus perceived societal standards moderated relationships between psychopathy and CNI-derived N and I parameters. Specifically, the negative association between psychopathy and N parameter was stronger under personal judgment than perceived societal judgment, and the negative association between psychopathy and I parameter was stronger under personal than perceived societal judgment. However, as Liu and Liao (2021) noted, CNI model parameters are overestimated or untenable. We reanalyzed their data using the CAN algorithm to determine whether the moderating role of personal/perceived societal standards remains.

Reanalysis Study 3: Moderating Role of Personal/Perceived Societal Standards on Psychopathy-Moral Decision Relationships

Method

Participants and Measurement. Luke and Gawronski (2020) recruited 337 participants (165 female, 169 male, 3 prefer not to answer; aged 18-76, M = 35.53, SD = 11.22). Participants completed Levenson' s 16-item Primary Psychopathy Scale (Levenson et al., 1995) and a 48-scenario moral decision task (Korner et al., 2020). During the moral decision task, participants received instructions to make decisions based on either personal standards (their own opinions) or perceived societal standards (what is socially acceptable). See Luke and Gawronski (2020) for details.

Procedure. We downloaded Luke and Gawronski' s (2020) raw data from https://osf.io/7nscq/, computed six moral decision parameters using the CAN algorithm, and conducted two sets of analyses: (1) correlations between psychopathy and moral decision parameters, and (2) moderating effects of personal/perceived societal standards.

Results

Part 1: Correlations Between Psychopathy and Moral Decision Parameters. As shown in Table 3 , psychopathy trait scores negatively correlated with C and N parameters, positively correlated with A, IrrespectiveI, and IrrespectiveA parameters, and negatively correlated with moral obedience, regardless of condition.

Table 3. Partial correlations between psychopathy and moral decision parameters (controlling for gender) in Luke and Gawronski (2020). Personal (n = 174) and societal (n = 163) conditions are shown.

Part 2: Moderation Role of Personal/Perceived Societal Standards. We conducted moderation analyses using the PROCESS plug-in (Hayes, 2013) with Model 1 and 5000 bootstraps. Psychopathy score served as the independent variable, personal/perceived societal standards condition as the moderator, gender as a control variable, and each of the six moral decision parameters as dependent variables in separate analyses.

As shown in Figure 8 [Figure 8: see original paper], the moderating effect of personal/perceived societal standards was marginally significant for the relationship between psychopathy and A parameter (β = -0.036, t(332) = -1.67, p = .097, 95% CI [-0.078, 0.007]) and statistically significant for psychopathy and IrrespectiveA parameter (β = -0.070, t(332) = -1.98, p = .049, 95% CI [-0.139, -0.001]). Positive correlations between psychopathy and A/IrrespectiveA parameters were stronger under personal standards than perceived societal standards.

Discussion

Luke and Gawronski (2020) found that personal/perceived societal standards moderated relationships between psychopathy and CNI-derived N and I parameters. However, we found no moderating effect using CAN-derived N and IrrespectiveI parameters, possibly because the CNI model overestimates the N parameter (Liu & Liao, 2021) and amplifies coefficient differences. Furthermore, the CNI model' s I parameter is untenable (Liu & Liao, 2021). When making moral decisions under personal rather than perceived societal standards, psychopathy more strongly predicts overall action preferences and action preferences irrespective of norms and consequences. This suggests psychopathic individuals suppress action impulses when considering societal standards. These results differ completely from Luke and Gawronski (2020), further demonstrating that CNI model parameters are unreliable.

The reanalysis results suggest culture-related social standards may influence psychopathy-moral decision relationships. Therefore, Reanalysis Study 4 examined data from Chinese participants.

Reanalysis Study 4: Relationship Between Psychopathy Traits and Moral Decision Parameters Under Chinese Culture

Method

Li et al. (2020) recruited 869 valid student participants (587 female, 282 male; aged 17-47, M = 19.03, SD = 1.71). Participants completed Levenson' s self-report psychopathy scales (26 items total: 16-item primary psychopathy subscale and 10-item secondary psychopathy subscale) and a 24-dilemma moral decision task (Gawronski et al., 2017).

Because CNI-derived C, N, and I parameters cannot be used for correlation analysis, Li et al. (2020) artificially divided participants into high (top 20% of psychopathy scores) and low (bottom 20%) groups for between-group comparisons. They found high psychopathy individuals had significantly weaker norm sensitivity than low psychopathy individuals, but no significant differences in consequence sensitivity or inaction/action preferences irrespective of norms and consequences.

Given that the N parameter is overestimated and the I parameter untenable (Liu & Liao, 2021), we downloaded their raw data from https://osf.io/hcx5a/, computed six moral decision parameters using the CAN algorithm, and conducted correlation analyses with all 869 participants.

Results

As shown in Table 4 , among CAN-derived parameters, primary psychopathy scores negatively correlated with N parameter and Moral obedience, and positively correlated with IrrespectiveI and IrrespectiveA parameters. Secondary psychopathy scores positively correlated with A and IrrespectiveA parameters and negatively correlated with moral obedience. Total psychopathy scores negatively correlated with N parameter and Moral obedience, and positively correlated with IrrespectiveI and IrrespectiveA parameters.

Table 4. Partial correlations between psychopathy and moral decision parameters (controlling for gender) in Li et al. (2020).

Discussion

We replicated Li et al.' s (2020) finding that high psychopathy individuals have weaker norm sensitivity than low psychopathy individuals. Furthermore, we replicated our reanalysis results that high psychopathy individuals have stronger inaction and action preferences irrespective of norms and consequences and

weaker moral obedience. These results are stable and cross-culturally consistent.

Moreover, psychopathy subscales show different relationships with moral decision parameters. Specifically: (1) Primary psychopathy negatively correlates with norm sensitivity while secondary psychopathy does not; (2) Primary psychopathy does not correlate with overall action preferences while secondary psychopathy positively correlates; (3) Primary psychopathy positively correlates with inaction preferences irrespective of norms and consequences while secondary psychopathy does not. Previous research indicates primary psychopathy is associated with callousness, interpersonal manipulation, and selfishness, while secondary psychopathy relates to emotional disturbance and internal conflict leading to antisocial behavior (Horan et al., 2015; Wang et al., 2018). These differences may explain why primary and secondary psychopathy correlate differently with moral decision parameters.

General Discussion

Main Results of Present Reanalysis Study

Across four reanalysis studies, we revealed a new perspective on the psychopathy-moral decision relationship. First, studies from Gawronski' s research team consistently demonstrated that psychopathy negatively associates with consequence sensitivity, contradicting previous conclusions that psychopathic individuals care more about consequences (Bartels & Pizarro, 2011; Djeriouat & Tremoliere, 2014; Gao & Tang, 2013; Koenigs et al., 2012; Patil, 2015; Seara-Cardoso et al., 2013; S. Tassy et al., 2013). In fact, they do not. However, the Chinese sample did not show this relationship, possibly due to cultural differences, as research suggests psychopathy-antisocial conduct relationships are moderated by country (Leistico et al., 2008) and decision-making is influenced by individualism/collectivism (LeFebvre & Franke, 2013). Nevertheless, sampling bias may confound these cultural differences, as Li et al. (2020) surveyed college students rather than a broader age range. Future studies should examine whether and why Chinese participants' psychopathy traits fail to predict consequence sensitivity in moral decision-making.

Second, all studies consistently demonstrated that higher psychopathy traits associate with weaker norm sensitivity. Research shows psychopathic individuals have affective deficits making them less averse to harmful actions (Reynolds & Conway, 2018; S. Tassy et al., 2013). Based on the dual-process model of moral cognition (Greene, 2009; Paxton & Greene, 2010), high psychopathy individuals care less about moral norms underlying proposed actions. Furthermore, we found that higher psychopathy associates with stronger action and inaction preferences irrespective of norms and consequences, and weaker moral obedience. These novel findings imply that high psychopathy individuals cannot follow moral principles effectively. A meta-analysis found that psychopathic individuals fail to understand moral principles and have a different moral compass

(Marshall et al., 2018). When both norms and consequences principles demand action or inaction, more psychopathic individuals show stronger inclinations to do the opposite.

Third, Korner et al.' s (2020) and Luke and Gawronski' s (2020) studies showed that higher psychopathy positively correlates with stronger overall action preferences, while the other two studies did not. If this pattern is reliable, it may reflect psychopathic individuals' lower behavioral inhibition, which has been linked to greater endorsement of action proposals (van den Bos et al., 2011). However, this inconsistent effect requires future replication.

Fourth, instrumental harm and moral identity partially mediated relationships between psychopathy and some moral decision parameters. Many studies show psychopathic individuals respond differently to moral dilemmas under judgment versus choice perspectives (Cima et al., 2010; Pletti et al., 2017; S. Tassy et al., 2013), with more psychopathic individuals endorsing harmful actions to save more people under choice but not judgment perspectives. Focusing primarily on the choice perspective, we found instrumental harm and moral identity frequently mediate psychopathy-moral decision relationships. This suggests that higher instrumental harm inclinations and lower moral identity explain why psychopathic individuals care less about consequences and norms, show stronger overall action preferences and action preferences irrespective of norms and consequences, and exhibit weaker moral obedience. Kahane et al. (2018) developed the instrumental harm subscale and first found that subclinical psychopathy correlates with instrumental harm. Our results confirm and deepen this relationship. Glenn et al. (2010) found that psychopathic traits may lead to immoral behavior partly because individuals do not construe their identities in moral terms. Our results further support this claim, identifying moral identity as an important mediator.

Fifth, making moral decisions under perceived societal rather than personal standards alleviates psychopathy' s positive predictions of overall action preferences and action preferences irrespective of norms and consequences. These moderation results differ completely from the original study, demonstrating that perceived societal standards may help suppress psychopathic individuals' action impulses, especially when both norms and consequences principles demand inaction. Previous research shows psychopathic individuals can make moral judgments but do not care due to affective deficits (Cima et al., 2010; S. Tassy et al., 2013), suggesting they understand societal standards. Our study clarifies that societal standards can help suppress psychopathy-related action impulses, reducing endorsement of action when norms and consequences demand inaction.

Methodological Contrasts Between CNI Model and CAN Algorithm

Methodology determines result credibility. As Liu and Liao (2021) discussed, the CNI model overestimates the N parameter because it presupposes that agents follow norm principles only if they do not follow consequence principles. This

prerequisite is unnecessary according to the corrective dual-process model of moral cognition (Baron & Goodwin, 2020). In contrast, the CAN algorithm has no such prerequisite and computes N parameters algebraically, aligning better with moral cognition literature and demonstrating that deontological and utilitarian inclinations can be computed independently (Bago & De Neys, 2019; Greene, 2009).

Furthermore, the CNI model' s I parameter is untenable (Liu & Liao, 2021). It claims to depict inaction/action preferences irrespective of norms and consequences, meaning agents disregard norm and consequence requirements when choosing action or inaction. However, based on the four scenario types, the probability of endorsing a proposal in proscriptive norm scenarios where benefits are smaller than costs (p2) represents action preference when both norms and consequences demand inaction. Conversely, the probability of rejecting a proposal in prescriptive norm scenarios where benefits exceed costs (1 - p3) represents inaction preference when both principles demand action. Gawronski et al. (2017) reasoned that aggregating these probabilities should equal 1, implying p2 = p3—a highly improbable equality stressed by Liu and Liao (2021). Therefore, the CNI model' s I parameter is untenable. We developed IrrespectiveI, IrrespectiveA, and Moral obedience parameters using the CAN algorithm, providing deeper insights into psychopathy-moral decision relationships.

In summary, the CAN algorithm overcomes CNI model limitations and illuminates the psychopathy-moral decision relationship more clearly. Rather than showing that psychopathic individuals are more utilitarian, we demonstrate they are less sensitive to consequences and norms, less obedient to moral principles, and have stronger inclinations toward overall action preferences and action/inaction preferences irrespective of norms and consequences. We encourage researchers to use this new method for other moral decision-making topics.

Contributions and Limitations

The most important contribution of this reanalysis research is demonstrating that the CAN algorithm provides deeper insights into agents' moral decision preferences. We appreciate that the CNI model expanded the scenario library to include prescriptive norm scenarios, enabling measurement of both proscriptive and prescriptive aspects of moral cognition (Janoff-Bulman et al., 2009). However, its processing tree logic is problematic, biasing parameter estimates. Our reanalysis provides evidence for this bias, suggesting that other CNI model research should exercise caution in data analysis and consider reanalyzing data with the CAN algorithm.

Second, we provide new insights into psychopathy-moral decision relationships. What is novel in this reanalysis? First, we recomputed moral decision parameters using the CAN algorithm, demonstrating that higher psychopathy traits associate with reduced concern for consequences and norms, weaker moral obedience, and stronger overall action preferences and action/inaction preferences irre-

spective of norms and consequences—findings not present in the original studies. Second, we explored mediation processes, revealing significant roles for instrumental harm and moral identity—also novel. Third, we clarified the moderating role of personal/perceived societal standards, another new contribution.

However, limitations remain. This study primarily reanalyzes existing data; more empirical research is needed to further examine psychopathy' s effects on moral decisions. Previous research suggests affective deficits (S. Tassy et al., 2013), lack of empathic concern (Gleichgerrcht & Young, 2013), and anxious emotion (Koenigs et al., 2012) may explain psychopathic individuals' different moral decisions. Future studies should examine these factors.

Additionally, random error in parameters requires careful consideration. When participants misunderstand scenarios and respond randomly, this error confounds parameters differently. C and N parameter computations involve all four scenario types, theoretically balancing random errors through subtraction and making these parameters convincing. However, IrrespectiveI, IrrespectiveA, and Moral obedience parameters depend primarily on response probabilities in scenarios where both norms and consequences advocate or prohibit action, making them vulnerable to random error. The A parameter, aggregating action probabilities across all scenarios, also involves random error. These four parameters should be interpreted cautiously.

Conclusion

Reanalyzing four datasets with the CAN algorithm revealed that individuals with higher psychopathy traits care less about consequences and norms, exhibit weaker moral obedience, but show stronger inclinations toward overall action preferences and action/inaction preferences irrespective of norms and consequences. Instrumental harm and moral identity are important mediators between psychopathy and moral decisions. Perceived societal standards rather than personal standards can alleviate psychopathy' s positive predictions of overall action preference and action preferences irrespective of norms and consequences in moral decision-making.

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Note: Figure translations are in progress. See original paper for figures.