Diffusion of Punishment

in Collective Norm Violations

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Author Contributions

A. Keshmirian generated the study concept. Data collection was performed by A. Keshmirian for experiments 1 and 2.b and A. Keshmirian and B. Hemmatian for experiment 2.a. A. Keshmirian performed interpretation and visualization of both experiments. A. Keshmirian prepared materials for Experiment 1. A. Keshmirian and O. Deroy prepared materials for Experiment 2 while B. Bahrami and B. Hemmatian provided critical revisions. Experiment 1 was performed under F. Cushman and Experiment 2 under F. Cushman, B. Bahrami, and O. Deroy's supervision. A. Keshmirian analyzed the data of both experiments and drafted the original manuscript, while B. Hemmatian, B. Bahrami, O. Deroy, and F. Cushman provided critical revisions. F. Cushman, O. Deroy, and B. Bahrami provided the funding.

The Declaration of Conflicting Interests

The authors declare no conflicts of interest concerning the authorship or the publication of this article.

Open Practices Statement

The preregistration for experiment 2.a and 2.b can be accessed at <https://osf.io/hjnxm> and <https://osf.io/xw39e> respectively. De-identified data for all experiments, along with a codebook and materials, are openly available at <https://osf.io/m3f47/>

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Abstract: People assign less punishment to individuals who inflict harm collectively, compared to those who do so alone. We show that this arises from judgments of diminished individual causal responsibility in the collective cases. In Experiment 1, participants ($N=1002$) assigned less punishment to individuals involved in collective actions leading to intentional and accidental deaths, but not failed attempts, emphasizing that harmful outcomes, but not malicious intentions, were necessary and sufficient for the diffusion of punishment. Experiments 2.a compared the diffusion of punishment for harmful actions with ‘victimless’ purity violations (e.g., eating human flesh in groups; $N=752$). In victimless cases, where the question of causal responsibility for harm does not arise, diffusion of collective responsibility was greatly reduced—an effect replicated in Experiment 2.b ($N=500$). We propose discounting in causal attribution as the underlying cognitive mechanism for reduction in proposed punishment for collective harmful actions.

3-5 Keywords regarding Methods used: Online data acquisition, Mixed Effects Models, Bayesian Regression, Open science, Open data

3-5 Keywords regarding the scientific topic: Morality, Collective harm, Diffusion of punishment, Causal discounting, Causal attribution

Statement of Relevance

When judging a crime committed by a group, each criminal's liability must be determined individually. How do ordinary people judge the punishment suitable for collective harmful actions? We show that an individual harm-doer's punishment is typically, but not always, reduced in collective actions. The exceptions point to an underlying cognitive mechanism. We observe diffusion of punishment when punishment depends on an assessment of causal responsibility for harm, such as in cases of intentional or accidental harm. Diffusion of punishment is absent in cases where there is no causal responsibility for harm, e.g., in unsuccessful attempts or victimless actions deemed immoral. These findings refine current cognitive accounts of punishment, and have implications in forensic settings, allowing us to contrast the structure of legal liability with the moral intuitions of ordinary people.

1 Introduction

In 44 BC, Roman senators plotted Julius Caesar's murder, collectively stabbing him more than 20 times at a senate meeting. But who, exactly, was to blame and how much? Many crimes like gang rape, collective hate crimes, co-offending, and conspiracies are committed by groups. Understanding how blame and punishment are assigned in such group harms helps refine current models of moral judgment, and assess their correspondence with legal liability standards.

We dissociate two factors that might influence judgments of collective harm: Intent to harm, and causal responsibility for it. Generally, people judge an actor as fully blameworthy if they intentionally cause harm (Guglielmo et al., 2009; Malle et al., 2014; Malle & Knobe, 1997; Shaver, 1985; Shultz & Wright, 1985). Much research suggests that these two factors — intentionality and causal responsibility for harm — play dissociable roles in moral judgment (Cushman, 2008; Young et al., 2007, 2010). They may influence the judgment of group actions in different, even contradictory, ways:

1.1 Intentionality

How are intent-based moral judgments affected by the distinction between solo and group actors? One natural possibility is that group actors are held just as responsible, given that each member of the group volitionally decides to engage in transgressive behavior. Alternatively, they may also be held less responsible on the belief that they got socially “caught up” in something they would not otherwise have done (Malle et al., 2001; Malle & Knobe, 1997). In this case, group actors would receive less blame and hence punishment than solo actors committing equivalent acts.

1.2 Causal responsibility

How will judgments of the causal responsibility of group actors compare with solo actors? Again, one possibility is that it will make no difference. Causal responsibility may be treated

as categorical— one is either responsible or not (Moore, 2009). Since participants in group harms are causal *contributors* to the outcome, they would be held causally responsible to the same extent as a solo actor (e.g., felony murder, see Binder et al., 2016). For instance, in many US states (e.g., Connecticut General Statutes. tit. 53a-54c, Chapter 952; 2012), in the case of collective murder, it is argued that since the felony itself *causes* death, every participant in the felony is causally responsible for the death (Figure 1 – left).

Alternatively, causal responsibility may be diminished when distributed across a number of people (diffusion of punishment hypothesis; Figure 1 - right). This comports with several foundational ideas in the literature on causal attribution. First, “causal discounting” refers to the idea that causal attributions to one variable are diminished as other contributing variables are introduced (Kelley, 1973; Morris & Larrick, 1995). Second, “overdetermination” occurs when an effect would have occurred without the contribution of any sole individual. In such cases, people are likely to perceive each individual as less causally responsible (Lagnado et al., 2013). Similarly, the degree to which the individual has causal control over the outcome may be diminished in collective violations, and so causal power theory would suggest diminished attributions of causal responsibility (Cheng, 1997). Because punishment judgments are sensitive to attributions of causal responsibility for harm (Cushman, 2008), these theories predict diminished punishment for group actors.

1.3 Existing research

Evidence on the punishment of groups compared to solo actors is mixed. An archival study suggests judges gave harsher sentences to lone offenders compared to group offenders, controlling for the crime (Feldman & Rosen, 1978). However, a follow-up experiment on hypothetical robberies failed to find corroborating evidence, a result ascribed to the small sample size (Feldman & Rosen, 1978). More recently, El Zein et al. (2020) investigated second-party punishment in fairness-based group games but found no difference between proposed punishment for lone fairness violators compared with collective ones (El Zein et al., 2020). Another study of the punishment of cheaters showed that group actors were considered less dishonest than individual actors, but differences in judgments of deserved punishment were only marginally significant ($p = .08$; Vainapel et al., 2019).

A key limitation of prior studies is that they cannot dissociate the potentially divergent role of intent-based versus responsibility-based processes in deserved punishment judgments. To disentangle these, in Experiment 1, we compared accidental harm (where there is no malign intent, but causal responsibility is preserved) and attempted harm (where the intent is preserved, but no harm is caused). In Experiment 2, we investigated cases of collective harmless purity violations, such as disrespecting the deceased, and compared them to collective harmful actions. Like attempted harms, these preserve the element of volitional action going against moral norms while eliminating any relevant question of causal responsibility.

Figure 1. a. Two models of punishment in solo and joint harmful actions: legal models suggest similar punishment for joint and solo acts. Discounting models predict less punishment in joint than solo harm violations (diffusion of punishment hypothesis) **b.** Causal links in two models of punishment. In legal models, all perpetrators in joint actions are causally responsible for the harmful outcome to the same degree as in solo actions. In the discounting models (diffusion of punishment hypothesis), each individual in the group is less causally responsible for the outcome.

2 Experiment 1

Experiment 1 tested whether a third party punishes an individual less if she inflicts a harmful outcome on a victim as part of a group, rather than acting alone. We employed a 2x2x2 design with three factors: collectivity, intent, causation. Collectivity was treated as a between-subject, and intent and causation of harm (henceforth called ‘causation’ in short) as within-subject factors. By independently manipulating the agents' intent (absent vs. present) and causation (absent vs. present), we can differentiate between the effect of collectivity on intent- and responsibility-based processes of moral judgment.

2.1 Methods

2.1.1 Participants

One thousand and seventy-five participants were recruited via Amazon's Mechanical Turk. Thirty-seven participants were excluded for having duplicated IDs. We used a data-driven Mahalanobis Distance measure (Dupuis et al., 2019) to identify non-human participants and inconsistent or inattentive responses in our data (see Supplementary Online Material). This step resulted in excluding 36 participants. The final sample of 1002 US residents (452 males, eight choosing the "other" option) had an average age of 24.5 years ($SD = 10.5$, range: 18 to 64). We replicated the main results including those who failed the Mahalanobis exclusion criterion (see Table3, Supplementary Online Material).

2.1.2 Material and procedure

Each participant was randomly assigned to one of two collectivity conditions (joint or solo action) and read four moral scenarios in which a character committed an act either as part of a group (joint action) or alone (solo action). The dependent measure was always the deserved punishment for a given character on a 7-point scale (1 labeled as "not at all", 4 as "somewhat", and 7 as "a lot").

Intent (absent vs. present) and causation (absent vs. present) were crossed within subjects across the four scenarios. In neutral conditions, the agent(s) acted with no malign intention, and caused no harm. Accidental conditions involved an unintended death following the described action. In the attempted and intentional cases, the agent(s) acted with malign intent, either failing or succeeding in murdering another person. The following is an intentional, solo, harmful action scenario adapted from Young et al. (2010) (see Supplementary Online Material for full scenario texts):

Stacey and Kate are friends and decide to go rock climbing. They are going to use new harnesses to scale a gigantic cliff.

Kate starts to put on one of the new harnesses. The clamp on the new harness is subtly flawed, so the whole harness is incredibly unsafe to use.

Because the clamp on the harness does not audibly click into place, Stacey realizes that the new harness is malfunctioning and may not be safe to use.

She straps Kate into the harness and asks Kate to go first. Partway up the cliff, the harness gives way, causing Kate to fall and die.

The three sentences in italics were substituted in joint action conditions with statements about "Stacey, Anita, James, and Kate" instead, implicating the first three characters in the harm inflicted on the last-named individual.

A random pairing of stories was first created for within-subject manipulations and then counterbalanced across participants. The order of scenarios was randomized. Demographics followed the last vignette, including age, gender, political orientation (from 1 denoted as "very liberal" to 7 marked as "very conservative"), ethnicity, and education level.

2.2 Results

Figure 3 shows the results of Experiment 1. Statistical analysis was conducted using R (<https://www.r-project.org/>), employing generalized mixed-effects models appropriate for our design's hierarchical structure. Since our dependent variable has a Likert scale, we employed ordinal logistic mixed-effect models using the package 'ordinal' (Christensen, 2019).

Punishment ratings for intentional harm were significantly higher than accidental and attempted harm, and ratings in the mentioned conditions all exceeded those for the neutral condition, showing that the intent and causation manipulations worked as expected (see Table 2 - Supplementary Online Material).

To test the diffusion of punishment hypothesis, we modeled punishment judgments using an ordinal mixed-effects model. We included collectivity (solo vs. group), intent (present vs. absent), and causation (present vs. absent) as fixed effects, along with all possible interactions. We included participant and vignette context as random intercepts, along with the 'maximal' random slopes structure advocated by Barr et al (2014). We then performed a series of model comparisons, contrasting this full model with sparser models omitting fixed effects of interest.

Model comparison favored the variant including all three factors (see Supplementary Online Material).

The interaction of causation and collectivity was significant ($b = 1.4125$, $SE = .2$, $z = 7.245$, $p < .001$), while that of intention and collectivity was not ($b = .138$, $SE = .163$, $z = 7.245$, $p = .3$). To further interpret the results, we computed contrasts over estimated marginal means using the *emmeans* package in R (Lenth et al., 2021). Pairwise comparison showed less assigned punishment for characters when involved in joint actions compared to solo actions for intentional ($b = .745$, $SE = .129$, $z = 4.451$, $p = .0002$) and accidental killings ($b = .4363$, $SE = .128$, $z = 3.411$, $p = .014$), but not in failed attempts ($b = .029$, $SE = .129$, $z = .229$, $p > 0.99$). Since we predicted a null effect for attempted murder, following Aczel et al.'s (2018) method, a Bayesian mixed-effect model approach using *brms* package in R (Bürkner, 2018) was performed to confirm the pattern of results (intentional: $BF_{10} = 498.32$, $CI_{95} = [.29, .69]$; accidental: $BF_{10} = 21.74$, $CI_{95} = [.12, .52]$; attempted: $BF_{10} = .05$, $CI_{95} = [-.17, .22]$; see Table 4 in Supplementary Online Material). Unexpectedly, protagonists in neutral conditions received harsher proposed punishment for joint compared to solo actions ($b = .9761$, $SE = .166$, $p < .0001$; see Figure 1 and Table 2 in Supplementary Online Material). This effect was not predicted. Comparisons of specific items can be found in Supplementary Online Material, Figure S1.

Figure 2. a. Four experimental conditions as the outcome of 2 by 2 design: intent (absent vs. present) and causation (absent vs. present) **b.** Box-and-whisker plot of punishment ratings as a function of collectivity (different colors) across neutral, accidental, attempted, and intentional actions (horizontal axis). The box = middle 50% of scores. The thick horizontal line within each box represents the median. Upper and lower whiskers show the range of scores in the highest and lowest quartiles. The dots represent outliers.

2.3 Discussion

We found a robust reduction in proposed punishment across instances of intended and accidental harm when perpetrators acted as part of a group rather than lone agents. The contrast between these results and previous studies (Feldman & Rosen, 1978; El Zein et al., 2020) may be attributed to the more representative range of clearly and more strongly harmful causations (i.e., death) represented in our materials. That no diffusion of punishment was observed for attempted harm suggests that diffusion of punishment depends on discounting principle in *causal* attribution of *harmful* outcomes rather than intentions.

3 Experiment 2

Not all acts deemed immoral involve causing harm. 'Victimless' purity violations are condemned on the basis of a moral norm violation rather than harmful causation (McHugh et al., 2017). They are judged based on perpetrators' impact on themselves rather than victims (Chakroff et al., 2013; Dungan et al., 2017), and elicit disgust only when people judge immoral characters rather than outcomes (Giner-Sorolla & Chapman, 2017). If the diffusion of punishment results from a discounting principle in causal attribution, it would only apply to actions that cause harmful outcomes. Therefore, we expected it to be weaker for judgments of purity violations.

We test this prediction in Experiment 2 by directly comparing diffusion of punishment in scenarios involving harm and purity violations. Unlike most previous studies, instead of assuming that harm scenarios induce a sense of harmfulness alone and the purity vignettes only a sense of disgust, we asked our participants to rate how harmful or gross they found the protagonist(s)' action in all scenarios, examining their evaluation of the causation more directly.

3.1 Experiment 2.a

3.1.1 *Methods*

3.1.1.1 Participants

A target sample size was predetermined using a Monte Carlo simulation, following guidelines provided by DeBruine & Barr (2021; see the OSF repository). The final sample consisted of 752 US and UK residents (331 females; three others, age: $M = 28.08$ years, $SD = 6.5$, range: 18 to 60) recruited through Prolific Academic (<https://www.prolific.co/>) and compensated for their time. Twenty-six participants were excluded for having Prolific IDs that duplicated those from a pilot study. To increase precision, we used data-driven methods (as in Experiment 1) and questionnaires for attention checks to exclude inattentive responders. No difference was observed between the two methods. Another 39 were excluded for failing attention checks—they assigned 0 to 49 (on a 100-point scale) blame to a person who "destroys the entire planet" ($n = 18$), or 51 to 100 for someone who "gives money to a charitable organization" ($n = 21$).

3.1.1.2 Materials and procedure

Experiment 2a compared judgments for less grave *harm* than in Experiment 1 (e.g., intentionally breaking someone's leg) with *purity* violations (e.g., masturbating over a grave). Collectivity was manipulated as before. The moral domain (harm vs. purity) was additionally manipulated within subjects. Hence, each subject responded to four scenarios, presented to her in two blocks (harm block and purity block). The scenarios were randomly chosen from a battery of 8 items, counterbalanced across participants. The order of blocks and the items within each block were randomized and counterbalanced across subjects. Four items were adapted from a previous study on harm (Young et al., 2010, see Supplementary Online Material), and four items were original materials (some inspired by Rottman & Young, 2019) representing purity violations. The items were matched for severity of joint vs. solo action in a pilot study.

For instance, a purity violation in the solo condition would read:

Dan's favorite singer has died and has been buried in a nearby cemetery. He always had wild fantasies about the singer, and one night, he forms the following plan: He enters the cemetery late at night and goes to masturbate over the singer's grave, making sure he cannot be seen. After that, he ensures that the grave is clean and exactly as it was before and leaves.

The same scenario in the joint condition would introduce Dan, Ray, and Carl as friends who collectively committed the act.

To ensure more precision regarding variability in judgments by providing more options along the spectrum, we measured proposed punishment on a 100-point Likert scale. Zero to 50 was labeled as mild and 50 to 100 as severe punishment. Perceived harmfulness and grossness were measured on similar scales.

Similar to Experiment 1, we employed generalized ordinal mixed-effects models appropriate for our design's hierarchical structure. Since our dependent variable was on a 100-point scale, we employed linear mixed-effect models through LME4 (Bates et al., 2015). Other aspects of the design were identical to Experiment 1.

3.1.2 Results

We first tested whether our conceptual distinction between harm and purity is successfully reflected in our item construction. We modeled harmfulness and grossness ratings using a linear mixed-effects model (R package **lme4**; Bates et al., 2015). We included collectivity (solo vs. group) and domain (purity vs. harm) as fixed effects, along with their possible interactions. Participant and vignette context were included as random intercepts, along with 'maximal' random slopes (Barr et al., 2014). We then performed a series of model comparisons, contrasting this full model with sparser models omitting fixed effects of interest and computing contrasts over estimated marginal means for the winning model (the full model, using the *emmeans* package; Lenth et al., 2021). As expected, a significant main effect of domain was found for both harmfulness ($b = 38.76$, $SE = 4.68$, $t = -8.29$, $df = 6.32$, $p < .0001$) and grossness ($b = 41.45$, $SE = 2.43$, $t = 17.06$, $df = 7.37$, $p < .0001$). No significant effect of collectivity was found for either Harmfulness ratings ($BF_{10} = .754$, $CI_{95} = [-1.68, 1.443]$) and Grossness ratings ($b = .0018$; $p = .4$; $BF_{10} = .768$, $CI_{95} = [-1.577, 2.268]$), whether using linear mixed-effects analysis (R package **lme4**; Bates et al., 2015) or its Bayesian counterpart (R package **brms**; Bürkner, 2018- see Figure 3). In addition to establishing the adequacy of our item construction, these results support the Moral Foundations account of disparate moral domains for harm and purity (Graham et al., 2013).

Figure 3. Harmfulness (left) and Grossness (right) ratings are matched across Joint and Solo actions but significantly different across domains: Harmfulness is higher in the Harm domain(left), and grossness is higher in the Purity domain (right). Graph conventions are the same as Figure 2.

We investigated the interaction between collectivity (solo vs. joint) and domain (purity vs. harm) in a linear mixed-effect model, including participant and vignette context as random intercepts along with ‘maximal’ random slopes (Barr et al, 2014). There was a main effect of collectivity ($b = 3.36$, $SE = 1.52$, $t = 2.21$, $p = 0.03$) but the predicted interaction with domain was not significant ($b = 0.18$, $SE = 1.48$, $t = 0.12$, $p = .9$). Given the within-subjects blocked design, we investigated possible spillover effects in which participant responses to the first block (of, e.g., harm cases) would affect their responses in the second block (of, e.g., purity cases). This might have the effect of deflating diffusion of punishment in harm cases and inflating it in purity cases. To confirm the dissociation of domains, we dissected the first blocks into harm and purity datasets. An exploratory mixed effect analysis with a model similar to the above - but only including responses to the first blocks - showed the predicted significant diffusion of punishment in harm blocks ($b = 6.01$, $SE = 2.65$, $t = 2.27$, $p = .02$), but not in purity blocks ($b = 1.47$, $SE = 3.05$, $t = 0.50$, $p = .62$) (see Figure 4; for more details see Supplementary Online Material). Therefore, as predicted, collectivity was a significant predictor of judgments for harm but not for purity.

The lack of interaction between domain and collectivity could be due to a carryover between experimental blocks since we had employed a within-subject design. Consistent with this possibility, when analysing the first blocks only, where carryover effects are not possible, diffusion of punishment only appears for harm. To confirm the lack of diffusion in the purity domain more rigorously, we conducted a pre-registered replication experiment where we only included purity violations in a between-subjects design.

Figure 4. In the first blocks, participants punished individuals for solo actions (dark grey) more than joint actions (light grey) in harm scenarios (left) but not in purity conditions (right). Panels were created using `ggstatssplot` package (Patil, 2021).

3.2 Experiment 2.b

3.2.1 *Methods Exp 2.b*

3.2.1.1 Participants

A target sample size was predetermined using a Monte Carlo simulation via the SIMR package (Green & MacLeod, 2016). We determined the sample size with 93.00% (91.24, 94.50) power to detect the main effect of collectivity in purity domain with the same parameters obtained from the main linear regression model of punishment in Experiment 1. The final sample consisted of 500 US and UK residents (250 females; three others, age: $M = 30.1$ years, $SD = 5$, range: 18 to 58) recruited through Prolific Academic (<https://www.prolific.co/>) and compensated for their time. Five participants were excluded for having Prolific IDs that duplicated those from a pilot study. Attention checks and their results were as in Exp 2.a (see Supplementary Online Material). Another 32 were excluded for failing attention checks.

3.2.1.2 Materials and procedure

The number of protagonists was manipulated as in Experiment 2.a while only one moral domain (purity) was provided to the subjects. Each participant responded to four fully randomized scenarios, all from the purity domain. The scenarios were the same as experiment

2.a. We measured punishment after each scenario on a 7-point Likert scale similar to Experiment 1 since the 100-point scale had no impact in Experiment 2.a.

3.2.2 Results

A linear mixed-effect analysis was performed with collectivity (joint vs. solo) as fixed, and participants and items as random factors (see Supplementary Online Material for more details). Pairwise comparison indicated that judgments were similar in joint and solo purity violations ($b = .1853$, $SE = .1190$, $t = 1.557$, $p = .12$), which was confirmed by Bayesian mixed-effects analysis ($BF_{10} = 0.392$, $CI_{95} = [-.429, .041]$) (see Figure 5).

Figure 5. No difference in punishment judgments was observed between collective and solo purity violations in Experiment 2.b.

3.2.3 Discussion

In Experiment 2.a we found stronger diffusion of punishment in the harm domain, with evidence that any diffusion in purity scenarios may be due to carryover effects. Confirming this interpretation, in Experiment 2.b we found no diffusion of punishment for actions deemed impure but harmless, despite ample power. This suggests that punishment is diffused only when the collective action contains a causal link to a harmful outcome, and is absent for victimless moral violations.

4 General discussion

Though group immoral actions are commonly performed, punitive reactions to them are rarely studied. Research on solo actions shows that punishment depends on two general processes: judgments of causal responsibility and intent to harm (Cushman, 2008). Drawing

on two complementary and well-established paradigms for dissociating causal and intent-based processes, we studied how punishment judgments respond to collective moral violations.

In Experiment 1, a reduction of punishment in group harmful acts was attributable to the causal process of moral judgment—a diffusion of causal responsibility. This is consistent with discounting theories which argue that assigning punishment follows from a causal attribution of harmful outcomes, whereby having more than one sufficient cause results in lower responsibility assigned to each cause (Gerstenberg & Lagnado, 2010; Halpern, 2016; Kelley, 1987; 1973; Lagnado et al., 2013; Morris & Larrick, 1995; Shaver, 1985). In contrast, we found no reduction in punishment attributable to the *intent-based* process of moral judgment.

Two different methods provided convergent evidence for the dissociation between causal and intent-based contributions to the judgment of group crimes. First, we found that accidental harm-doers (who bear causal responsibility for harm without intent) were punished less when part of a group compared to solo actors. Yet attempted harm-doers (who act with harmful intent but bear no causal responsibility for harm) were punished identically across solo and collective contexts. Second, we found that having an identifiable harmed victim was necessary for the diffusion: victimless purity violations were punished equivalently across collectivity conditions.

The punishment diffusion observed for harmful outcomes can explain how individuals use group membership to minimize senses of regret and responsibility (El Zein et al., 2020) and protect themselves from the costs of morality violations like punishment (El Zein et al., 2019). Seeking 'safety in numbers' by acting as part of groups, each perpetrator may expect mitigated punishment and blame. The diffusion may, therefore, promote collective moral norm violation (Bandura et al., 1975; Darley & Latane, 1968; Latane et al., 1979).

Our findings also bear on theories of moral judgment. First, they support the dissociation of causal and mental-state processes in moral judgment (Cushman, 2008; Rottman & Young, 2019; Young et al., 2007, 2010). Second, they support disparate judgment processes for harmful versus "victimless" moral violations (Chakroff et al., 2013, 2017; Dungan et al., 2017; Giner-Sorolla & Chapman, 2017; Rottman & Young, 2019). Third, they reinforce the idea that punishment often involves a "backward-looking" retributive focus on responsibility, rather than a "forwards-looking" focus on rehabilitation, incapacitation, or deterrence (which, we presume, would generally favor treating solo and group actors equivalently). Punishers' future-oriented self-serving motives and their evolutionary roots need further investigation as alternative sources for punishment diffusion. For instance, punishing joint violators may produce more enemies for the punisher, reducing the motivation for a severe response.

Whether the diffusion of punishment and our causal explanation for it extends to other moral domains (e.g., fairness; Graham et al., 2011) is a topic for future research. Another interesting extension is whether different causal *structures* produce different effects on judgments. Our vignettes were intentionally ambiguous about causal chains and whether multiple agents overdetermined the harmful outcome. Contrasting diffusion in conjunctive moral norm violation (when collaboration is *necessary* for violation) with disjunctive ones (when one individual would *suffice*) is informative, since attributions of responsibility are generally higher in the former class (Gerstenberg & Lagnado, 2010; Kelley, 1973; Lagnado et al., 2013; Morris & Larrick, 1995; Shaver, 1985; Zultan et al., 2012).

Our findings highlight a divergence between legal theories of justice and laypeople's perceptions of apt punishment when harm is inflicted collectively, shedding light on the

cognitive underpinnings of collective atrocities in the hopes of a more moral future. Whether and how the discrepancy can be addressed may have implications for society at large.

References

- Aczel, B., Palfi, B., Szollosi, A., Kovacs, M., Szaszi, B., Szecsi, P., Zrubka, M., Gronau, Q. F., van den Bergh, D., & Wagenmakers, E.J. (2018). Quantifying Support for the Null Hypothesis in Psychology: An Empirical Investigation. *Advances in Methods and Practices in Psychological Science*, 357–366. doi:[10.1177/2515245918773742](https://doi.org/10.1177/2515245918773742)
- Bandura, A., Underwood, B., & Fromson, M. E. (1975). Disinhibition of aggression through diffusion of responsibility and dehumanization of victims. *Journal of Research in Personality*, 9(4), 253–269. [https://doi.org/10.1016/0092-6566\(75\)90001-X](https://doi.org/10.1016/0092-6566(75)90001-X)
- Binder, G., Weisberg, R., & Fissell, B. M. (2017). Capital punishment of unintentional felony murder. *Social Science Research Network*, Notre Dame Law Review, 92, 1141-1214.
- Chakroff, A., Dungan, J., & Young, L. (2013). Harming ourselves and defiling others: what determines a moral domain? *PloS One*, 8(9). <https://doi.org/10.1371/journal.pone.0074434>
- Chakroff, A., Russell, P. S., Piazza, J., & Young, L. (2017). From impure to harmful: Asymmetric expectations about immoral agents. *Journal of Experimental Social Psychology*, 69, 201–209. <https://doi.org/10.1016/j.jesp.2016.08.001>
- Cheng, P. W. (1997). From Covariation to causation: a causal power theory. *psychological Review*, 104(2), 367–405. <https://doi.org/10.1037/0033-295X.104.2.367>
- Cushman, F. (2008). Crime and punishment: Distinguishing the roles of causal and intentional analyses in moral judgment. *Cognition*, 108(2), 353–380. <https://doi.org/10.1016/j.cognition.2008.03.006>
- Darley, J. M., & Latane, B. (1968). Bystander intervention in emergencies: Diffusion of responsibility. *Journal of Personality and Social Psychology*, 8(4), 377–383. <https://doi.org/10.1037/h0025589>
- DeBruine, L. M., & Barr, D. J. (2021). Understanding mixed-Effects models through data simulation: *Advances in Methods and Practices in Psychological Science*, 4(1). <https://doi.org/10.1177/2515245920965119>
- Dungan, J. A., Chakroff, A., & Young, L. (2017). The relevance of moral norms in distinct relational contexts: Purity versus harm norms regulate self-directed actions. *PLoS ONE*, 12(3). <https://doi.org/10.1371/journal.pone.0173405>
- Dupuis, M., Meier, E., & Cuneo, F. (2019). Detecting computer-generated random responding in questionnaire-based data: A comparison of seven indices. *Behavior Research Methods*, 51(5), 2228–2237. <https://doi.org/10.3758/s13428-018-1103-y>
- El Zein, M., Bahrami, B., & Hertwig, R. (2019). Shared responsibility in collective decisions. *Nature Human Behaviour*, 3(6), 554–559. <https://doi.org/10.1038/s41562-019-0596-4>
- El Zein, M., Seikus, C., De-Wit, L., & Bahrami, B. (2020). Punishing the individual or the group for norm violation. *Wellcome Open Research*, 4, 139. <https://doi.org/10.12688/wellcomeopenres.15474.2>
- Feldman, R. S., & Rosen, F. P. (1978). Diffusion of responsibility in crime, punishment, and other adversity. *Law and Human Behavior*, 2(4), 313–322. <https://doi.org/10.1007/BF01038984>

- Gerstenberg, T., & Lagnado, D. (2010). Spreading the blame: The allocation of responsibility amongst multiple agents. *Cognition*, 115(1), 166–171. <https://doi.org/10.1016/j.cognition.2009.12.011>
- Giner-Sorolla, R., & Chapman, H. A. (2017). Beyond purity: moral disgust toward bad character. *Psychological Science*, 28(1), 80–91. <https://doi.org/10.1177/0956797616673193>
- Graham, Jesse & Haidt, Jonathan & Koleva, Sena & Motyl, Matt & Iyer, Ravi & Wojcik, Sean & Ditto, Peter. (2012). Moral foundations theory: the pragmatic validity of moral pluralism. *Advances in Experimental Social Psychology*. 47. <https://doi.org/10.1016/B978-0-12-407236-7.00002-4>
- Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of Personality and Social Psychology*, 101(2), 366–385. <https://doi.org/10.1037/a0021847>
- Gray, K., Schein, C., & Ward, A. F. (2014). The myth of harmless wrongs in moral cognition: Automatic dyadic completion from sin to suffering. *Journal of Experimental Psychology: General*, 143(4), 1600–1615. <https://doi.org/10.1037/a0036149>
- Green, P., & MacLeod, C. J. (2016). SIMR: an R package for power analysis of generalized linear mixed models by simulation. *Methods in Ecology and Evolution*, 7(4), 493–498. <https://doi.org/10.1111/2041-210X.12504>
- Guglielmo, S., Monroe, A. E., & Malle, B. F. (2009). At the heart of morality lies folk psychology. *Inquiry*, 52(5), 449–466. <https://doi.org/10.1080/00201740903302600>
- Halpern, J. (2016). *Actual Causality*. The MIT Press.
- Kelley, H. H. (1987). *Causal schemata and the attribution process*. In E. E. Jones, D. E. Kanouse, H. H. Kelley, R. E. Nisbett, S. Valins, & B. Weiner (Eds.), *Attribution: Perceiving the causes of behavior* (p. 151–174). Lawrence Erlbaum Associates, Inc.
- Kelley, H. H. (1973). The processes of causal attribution. *American Psychologist*, 28(2), 107–128. <https://doi.org/10.1037/h0034225>
- Lagnado, D., Gerstenberg, T., & Zultan, R. (2013). Causal responsibility and counterfactuals. *Cognitive Science*, 37(6), 1036–1073. <https://doi.org/10.1111/cogs.12054>
- Latane, B., Williams, K., Harkins, S., Diener, E., Har-Vey, J., Kerr, N., Kidd, R., Levinger, G., Ostrom, T., Petty, R., & Wheeler, L. (1979). Many Hands Make Light the Work: The Causes and Consequences of Social Loafing. *Journal of Personality and Social Psychology*, 37(6), 822–832.
- Malle, B. F., Guglielmo, S., & Monroe, A. E. (2014). A theory of blame. *Psychological Inquiry*, 25(2), 147–186. <https://doi.org/10.1080/1047840X.2014.877340>
- Malle, B. F., & Knobe, J. (1997). The folk concept of intentionality. *Journal of Experimental Social Psychology*, 33(2), 101–121. <https://doi.org/10.1006/jesp.1996.1314>
- Malle, B. F., Moses, L. J., & Baldwin, D. A. (2001). *Intentions and intentionality: foundations of social cognition*. The MIT Press. <https://doi.org/10.7551/mitpress/3838.001.0001>
- McHugh, C., McGann, M., Igou, E. R., & Kinsella, E. L. (2017). Searching for moral dumbfounding: Identifying measurable indicators of moral dumbfounding. *Collabra: Psychology*, 3(1). <https://doi.org/10.1525/collabra.79>
- Moore, M. S. (2010). *Causation and Responsibility: An essay in law, morals, and metaphysics*. New York, N.Y: Oxford University Press <https://doi.org/10.1093/acprof:oso/9780199256860.001.0001>

- Morris, M. W., & Larrick, R. P. (1995). When one cause casts doubt on another: a normative analysis of discounting in causal attribution. *Psychological Review*, 102(2), 331–355. <https://doi.org/10.1037/0033-295X.102.2.331>
- Rottman, J., & Young, L. (2019). Specks of dirt and tons of pain: dosage distinguishes impurity from harm. *Psychological Science*, 30(8), 1151–1160. <https://doi.org/10.1177/0956797619855382>
- Schein, C., & Gray, K. (2018). The theory of dyadic morality: reinventing moral judgment by redefining harm. *Personality and Social Psychology Review*, 22(1), 32–70. <https://doi.org/10.1177/1088868317698288>
- Shaver, K. G. (1985). *The attribution of blame: causality, responsibility, and blameworthiness*. New York:Springer-Verlag, 1985. <https://doi.org/10.1007/978-1-4612-5094-4>
- Shultz, T. R., & Wright, K. (1985). Concepts of negligence and intention in the assignment of moral responsibility. *Canadian Journal of Behavioural Science* 17(2), 97–108. <https://doi.org/10.1037/h0080138>
- Vainapel, S., Weisel, O., Zultan, R., & Shalvi, S. (2019). Group moral discount: Diffusing blame when judging group members. *Journal of Behavioral Decision Making*, 32(2), 212–228. <https://doi.org/10.1002/bdm.2106>
- Young, L., Camprodon, J. A., Hauser, M., Pascual-Leone, A., & Saxe, R. (2010). Disruption of the right temporoparietal junction with transcranial magnetic stimulation reduces the role of beliefs in moral judgments. *Proceedings of the National Academy of Sciences of the United States of America*, 107(15), 6753–6758. <https://doi.org/10.1073/pnas.0914826107>
- Young, L., Cushman, F., Hauser, M., & Saxe, R. (2007). The neural basis of the interaction between theory of mind and moral judgment. *Proceedings of the National Academy of Sciences of the United States of America*, 104(20), 8235–8240. <https://doi.org/10.1073/pnas.0701408104>
- Zultan, R., Gerstenberg, T., & Lagnado, D. A. (2012). Finding fault: causality and counterfactuals in group attributions. *Cognition*, 125(3), 429–440. <https://doi.org/10.1016/J.COGNITION.2012.07.014>

5 Supplementary Online Material

5.1 Experiment 1

5.1.1 Outlier detection

To perform tests of outlier detection, we used `<outlier_function.r>` from **Performance** package (Lüdecke et al., 2021), which uses Mahalanobis distance. We calculated the mean of punishment in all conditions of Outcome by Intention and used a multivariate approach to exclude the inattentive subjects with the alpha threshold is set to 0.025 (corresponding to the 2.5% most extreme observations). We replicated the main results including those who failed the Mahalanobis exclusion criterion (see Table3).

5.1.2 Mixed effect models

5.1.2.1 Logistic mixed effect model

We performed different ordinal logistic mixed-effect models by using package 'ordinal' (Christensen et al., 2019). In all models we accounted for subjects and Items variability by adding them as random slopes to the model.

5.1.2.2 Sanity check

In **model 0** we include Outcome and Intention as main factors for sanity check. Pairwise comparison between conditions for model 0 is presented in Table S 1 as well as Figure 1.

Table S 1.

Pairwise comparison of punishment for different levels of Intention (Innocent, Malign) by Outcome (Harmless, Death).

contrast	<i>estimate</i>	<i>SE</i>	<i>z.ratio</i>	<i>p.value</i>
Innocent Death - Malign Death	-1.8760254	0.0883773	21.227456	<.0001
Innocent Death - Innocent Harmless	2.2000354	0.1007347	21.839906	<.0001
Innocent Death - Malign Harmless	0.5258203	0.0818840	6.421525	<.0001
Malign Death - Innocent Harmless	4.0760608	0.1151210	35.406760	<.0001
Malign Death - Malign Harmless	2.4018457	0.0923410	26.010611	<.0001
Innocent Harmless - Malign Harmless	-1.6742151	0.0985121	16.995017	<.0001

P-value adjustment: Tukey method for comparing a family of 3 estimates

Figure S1. Intentional murder received the highest level of punishment, more than accidental killings and attempted murders, while neutral actions received the lowest amount of punishment.

5.1.2.3 Main models

In **model 1** we added outcome, in **model 2** intention and in **model 3** both to our effect of interest Collectivity as an interaction effect, while accounting for subjects (TurkIDs) and Items as random factors in all models. Model comparisons favored model 3 ($p < .0001$, $AIC = 12358$). A pairwise comparison between conditions in model 3 is presented in Table S 2.

Table S 2.

Pairwise comparison of punishment for different levels of Intention by Outcome by Collectivity.

contrast	<i>estimate</i>	<i>SE</i>	<i>z.ratio</i>	<i>p.value</i>
Solo Accidental – Joint Accidental	0.4363	0.1278	3.4115	0.0149
Solo Intentional –Joint Intentional	0.5746	0.1290	4.4514	0.0002
Solo Neutral – Joint Neutral	0.9761	0.1660	-5.8785	<.0001
Solo Attempted – Joint Attempted	0.0294	0.1286	0.2291	0.9999

P-value adjustment: Tukey method for comparing a family of 3 estimate

Table S 3.

Pairwise comparison of punishment as in Table S2 but including outliers.

contrast	<i>estimate</i>	<i>SE</i>	<i>z.ratio</i>	<i>p.value</i>
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Solo Accidental – Joint Accidental	0.3500	0.126	2.782	0.0949
Solo Intentional – Joint Intentional	0.5746	0.1290	4.4514	0.0274
Solo Neutral – Joint Neutral	0.9761	0.1660	-5.8785	<.0001
Solo Attempted – Joint Attempted	0.0325	0.127	0.2561	1.0000

P-value adjustment: Tukey method for comparing a family of 3 estimates

5.1.3 Bayesian mixed model

In addition to the frequentist approach above, we also performed Bayesian mixed effect analysis. This is an important analysis since our effect of interest was not significant in attempted cases. In order to examine this null effect, we used **brms** package in R (Bürkner, 2018), with 5000 iterations, 5 chains and weakly informative prior (model betas drawn from normal distribution; mean = 0 and SD = 1). Result highlights the interaction Collectivity by Outcome ($BF_{10} = 1,720,000$, $b = .71$, $SE = .13$, $CI_{Lower} = .13$, $CI_{Upper} = .46$) more than Intention ($BF_{10} = 0.32$, $b = .64$, $SE = .13$, $CI_{Lower} = -.439$, $CI_{Upper} = .18$). Pairwise comparison result of this model is shown in Table S 4.

Table S 4.

Pairwise comparison of Bayesian mixed-effect model.

<i>Parameter</i>	<i>CI</i>	<i>CI_low</i>	<i>CI_high</i>	<i>BF₁₀</i>
Solo Innocent Death - Joint Innocent Death	95	0.12	0.52	21.74
Solo Malign Death – Joint Malign Death	95	0.29	0.69	498.32
Solo Innocent Harmless - Joint Innocent Harmless	95	-0.61	-0.22	63.12
Solo Malign Harmless - Joint Malign Harmless	95	-0.17	0.22	0.05

5.1.4 Item-based analysis

An item-based analysis was performed to compare the ratings for each item in different conditions. Repeated measure ANOVA test shows a significant difference between conditions across items in intentional and accidental cases. The result of the analysis is shown in Figure S1.

Figure S2. Across 4 items in intentional murder and accidental killings, ANOVA test shows a significant difference between different conditions. Items are rated more punishable in Individual Condition in comparison to Joint Condition. The statistical test result is shown in the figure, using **ggstatssplot** package (Patil, 2021).

5.2 Experiment 2

5.2.1 Mixed effect models

5.2.1.1 Linear mixed effect model experiment

We performed different linear mixed-effects models by using package **LME4** (package lme4; Bates et al., 2015). In all models we accounted for subjects and Items variability by adding them as random slopes to the model.

For experiment 2.1 we used three models, with condition as fixed factor in **model1**, its interaction with Domain **model2** and without the interaction in **model3**. Model comparison showed no difference (Table S 5).

Table S 5.
Model comparison between two models of punishment

	npar	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
M0_punishment	5	24930.31	24959.91	-12460.16	24920.31	NA	NA	NA
M2_punishment	6	24930.00	24965.51	-12459.00	24918.00	2.3150673	1	0.1281258
M1_punishment	7	24931.98	24973.41	-12458.99	24917.98	0.0150753	1	0.9022800

For Harmfulness and Grossness, we used a model with Condition and Domain (with interaction term) as fixed factors. The result is shown in Table S 6 and Table S 7, respectively.

Table S 6.
Pairwise comparison of harmfulness for different levels of Domain by Collectivity.

contrast	estimate	SE	t.ratio	p.value
Solo Harm - Joint Harm	-0.5315015	1.497927	-0.3548247	0.9846839
Solo Harm - Solo Purity	38.7623136	4.676596	8.2885735	0.0005367
Joint Harm - Joint Purity	40.0323503	4.686346	8.5423373	0.0004316
Solo Purity - Joint Purity	0.7385352	1.497848	0.4930643	0.9606476
P-value adjustment: Tukey method for comparing a family of 3 estimates				

For purity, we adopted the same approach as above. The result is shown in Table S 7.

Table S 7.

Pairwise comparison of grossness for different levels of Domain by Collectivity.

contrast	estimate	SE	t.ratio	p.value
Solo Harm - Joint Harm	0.57	1.7	0.33	0.99
Solo Harm - Solo Purity	-41.45	2.4	-17.06	0.00
Joint Harm - Joint Purity	-42.86	2.5	-17.50	0.00
Individual Purity - Joint Purity	-0.84	1.7	-0.48	0.96

P-value adjustment: Tukey method for comparing a family of 3 estimates

We later performed a between subject analysis for two different domains: Harm and Purity. This exploratory analysis was done to check for any carryover effect. In doing so, we checked the punishment for first Blocks (either Harm or Purity), with fixed effect of Collectivity accounted for Item and participants variability (Table S8). Item bases analysis is shown in Figure S3.

Table S 8.

Pairwise comparison punishment in harm and purity - between subject analysis of first blocks

contrast	estimate	SE	t.ratio	p.value (1-sided)
Solo Harm - Joint Harm	6.005	2.649	2.267	0.0243
Solo Purity - Joint Purity	1.74	3.5	0.50	0.629

P-value adjustment: Tukey method for comparing a family of 3 estimates

Figure S3. Across 4 items of Harm (left) and Purity (right), ANOVA test shows a significant difference between different conditions only in Harm but not in Purity in the first blocks. Items are rated more punishable in Solo Condition in comparison to Joint Condition for Harm (left) but not purity (right). The statistical test result is shown in the figure, using **ggstatssplot** package (Patil, 2021).

5.2.2 Bayesian mixed models

In addition to the frequentist approach above, we also performed Bayesian mixed effect models for experiment 2.b. This is especially important since our effect of interest was a null result in purity violations. In order to examine this null effect, we used **brms** package in R (Bürkner, 2018), with 5000 iterations, 5 chains and weakly informative prior (model betas drawn from normal distribution; mean = 0 and SD = 1). Result highlighted little evidence to reject the null hypothesis ($BF_{10} = 1,720,000, b = .71, SE = .13, CI_{\text{Lower}} = .13, CI_{\text{Upper}} = .46$).

5.3 Scenarios used in Experiment 1

5.3.1 Individual neutral conditions:

Rafting

1- Monica and her friend are rafting down the Colorado River. Monica's friend is a novice. They stop by the bank to have a swim. Monica's friend starts to swim downstream. The next segment of the river is very tame this year. It is easy to swim through. Because Monica has rafted down this part of the Colorado River last year, she believes the next segment is very tame and gentle. She thinks her friend will be able to enjoy the scenery. Monica silently watches as her friend swims downstream. Monica's friend swims safely down the next segment of the river.

Climbing

2- Stacey and her friend are going rock climbing, and they are going to use harnesses to scale a gigantic cliff. Stacey's friend starts to put on the new harness. The clamp on the new harness is subtly flawed, so the whole harness is unsafe to

use. Because Stacey bought the harness from a quality sports store, Stacey believes that the harness is in prime functioning condition. Stacy's friend wears the harness. Halfway up the cliff, the harness gives way, and her friend plummets to her death.

Swimming

3- Peter is traveling in Africa with a friend. His friend sees a pond and wants to go wading in it because it is very hot. His friend begins to walk toward the pond. The pond is a good place for tourists. It does not contain any disease-carrying organisms. The water is unusually clean, so it is safe to wade in. Peter believes that it is not safe to wade in the pond because he heard stories about Malarial mosquitoes lives in the pond. Peter encourages his friend to wade in the pond. His friend loves the cool water and has a great time splashing around.

Watching the dolphin

4- Ryan is at the zoo with his nephew. They are watching the dolphin show when the nephew complains that his stomach hurts. Ryan's nephew is really sick. He is suffering from severe appendicitis. It may cause the appendix to burst, spreading infection throughout the abdomen. Ryan believes that his nephew's stomach hurts because of severe appendicitis. Ryan thinks that his nephew needs medical attention immediately. Ryan takes his nephew to see the monkeys next. His nephew starts feeling worse and soon blacks out and dies because of severe internal bleeding.

4.5.3.2 Individual accidental conditions:

Rafting

5- Monica and her friend are rafting down the Colorado River. Monica's friend is a novice. They stop by the bank to have a swim. Monica's friend starts to swim downstream. The next segment of the river is very rough and fast this year. It is full of boulders that make it dangerous to swim through. Because Monica has rafted down this part of the Colorado River last year, she believes the next segment is very tame and gentle. She thinks her friend will be able to enjoy the scenery. Monica silently watches as her friend swims downstream. Monica's friend gets thrown by the current and crashes into a boulder and dies.

Climbing

6- Stacey and her friend are going rock climbing, and they are going to use harnesses to scale a gigantic cliff. Stacey's friend starts to put on the new harness. The new harness is a top-of-the-line model, in fine working condition, and completely safe to use. Because the clamp on the harness does not audibly click into place, Stacey believes that the harness is malfunctioning and not safe to use. Stacy's friend wears the harness, scales the cliff safely, and enjoys the exhilarating experience.

Swimming

7- Peter is traveling in Africa with a friend. His friend sees a pond and wants to go wading in it because it is very hot. His friend begins to walk toward the pond. Malarial mosquitoes actually live in the pond. A single bite is enough to create an infection, so the pond is unsafe to wade in. Peter believes that it is not safe to wade in the pond because he heard stories about Malarial mosquitoes lives in the pond. Peter encourages his friend to wade in the pond. His friend is bitten by several mosquitoes and contracts malaria, which leads to his death.

Watching the dolphin show

8- Ryan is at the zoo with his nephew. They are watching the dolphin show when the nephew complains that his stomach hurts. Ryan's nephew is really fine. His stomach sometimes hurts when he eats too much junk food, as on that day, but he usually feels a lot better after an hour or so. Ryan believes that his nephew's stomach

hurts because he ate too much cotton candy and fried dough that afternoon. Ryan thinks his nephew just needs to walk it off. Ryan takes his nephew to see the monkeys next. His nephew starts feeling better. They end up seeing nearly all the exhibits at the zoo.

4.5.3.3 Individual attempted conditions:

Rafting

9- Monica and her friend are rafting down the Colorado River. Monica's friend is a novice. They stop by the bank to have a swim. Monica's friend starts to swim downstream. The next segment of the river is very tame this year. It is easy to swim through. Because Monica has rafted down this part of the Colorado River last year, she believes that the next segment is very rough and dangerous. She thinks that the current will be too strong for her friend. Monica silently watches as her friend swims downstream. Monica's friend swims safely down the next segment of the river.

Climbing

10- Stacey and her friend are going rock climbing, and they are going to use harnesses to scale a gigantic cliff. Stacey's friend starts to put on the new harness. The clamp on the new harness is subtly flawed, so the whole harness is incredibly unsafe to use. Because the clamp on the harness does not audibly click into place, Stacey believes that the harness is malfunctioning and not safe to use. Stacey's friend wears the harness. Halfway up the cliff, the harness gives way, and her friend plummets to her death.

Swimming

11- Peter is traveling in Africa with a friend. His friend sees a pond and wants to go wading in it because it is very hot. His friend begins to walk toward the pond. The pond is a good place for tourists. It does not contain any disease-carrying organisms. The water is unusually clean, so it is safe to wade in. Peter believes that it is safe to wade in the pond because other tourists around them are doing it too and are obviously having fun. Peter encourages his friend to wade in the pond. His friend loves the cool water and has a great time splashing around.

Watching the dolphin show

12 - Ryan is at the zoo with his nephew. They are watching the dolphin show when the nephew complains that his stomach hurts. Ryan's nephew is really sick. He is suffering from severe appendicitis. It may cause the appendix to burst, spreading infection throughout the abdomen. Ryan believes that his nephew's stomach hurts because he ate too much cotton candy and fried dough that afternoon. Ryan thinks his nephew just needs to walk it off. Ryan takes his nephew to see the monkeys next. His nephew starts feeling worse and soon blacks out and dies because of severe internal bleeding.

5.3.4 Individual intentional conditions:

Rafting

13- Monica and her friend are rafting down the Colorado River. Monica's friend is a novice. They stop by the bank to have a swim. Monica's friend starts to swim downstream. The next segment of the river is very rough and fast this year. It is full of boulders that make it dangerous to swim through. Because Monica has rafted down this part of the Colorado River last year, she believes that the next segment is very rough and dangerous. She thinks that the current will be too strong for her friend. Monica silently watches as her friend swims downstream. Monica's friend gets thrown by the current and crashes into a boulder and dies.

Climbing

14-Stacey and her friend are going rock climbing, and they are going to use harnesses to scale a gigantic cliff. Stacey's friend starts to put on the new harness. The new harness is a top-of-the-line model, in fine working condition, and completely safe to use. Because Stacey bought the harness from a quality sports store, Stacey believes that the harness is in prime functioning condition. Stacy's friend wears the harness, scales the cliff safely, and enjoys the exhilarating experience.

Swimming

15 - Peter is traveling in Africa with a friend. His friend sees a pond and wants to go wading in it because it is very hot. His friend begins to walk toward the pond. Malarial mosquitoes actually live in the pond. A single bite is enough to create an infection, so the pond is unsafe to wade in. Peter believes that it is safe to wade in the pond because other tourists around them are doing it too and are obviously having fun. Peter encourages his friend to wade in the pond. His friend is bitten by several mosquitoes and contracts malaria, which leads to his death.

Watching the dolphin show

16- Ryan is at the zoo with his nephew. They are watching the dolphin show when the nephew complains that his stomach hurts. Ryan's nephew is really fine. His stomach sometimes hurts when he eats too much junk food, as on that day, but he usually feels a lot better after an hour or so. Ryan believes that his nephew's stomach hurts because of severe appendicitis. Ryan thinks that his nephew needs medical attention immediately. Ryan takes his nephew to see the monkeys next. His nephew starts feeling better. They end up seeing nearly all the exhibits at the zoo.

5.3.5 Group neutral conditions:

Rafting

17- Monica, Kate, Josh, and their friend Tom are rafting down the Colorado River. Tom is a novice. They stop by the bank to have a swim. Tom starts to swim downstream. The next segment of the river is very tame this year. It is very easy to swim through. Because Monica, Kate, and Josh have rafted down this part of the Colorado River last year together, they believe the next segment is very tame and gentle. They think Tom will be able to enjoy the scenery. They all silently watch as Tom swims downstream. Tom swims safely down the next segment of the river.

Climbing

18 - Stacey, Anita, James, and Kate are going rock climbing, and they are going to use harnesses to scale a gigantic cliff. Kate starts to put on the new harness. The clamp on the new harness is actually subtly flawed, so the whole harness is incredibly unsafe to use. Because Stacey, Anita, James bought the harness from a quality sports store together, they all believe that the harness is in prime functioning condition. Kate wears the harness. Halfway up the cliff, the harness gives way, and Kate plummets to her death.

Swimming

19 - Peter, Sophia, David, and Anna are traveling in Africa. Anna sees a pond and wants to go wading in it because it is very hot. She begins to walk toward the pond. A pond is a good place for tourists. It does not contain any disease-carrying organisms. The water is unusually clean, so it is safe to wade in. Peter, Sophia, David all believe that it is not safe to wade in the pond because they have heard stories about the Malarial mosquitoes in the pond. Peter, Sophia, and David encourage Anna to wade in the pond. Anna loves the cool water and has a great time splashing around.

Watching the dolphin show

20 - Ryan, Emma, and Joe are at the zoo with their nephew. They are watching the dolphin show when the nephew complains that his stomach hurts. Their nephew is really sick. He is suffering from severe appendicitis and. It may cause the appendix to burst, spreading infection throughout the abdomen. Ryan, Sophia, and Joe all believe that their nephew's stomach hurts because of severe appendicitis. Ryan, James, and Joe all think that their nephew needs medical attention immediately. Ryan, Sophia, and Joe take their nephew to see the monkeys next. Their nephew starts feeling worse and soon blacks out and dies because of severe internal inflammation.

5.3.6 Group accidental conditions:

Rafting

21 - Monica, Kate, Josh, and their friend Tom are rafting down the Colorado River. Tom is a novice. They stop by the bank to have a swim. Tom starts to swim downstream. The next segment of the river is very rough and fast this year. It is full of boulders that make it dangerous to swim through. Because Monica, Kate, and Josh have rafted down this part of the Colorado River last year together, they all believe the next segment is very tame and gentle. They think Tom will be able to enjoy the scenery. They all silently watch as Tom swims downstream. Tom gets thrown by the current and crashes into a gigantic boulder and dies.

Climbing

22- Stacey, Anita, James, and Kate are going rock climbing, and they are going to use harnesses to scale a gigantic cliff. Kate starts to put on the new harness. The new harness is a top-of-the-line model, in fine working condition, and completely safe to use. Because the clamp on the harness does not audibly click into place, Stacey, Anita, and James all believe that the harness is malfunctioning and not safe to use. Kate wears the harness, scales the cliff safely, and enjoys the exhilarating experience.

Swimming

23-Peter, Sophia, David, and Anna are traveling in Africa with a friend. Anna sees a pond and wants to go wading in it because it is very hot. Anna begins to walk toward the pond. Malarial mosquitoes actually live in the pond. A single bite is enough to create an infection, so the pond is unsafe to wade in. Peter, Sophia, and David believe that it is not safe to wade in the pond because they have heard stories about the Malarial mosquitoes in the pond. Peter, Sophia, and David encourage Anna to wade in the pond. Anna is bitten by several mosquitoes and contracts malaria, which leads to her death.

Watching the dolphin show

24- Ryan, Emma, and Joe are at the zoo with their nephew. They are watching the dolphin show when the nephew complains that his stomach hurts. Their nephew is really fine. His stomach sometimes hurts when he eats too much junk food, as on that day, but he usually feels a lot better after an hour or so. Ryan, Emma, and Joe believe that their nephew's stomach hurts because he ate too much cotton candy and fried dough that afternoon. Ryan, Emma, and Joe think their nephew just needs to walk it off. Ryan, Emma, and Joe take their nephew to see the monkeys next. Their nephew starts feeling better. They end up seeing nearly all the exhibits at the zoo.

5.3.7 Group attempted conditions:

Rafting

25- Monica, Kate, Josh, and their friend Tom are rafting down the Colorado River. Tom is a novice. They stop by the bank to have a swim. Tom starts to swim downstream. The next segment of the river is very tame this year. It is very easy to swim through. Because Monica, Kate, and Josh have rafted down this part of the Colorado River last year together, they all believe that the next segment is very rough and dangerous. They think that the current will be too strong for Tom. They all silently watch as Tom swims downstream. Tom swims safely down the next segment of the river.

Climbing

26- Stacey, Anita, James, and Kate are going rock climbing, and they are going to use harnesses to scale a gigantic cliff. Kate starts to put on the new harness. The clamp on the new harness is actually subtly flawed, so the whole harness is incredibly unsafe to use. Because the clamp on the harness does not audibly click into place, Stacey, Anita, and James all believe that the harness is malfunctioning and not safe to use. Kate wears the harness. Halfway up the cliff, the harness gives way, and Kate plummets to her death.

Swimming

27- Peter, Sophia, David, and Anna are traveling in Africa. Anna sees a pond and wants to go wading in it because it is very hot. She begins to walk toward the pond. The pond is a good place for tourists. It does not contain any disease-carrying organisms. The water is unusually clean, so it is safe to wade in. Peter, Sophia, and David all believe that it is safe to wade in the pond because other tourists around them are doing it too and are obviously having fun. Peter, Sophia, and David encourage Anna to wade in the pond. Anna loves the cool water and has a great time splashing around.

Watching the dolphin show

28- Ryan, Emma, and Joe are at the zoo with their nephew. They are watching the dolphin show when the nephew complains that his stomach hurts. Their nephew is really sick. He is suffering from severe appendicitis, and it may cause the appendix to burst, spreading infection throughout the abdomen. Ryan, Emma, and Joe believe that their nephew's stomach hurts because he ate too much cotton candy and fried dough that afternoon. Ryan, Emma, and Joe think their nephew just needs to walk it off. Ryan, Emma, and Joe take their nephew to see the monkeys next. Their nephew starts feeling worse and soon blacks out and dies because of severe internal inflammation.

5.3.8 Group intentional conditions:

Rafting

29- Monica, Kate, Josh, and their friend Tom are rafting down the Colorado River. Tom is a novice. They stop by the bank to have a swim. Tom starts to swim downstream. The next segment of the river is very rough and fast this year. It is full of boulders that make it dangerous to swim through. Because Monica, Kate, and Josh have rafted down this part of the Colorado River before, they all believe that the next segment is very rough and dangerous. They think that the current will be too strong for Tom. They all silently watch as Tom swims downstream. Tom gets thrown by the current and crashes into a gigantic boulder and dies.

Climbing

30- Stacey, Anita, James, and Kate are going rock climbing, and they are going to use harnesses to scale a gigantic cliff. Kate starts to put on the new harness. The new harness is a top-of-the-line model, in fine working condition, and completely safe to

use. Because Stacey, Anita, and James bought the harness together from a quality sports store, they all believe that the harness is in prime functioning condition. Kate wears the harness, scales the cliff safely, and enjoys the exhilarating experience.

Swimming

31- Peter, Sophia, David, and Anna are traveling in Africa. Anna sees a pond and wants to go wading in it because it is very hot. She begins to walk toward the pond. Malarial mosquitoes actually live in the pond. A single bite is enough to create an infection, so the pond is unsafe to wade in. Peter, Sophia, and David believe that it is safe to wade in the pond because other tourists around them are doing it too and are obviously having fun. Peter, Sophia, and David encourage Anna to wade in the pond. Anna is bitten by several mosquitoes and contracts malaria, which leads to her death.

Watching the dolphin show

32- Ryan, Emma, and Joe are at the zoo with their nephew. They are watching the dolphin show when the nephew complains that his stomach hurts. Their nephew is really fine. His stomach sometimes hurts when he eats too much junk food, as on that day, but he usually feels a lot better after an hour or so. Ryan, Emma, and Joe believe that their nephew's stomach hurts because of severe appendicitis. Ryan, Emma, and Joe all think that their nephew needs medical attention immediately. Ryan, Emma, and Joe take their nephew to see the monkeys next. Their nephew starts feeling better. They end up seeing nearly all the exhibits at the zoo.

5.4 Scenarios used in Experiment 2

Domain: Harm

Zoo- Group

Ryan, Emma, and Joe are siblings and at the zoo with their nephew. They are watching the dolphin show when their nephew complains that his stomach hurts. Their nephew is sick. He is suffering from severe appendicitis, and it may cause the appendix to burst, spreading the infection throughout the abdomen. Ryan, Emma, and Joe know that their nephew needs immediate medical attention. Still, they take him to see the monkeys instead of going to a hospital, although they know it is dangerous. Their nephew starts feeling worse and soon blacks out because of severe internal inflammation.

Zoo-Alone

Ryan is at the zoo with his nephew. They are watching the dolphin show when his nephew complains that his stomach hurts. His nephew is sick. He is suffering from severe appendicitis, and it may cause the appendix to burst, spreading the infection throughout the abdomen. Ryan knows that his nephew needs immediate medical attention. Still, he takes him to see the monkeys instead of going to the hospital, although he knows it is dangerous. His nephew starts feeling worse and soon blacks out because of severe internal inflammation.

Rock Climbing- Group

Stacey, Anita, James, and Kate are all friends. One day they decide to go rock climbing. They are going to use new harnesses to scale a gigantic cliff. Kate starts to put on one of the harnesses. The clamp on the harness is actually flawed, so the whole harness is incredibly unsafe to use. Because the clamp on the harness does not audibly click into place, Stacey, James, and Anita realize that the harness is malfunctioning and not safe to use. Still, they strap Kate into the harness and ask Kate to go

first, although they know it is dangerous. Partway up the cliff, the harness gives way, causing Kate to fall and break both her legs.

Rock Climbing- Alone

Stacey and Kate are friends and decide to go rock climbing. They are going to use harnesses to scale a gigantic cliff. Kate starts to put on one of the harnesses. The clamp on the harness is actually flawed, so the whole harness is incredibly unsafe to use. Because the clamp on the harness does not audibly click into place, Stacey realizes that the harness is malfunctioning and not safe to use. Still, she straps Kate into the harness and asks Kate to go first, although she knows it is dangerous. Partway up the cliff, the harness gives way, causing Kate to fall and break both her legs.

Party - Group

Charles, Grace, and Dan are classmates. They are at a party where people are drinking lots of beer. They are having fun mingling when they notice a friend on a couch with his eyes closed. Their friend had just failed his examinations and was drinking heavily to take his mind off them. He has passed out now. Charles, Grace, and Dan believe that their friend drank too much and needs immediate help. Charles, Grace, and Dan decide to hide their friend under some pillows, so nobody sees him, although they know it is dangerous for him. Their friend gets severe alcohol poisoning and remains in a coma for a day.

Party – Alone

Charles is at a party with a friend, where people are drinking lots of beer. He is having fun mingling when he notices his friend on a couch with his eyes closed. His friend had just failed his examinations and was drinking heavily to take his mind off them. He has passed out now. Charles believes that his friend drank too much and needs immediate help. Charles decides to hide his friend under some pillows, so nobody sees him, although he knows it is dangerous for him. His friend gets severe alcohol poisoning and remains in a coma for a day.

Rafting - Group

Susan, Steve, and Jane are gym buddies. They are rafting down the Colorado River with Tom, who is a novice. They stop by the bank to swim. Tom starts to swim downstream. The next segment of the river is very rough and fast this year. It is full of gigantic boulders that make it dangerous to swim through. Susan, Steve, and Jane have rafted down this part of the river before; they believe that the next segment is very rough. They think that the current will be too strong for Tom. Susan, Steve, and Jane still decide to encourage Tom to swim in the river. They watch as their friend swims downstream, knowing it is dangerous for him. Tom gets thrown by the current and crashes into a gigantic boulder, and breaks his head.

Rafting – Alone

Susan is rafting down the Colorado River with Tom, who is a novice. They stop by the bank to swim. Tom starts to swim downstream. The next segment of the river is very rough and fast this year. It is full of gigantic boulders that make it dangerous to swim through. Susan has rafted down this part of the river before; she believes that the next segment is very rough. She thinks that the current will be too strong for Tom. Susan still decides to encourage Tom to swim in the river. She watches as her friend swims downstream, knowing it is dangerous for him. Tom gets thrown by the current and crashes into a gigantic boulder, and breaks his head.

Domain: Purity

Corpse - Group

Linda, Moira, and Regina are all colleagues and work in a morgue. They all have had wild sexual fantasies about touching corpses. One night, Linda, Moira, and Regina decide to enter the morgue late at night. They touch the genitals of a corpse in the dark to their hearts' desire, making sure they cannot be seen, not even by each other. After that, they ensure that the corpse is intact and the morgue is exactly as it was before and leave.

Corpse - Alone

Linda works in a morgue. She has had wild sexual fantasies about touching corpses. One night, Linda decides to enter the morgue late at night. She touches the genitals of a corpse in the dark to her heart's desire, making sure she cannot be seen. After that, she ensures that the corpse is intact and the morgue is exactly as it was before and leaves.

Singer - Group

Dan, Ray, and Carl are friends. Their favorite singer has died and has been buried in a nearby cemetery. They have all had wild fantasies about the singer. One night according to a previous plan, Dan, Ray, and Carl enter the cemetery late at night. They masturbate over the singer's grave, making sure they cannot be seen, not even by themselves. After that, they make sure that the grave is clean and exactly as it was before and leaves.

Singer – Alone

Dan's favorite singer has died and has been buried in a nearby cemetery. Dan has always had wild fantasies about the singer. One night, according to a previous plan, Dan enters the cemetery late at night. He masturbates over the singer's grave, making sure he cannot be seen, not even by himself. After that, he makes sure that the grave is clean and exactly as it was before and leaves.

Human- Group

Anne, Monica, and Janet are colleagues. They work in a research institute where people donate their organs for scientific purposes after their death. They have been keen to eat human flesh once for the sake of experiencing its taste. One night, Anne, Monica, and Janet decide to enter the lab late at night. They cut from one of the corpses a body part that had already been studied and is no longer useful for any scientific purpose. After they make sure it is completely free of any contamination, they bring the small piece of human flesh home, cook it and eat it with bread and wine. They enjoy it, and nothing bad happens later.

Human – Alone

Anne works in a research institute where people donate their organs for scientific purposes after their death. She has been keen to eat human flesh once for the sake of experiencing its taste. One night, Anne decides to enter the lab late at night and cut from one of the corpses from a body part that had already been studied and is no longer useful for any scientific purpose. After she makes sure it is completely free of any contamination, she brings the small piece of human flesh home, cooks it, and eats it with bread and wine. She enjoys it, and nothing bad happens later.

Ash – Group

Joe, Eli, and Liz are young siblings. Even though their grandmother is not alive anymore, they still hate her. Before her death, their grandmother asked them to have her remains cremated after her death. She also asked them to keep the ashes in a beautiful urn. Joe, Eli, and Liz do exactly what their grandmother asked them to do, but also, they add a large amount of dog faeces into an urn of their grandmother's ashes.

Ash – Alone

Joe is a young adult. Even though his grandmother is not alive anymore, he still hates her. Before her death, her grandmother asked him to have her remains cremated after her death. She also asked him to keep her ashes in a beautiful urn. Joe does exactly what his grandmother asked him to do, but also, he adds a large amount of dog faeces into the urn of his grandmother's ashes.

References

- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software*, 67(1), 1 - 48. doi:<http://dx.doi.org/10.18637/jss.v067.i01>
- Bürkner, P.-C. (2018). Advanced {Bayesian} Multilevel Modeling with the {R} Package {brms}. *The R Journal*, 10(1), 395–411.
- Christensen, R. H. B. (2019). “ordinal—Regression Models for Ordinal Data.” R package version 2019.12-10. <https://CRAN.R-project.org/package=ordinal>.
- Lüdtke D, Ben-Shachar M, Patil I, Waggoner P, & Makowski D (2021). “Assessment, Testing and Comparison of Statistical Models using R.” *Journal of Open Source Software*, 6(59), 3112. doi: [10.31234/osf.io/vtq8f](https://doi.org/10.31234/osf.io/vtq8f).
- Patil, I. (2018). *ggstatsplot: "ggplot2" Based Plots with Statistical Details*. <https://doi.org/10.5281/zenodo.2074621>