

Action-inaction asymmetries in moral scenarios:
Replication of the omission bias examining morality and blame with extensions
linking to causality, intent, and regret

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Abstract

Omission bias is the preference for harm caused through omissions over harm caused through commissions. In a pre-registered experiment ($N = 313$), we successfully replicated an experiment from Spranca, Minsk, and Baron (1991), considered a classic demonstration of the omission bias, examining generalizability to a between-subject design with extensions examining causality, intent, and regret. Participants in the harm through commission condition(s) rated harm as more immoral and attributed higher responsibility compared to participants in the harm through omission condition ($d = 0.45$ to 0.47 and $d = 0.40$ to 0.53). An omission-commission asymmetry was also found for perceptions of causality and intent, in that commissions were attributed stronger action-outcome links and higher intentionality ($d = 0.21$ to 0.58). The effect for regret was opposite from the classic findings on the action-effect, with higher regret for inaction over action ($d = -0.26$ to -0.19). Overall, higher perceived causality and intent were associated with higher attributed immorality and responsibility, and with lower perceived regret. All materials are available on:

<https://osf.io/9gsqe/>

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Action-inaction asymmetries in moral scenarios:

Replication of the omission bias examining morality and blame and extensions linking to causality, intent, and regret

Omission bias is a well-researched phenomenon of the preference for harm caused through omission over harm caused through commission, even when the outcome is the same (Baron & Ritov, 1994; Connolly & Reb, 2003; Kordes-de Vaal, 1996). People facing moral dilemmas between taking action or doing nothing when outcomes are unknown and/or uncertain typically choose not to act, even when both decisions are perceived as likely to lead to similar negative outcomes. The present investigation aims to closely replicate a classic finding of the omission bias employing a procedural adjustment and extensions to the original design to address open questions and key developments in the literature.

Omission bias

Early research into omission bias shed light on the bias of parents towards inaction in vaccination decisions, despite the likelihood of such decisions resulting in negative outcomes (Ritov and Baron, 1990, 1992). Data from the United States in the early 1990s showed puzzling lower than expected vaccination rates. Ritov and Baron argued that this could be explained by an omission bias, such that parents perceived a decision for risking death from the flu by not vaccinating their child (omission) as being less immoral and incurring less responsibility than risking death from side effects of vaccinating their child (commission) (Ritov & Baron, 1990). Their findings showed that despite both decisions resulting in the same or even greater chances or degree of a harmful outcome, there was a clear preference for decisions of omission over commission. Asch et al. (1994) extended these findings to show that these lab experiments generalized to real vaccination decisions, with later studies

finding support for an omission bias in many other moral and non-moral domains (Cushman & Young, 2011; Meszaros et al., 1996).

Despite accumulating evidence in support of the omission bias, there were scholars, such as Connolly and Reb (2003), who challenged earlier findings and questioned the generalizability of the bias from the context of vaccination decisions, making the case that the evidence for a general omission bias is weak and inconclusive. The criticisms of a generalizable omission bias have tended to focus on two issues. First, regarding the scale of the moral decision being examined, it has been argued that the vaccination decision is an overly complex social-moral dilemma that is not a suitable test for the omission bias (Reb & Connolly, 2010). This includes criticisms that decisions of life and death may be tied to unflexing beliefs where alternatives involving some risk of death or serious side effects like those involved with vaccines might not be considered. Second, there have also been concerns regarding measurement and study design. The first of these was that the differentiation between omission and commission strongly depends on the response scales used in vaccination studies that were not themselves designed with this kind of rigorous academic analysis in mind (e.g. yes/no questionnaires in Asch et al., 1994). The next measurement and design concern has been the use of a numerical risk-balancing procedure in which participants have to make tradeoffs of probabilities to vaccinate or not (Hershey et al., 1994; Meszaros et al., 1996; Petrinovitch & O'Neill, 1996). These were seen as problematic in that it may be more straightforward and accurate to ask people to make a simple choice between 'vaccinate' and 'not vaccinate' rather than to address complicated computational evaluations with varying probabilities (Connolly & Reb, 2003; Reb & Connolly, 2010). Finally, some have postulated that the within-subject studies do not replicate well when conducted in a between-subject design (e.g. N'gbala & Branscombe, 1997; Connolly & Reb, 2003).

Together, these issues, the morally complex context of vaccination, and the measurement and

design of early studies, have raised the question of the generalizability of the omission bias from the particular case of vaccinations to a broader human condition.

Chosen omission bias experiment

Spranca et al. (1991) provided one of the first experimental accounts of a broad omission bias, with five experiments demonstrating the effect and exploring possible explanations. Their study has become a classic in the omission bias literature with 805 citations according to Google Scholar at the time of writing, and 766 of these citations including references to action and inaction¹. Their study's experiments first sought to address the moral complexity criticism by presenting participants with simple and straightforward everyday life examples of the bias, avoiding the political and cultural complexities of the vaccination dilemma scenarios that are at the center of the omission bias debate. Their experiments also sought to address the criticism of complex measurement method by removing the complexities of statistical and probabilistic evaluations in preference for more familiar ratings of morality on a scale of -1 to -100 and of responsibility as a reward to the victim. These steps made a strong case that the omission bias should be observed in less dire moral contexts and with more straightforward measurement techniques. This study along with others (e.g., Baron & Ritov, 2004, 2009) made steps to address challenges to the generalizability of the omission bias, yet the debate continues (e.g., Conolly & Reb, 2012a, 2012b; Willemsen & Reuter, 2016).

Replication and procedural adjustments

The steps taken in these and other related studies have not thoroughly addressed all concerns about the generalizability of an omission bias. Firstly, it was not clear whether the results would generalize to a between-subjects design in which participants would judge each

¹ Google Scholar search of "(omission OR commission OR action OR inaction)" in papers citing Spranca et al. (1991).

case based on its own merits rather than in comparison with other cases. Between-subjects designs also help address concerns of subjects' awareness of the manipulation and adjustments of their answers by making comparisons across conditions. Baron and Ritov (2004) acknowledge that these contrasts, if real, would be interesting to explore, though they speculate that the omission bias is not likely to disappear when subjects are aware of it. The authors insisted in follow-up studies that this within-subject design is important for holding intentionality constant (e.g. Royzman and Baron, 2002; Baron and Ritov, 2009), though the variation of intentionality is perhaps one interesting boundary condition on the omission bias effect (Kordes-de Vaal, 1996).

Additionally, recent large-scale mass collaborations have shown alarmingly high rates of failure to replicate classic findings in psychology (e.g. Klein et al., 2018) leading to a "credibility revolution" and increasing calls for more replication work (Zwaan, Etz, Lucas, & Donnellan, 2018). These serve as an opportunity to revisit classic findings on the omission bias, to further extend these findings to allow a better understanding of the phenomenon, and to address questions raised regarding the existence and the strength of the effect.

In the present investigation, we aimed to test the generalizability and extension of the omission bias by closely replicating and extending the 1991 study. We sought first to replicate the study with a procedural adjustment to a between-subjects design to test its generalizability, and then to extend the study with additional outcomes of participant perceptions of causality, intentionality, and regret. For the purposes of replication, we focused on their first experiment which consisted of two scenarios and served as the baseline for the other follow-up experiments. We aimed to replicate the original study as closely as possible, using their original scenarios and outcomes as source material. As far as we know, there have been no previous attempts to conduct a direct replication of this experiment.

We aimed for a close replication according to the replication taxonomy proposed by LeBel, McCarthy, Earp, Elson, and Vanpaemel (2018). We made adjustments to the original within-person design in which subjects read and evaluated all conditions of the same scenario, both commission(s) and omission, and we instead presented participants with either commission or omission. This was meant to address one of the main criticism of the omission bias findings in the ongoing debate in the literature was that the effect relies on within-subject or single-choice designs. Therefore, we chose a well-known demonstration of the omission-bias using a within-subject design and attempted a close direct replication using the same stimuli with a between-subject design.

We also made minor adjustments to validate participants' understanding of action and inaction in the scenarios. We added comprehension checks to ensure participants read and understood the scenarios in the way that was intended, thereby also disrupting automated or random responding and forcing participants to pay attention to key factors in the scenarios, and addressing any possible concerns that participants may have not understood the distinction between commission and omission in the scenarios.

Extensions: Causality, intentionality, and regret

In addition to the purpose of replicating the 1991 experiment, this study also seeks to extend the original experiment to factors beyond immorality and responsibility. The omission bias literature discussed three key factors in the omission bias effect: causality, intentionality, and regret.

Causality. Actions are perceived as more causal than inactions (Baron & Ritov, 2004; Bostyn & Roets, 2016; DeScioli et al., 2011; Royzman & Baron, 2002), and causality is key in determining immorality and responsibility. Therefore, harmful commissions would be seeing as more causal than harmful omissions, and therefore more immoral and responsible. In the original study causality was only indirectly assessed using an open-ended question to

show that causality perceptions affected judgement of immorality. We instead assessed causality perceptions using a clear quantitative scale to directly examine the role of causality in the omission bias.

Intentionality. Actions are perceived as more intentional than inactions (Hayashi, 2015; Kordes-de Vaal, 1996), and intent affects perceptions of morality and responsibility. In the original study and much of the subsequent work on omission bias, intentionality was treated as a confound to be controlled for or fixed (e.g. Royzman & Baron, 2002). We added a measure of intent to examine the extent to which perceptions of intentionality, and the role in omission bias.

Regret. Historically, the omission bias followed on an earlier demonstration of action-inaction asymmetries by Kahneman and Tversky (1982) coined the action-effect. In research on the action-effect, negative outcomes in everyday life situations are perceived as involving higher regret if they were a result of action compared to inaction. The action-effect is considered one of the strongest most replicated findings in the regret literature (Gilovich & Medvec, 1995). The action-effect was focused on regret and associated counterfactual thinking (thoughts of what might have been), and the omission bias extended that to show action-inaction asymmetries in moral situations and decisions made when faced with the choice between action and inaction (Anderson, 2003; Feldman, Kutscher, & Yay, 2018; Zeelenberg, Van den Bos, Van Dijk, & Pieters, 2002). The prevalent assumption is that the omission bias is aligned with action-effect (e.g., Ritov & Baron, 1990; DeScioli, Christner, & Kurzban, 2011), in that everyday life situations and moral situations would demonstrate a similar action-inaction regret asymmetry (e.g., Baron & Ritov, 2004; Ritov & Baron, 1995; Spranca et al., 1991). We therefore added a measure of regret to examine whether the action-effect regret action-inaction asymmetry phenomenon would be observed in classic omission bias moral scenarios.

In summary, we expected that in addition to Spranca et al.'s original predictions on perceived immorality and responsibility, participants would rate harmful outcomes through commission as being more casual, intentional, immoral, accountable, and regretful than through omissions.

Experiment

Pre-registration and open-science

We pre-registered the experiment on the Open Science Framework and data collection was launched later that day. Pre-registration, power analyses, and all materials used are available in the supplementary materials. These together with data and code were shared on the Open Science Framework: <https://osf.io/9gsqe/> ; Pre-registration link: <https://osf.io/6nn57> .

Effect size and power analysis

We pre-registered a power analysis of the results described in Spranca et al. (1991) and the analysis is provided in the supplementary materials ($\alpha = .05$, one tailed, power = .95; G*Power 3.1). Unfortunately, the original study did not report means and standard deviations to allow a more accurate estimate of the effect, and we therefore based our estimates on a conversion of the effect to Cohen's d as reported in Table 4 (also see supplementary).

Participants and procedure

A total of 313 American Amazon Mechanical Turk participants ($M_{\text{age}} = 36.37$, $SD_{\text{age}} = 11.91$; 157 females) were recruited online survey using Turkprime.com (Litman, Robinson, & Abberbock, 2017). Participants indicated their consent and were presented with two scenarios describing an actor in a position to harm a victim. Participants were randomly assigned to one condition in each of the two scenarios. In each scenario, an actor sought to cause a harmful outcome through either commission or omission and their behavior led either

to the intended harmful outcome or to a no-harm outcome for the victim. Participants were first presented with The Tennis Tournament scenario and then The Eyewitness scenario.

The *Tennis Tournament* was presented as follows:

John West plays tennis at the Wyncote Tennis Club two or three times a week. John is the best player belonging to the club, but he is not good enough to play professionally. The Club holds an annual tennis tournament, which occasionally attracts a big-name tennis player in the need of a warm-up before Wimbledon. The first prize is \$20,000, and the prize for the runner-up (who plays in the final but loses it) is \$10,000. This year, Ivan Lendl agreed to play in the tournament. John and Ivan quickly advanced until they were to meet in the final. John would of course love to win, but he realizes that he is at a large disadvantage. The tradition of Wyncote is for both finalists to meet for dinner at the club before the final the next morning. While getting dressed for dinner John remembers reading that Ivan is allergic to Cayenne pepper. He also recalls that house dressing served in the dining room contains Cayenne pepper. John thinks, 'If Ivan eats the house dressing, he will probably get stomach ache that will keep him up much of the night. Then I'll have a chance to win.' After the dinner, Ivan orders first. After he orders his main course, the waiter asks him whether he prefers the house dressing or Italian dressing. Ivan does not think that the house dressing might contain Cayenne pepper.

The scenario then ended with one of six outcomes with a manipulation of both commission-omission and intended harmful outcome.

[Commission before choice condition: Before Ivan makes a choice, John recommends that Ivan try the house dressing. Ivan orders it and gets a stomach

ache, as predicted. If Ivan had said nothing, Ivan would have ordered Italian dressing, but John does not know this for sure. John wins the match.

Omission condition: Ivan orders the house dressing and gets a stomach ache, as predicted. John says nothing. John realized that if he had warned Ivan about the Cayenne, even after Ivan announced his choice, Ivan would have ordered Italian dressing. John wins the match.

Commission after choice condition: Ivan orders Italian dressing. John then recommends that Ivan try the house dressing. Ivan changes his mind, orders the house dressing, and gets stomach ache, as predicted. John wins the match.]

In three additional endings, the scenarios were exactly as above with the only change being that Ivan won the match. So despite John's behavior of causing Ivan's allergic reaction, the behavior did not result in the intended harmful outcome of Ivan losing the match.

The text of the second scenario, *The Eyewitness*, was presented as follows:

Peter, a resident of Ohio, is driving through a small town in South Carolina. At a 4-way stop, he gets into a small accident with a town resident named Lyle. The accident came about like this:

Traveling north, Lyle approached the 4-way stop and failed either to slow down or stop. Meanwhile, Peter had just finished stopping and began to move east through the intersection. Peter noticed that a car, Lyle's, was crossing the intersection after having failed to stop. Peter slammed on his brakes, but too late to prevent his car from hitting Lyle's car as it passed in front of him. The accident was clearly Lyle's fault because the accident was caused by his failure to stop. However, because the accident's cause is not clear from its effects, the police may believe that Peter failed to stop and that caused Peter to run into Lyle's car broadside. Immediately after the accident, both men exclaimed that is

was the other's fault. When the police came, Peter told them that the accident was caused by Lyle's failure to stop. Lyle told the police that the accident was caused by Peter's failure to stop. Unknown to either man, there was an eyewitness to the accident, Ellen. Like Lyle, Ellen is a town resident. She thought to herself, 'I know the accident is Lyle's fault, but I know Lyle and do not wish him to be punished. The only way that Lyle will be faulted by the police is if I testify that the accident is indeed Lyle's fault.'

The scenario then ended with one of four outcomes that created a manipulation in which Ellen behaved to harm Peter by either commission or omission and then, as an outcome, Peter was either harmed by being charged or not harmed by not being charged for the accident.

[Commission - harm condition: Ellen told the police that the accident was caused by Peter's failure to stop. Peter is charged with failure to stop and fined.

Commission - no-harm condition: Ellen told the police that the accident was caused by Peter's failure to stop. Lyle is charged with failure to stop and fined.

Omission - harm condition: Ellen told the police nothing. Peter is charged with failure to stop and fined.

Omission – no-harm condition: Ellen told the police nothing. Lyle is charged with failure to stop and fined.]

Participants were randomly assigned to one of the conditions in each of the scenarios in a between-subject design. Each condition was followed by five comprehension questions participants had to answer correctly to proceed to answering the dependent measures, meant to ensure participants' accurate comprehension of the scenarios (see supplementary).

Measures

Immorality. Following from the original measure used by Spranca et al. (1991), participants were asked to rate the actor's morality of the decision in the given situation on a scale from -100 (*as immoral as possible to be in the situation*) to 0 (*not immoral at all*). This value was then reversed to a positive integer ranging from 0 (*not immoral at all*) to 100 (*as immoral as possible to be in the situation*).

Responsibility. Following from the original measure used by Spranca et al. (1991), participants rated perceived moral responsibility by putting a dollar value on the penalty that the actor should have imposed on them if they were caught in their potentially harmful behavior. In the first scenario, participants were presented with the following: "Suppose that Ivan found out that John knew about the dressing and Ivan's allergy and Ivan is now suing John. You are on the jury and are convinced by the evidence that the case is exactly as described above". In the second scenario, participants were presented with the following: "Suppose that Peter found out that Ellen told the police that it was Peter's failure to stop. You are on the jury and are convinced by the evidence that the case is exactly as described above". In both scenarios, participants were asked to provide a numerical answer with an unrestricted range with the following: "How much money, if any, do you think [Ivan / Peter] should receive in compensation? (in USD)". Responsibility compensation ratings were transformed using the natural log to address skewness.

Causality. Building on the original study's open-ended measure of causality, we added a quantitative measure of causality. Participants rated perceived causality by indicating their agreement to the following statements - Tennis Tournament scenario: "John understood that his behavior would affect Ivan in the way that it did"; Eyewitness scenario: "Ellen understood that her behavior would affect Peter." (1 - *Strongly disagree*; 7 - *Strongly agree*).

Intentionality. Participants rated perceived intentionality by indicating their agreement to the following statements - Tennis Tournament scenario: “John intended for his behavior to affect Ivan in the way that it did.”; Eyewitness scenario: “Ellen intended to harm Peter.” (1 - *Strongly disagree*; 7 - *Strongly agree*).

Regret. Participants rated perceived feelings of regret of the actor by indicating their agreement with the following statements - Tennis Tournament scenario: “John regrets his behavior.”; Eyewitness scenario: “Ellen regrets her behavior.” (1 - *Strongly disagree*; 7 - *Strongly agree*).

Results

Descriptives and correlations of the dependent measures are provided in Table 1. Sample size, means, and standard deviations of all experimental conditions are presented in Table 2.

To test our results, we first ran an independent t-test for each hypothesized condition on each outcome variable. As in the original study, we present the main findings of our t-tests with a pooled grouping of the commission before and commission after groups. As a supplementary analysis, we also tested the interaction between commission and harm using two-way analysis of variance (ANOVA) with commission versus omission and intended-harm versus no intended-harm, and the contrasts. The findings of both the T-test and ANOVA tests are presented in Table 3.

Replication results: Morality and responsibility

We tested the effects of commission and intended-harm on perceptions of morality and responsibility using a between-person t-test for main effects and ANOVA for the interaction effects as reported in Table 3. Unlike the original within-person design, our between-person design returned far few instances of matched values between conditions (i.e., in the original study, participants are reported as giving either higher, lower, or the same

attribution of morality or responsibility between condition, with very many conditions being evaluated as having the same morality or responsibility). For this reason, our dependent variables across these conditions can be evaluated as continuous rather than ordinal.

Before and after commission conditions were grouped and tested together as a pooled commission condition for hypothesized relationships. The findings in The Tennis Tournament scenario were in support of commission-omission asymmetry in immorality attributions (pooled commission vs. omission: $d = -0.45$). The effects for intended harm contrast were weaker ($d = 0.11$) with Cohen's d CI including 0, and with no support for an interaction between the two factors ($n_p^2 = .00$).

The findings for responsibility judgments were similar to the morality findings. Findings were again in support of commission-omission asymmetry for responsibility judgments (pooled commission vs. omission: $d = -0.53$). The effects for intended harm contrast were again weaker ($d = -0.20$) with Cohen's d CI including 0, and with no support for an interaction between the two factors ($n_p^2 = .00$).

The findings in The Eyewitness scenario regarding perceived immorality were very similar for the main omission bias hypotheses contrasting commission and omission ($d = -0.47$). Unlike The Tennis Tournament scenario, there was also a comparable effect for the harm/no-harm contrasts with immorality ($d = -0.40$), with an unexpected weak interaction ($F = 4.01$, $p = .046$, $n_p^2 = .01$). The same pattern emerged for responsibility judgments having very similar effects to the immorality ratings (commission vs. omission: $d = -0.40$; harm vs. no-harm: $d = -0.49$; interaction: $n_p^2 = .002$).

We concluded a successful replication of the omission bias omission-commission asymmetry reported in the original study. The findings regarding intended harm contrasts were not as clear, and they correspond to the mixed findings in the original study (only 8 and 6 of the 57 subjects rating higher immorality for the harmful outcome in The Tennis

Tournament and The Eyewitness scenarios respectively, with one subject showing the opposite effect). Based on the null to very weak interactions, we conclude that it is most likely that the two factors do not interact.

Extension results: Causality, intention, and regret.

Examining omission-commission contrasts, effects were generally consistent across the two scenarios for causality (Tennis Tournament: $d = -0.27$; Eyewitness: $d = -0.21$), intentionality (Tennis Tournament : $d = -0.28$; Eyewitness: $d = -0.58$), and regret (Tennis Tournament: $d = 0.18$; Eyewitness: $d = 0.26$). Also consistent, was the very weak interaction effects between omission-commission and harm/no-harm in both scenarios for these factors ($n_p^2 < .005$). The findings regarding the intended harm contrasts, however, were not consistent across the two scenarios. Effects were stronger and significant for Tennis Tournament scenario ($-0.43 < d < 0.29, p < .011$) compared to the weaker and non-significant effects in The Eyewitness scenario ($-0.17 < d < 0.04, p > .137$).

The correlations between the factors were consistent across the two scenarios. Higher immorality ratings were associated with higher ratings for causality ($r = .33$ to $.40$) and intentionality ($r = .27$ to $.16$), and lower ratings of regret ($r = -.24$ to $-.25$). The stronger the perceived connection between a person and the outcome (causality) and perceived intent to harm, the less likely the actor is perceived to be regretful of the act, the less moral the act seems, and the higher the compensation that was awarded to the target. Initial mediation analyses examining the role of causality and intentionality are provided in the supplementary.

Discussion

We set out to replicate and extend the classic Spranca et al. (1991) demonstration of the omission bias to address concerns about the generalizability and reliability of early studies. A summary and comparison of findings in the original and replication are provided in Table 4. We conclude a successful replication of the baseline omission bias with slight

deviations from the original findings regarding outcome bias. We found effects for the added extensions, with medium effects for intentionality and weaker effects for causality and regret, with the regret effects opposite from the literature on the classic action-effect (Kahneman & Tversky, 1982).

Immorality and responsibility: Support for an omission bias

Based on the original study, we expected participants to rate actions leading to harm through omission as less immoral than corresponding harm through commission. Our findings are in support of these omission bias findings, with a consistent effect in both scenarios of Cohen's d of -0.45 to -0.47, slightly weaker than expected, yet reasonable given the conversions and modifications in analyses.

Causality and intentionality: Support for classic omission bias findings

We extended the original study by Spranca et al. (1991) by adding possible factors associated with the omission-commission effect, causality and intent, to compliment morality and responsibility. Compared to commissions, omissions were generally perceived as less causal ($d = -0.21$ to -0.27) and less intentional ($d = -0.28$ to -0.58). These are in line with the idea that omissions are perceived as non-decisions involving less deliberation and intent (Hayashi, 2015; Kordes-de Vaal, 1996; Ritov & Baron, 1992).

Going beyond the experimental design, the findings from the correlational analyses were in line with the literature on the omission bias. The stronger the perceived connection between a person and the outcome (causality) and perceived intent to harm, the more immoral the act seems, and the higher the compensation that was awarded to the target. These findings help to support the model proposed in the early work on omission bias which theorized that perceptions of increased causality and intentionality of commission over omission drove the bias.

The role of this study's between-subject design is also worth noting regarding intentionality. The intended purpose of the within-subject design in the original study and other follow-ups by those authors (e.g., Royzman & Baron, 2002; Baron & Ritov, 2009) was to hold intentionality constant in the mind of the subject. Using a within-subject design was meant to make clear to participants that the intention of the actor was already formed when the decision presented itself. We adjusted to a between-subject design to test the generalizability of these earlier findings to a design that is closer to everyday life situations, where often information about behaviors and outcomes is incomplete. It also allowed us to measure and analyze variations in judgements of intentionality across scenarios. For more discussion on this, supplemental analyses of the relationship between intentionality and omission behaviors are reported in the supplementary. Our results provide empirical support for a role of intentionality in judgements of omission behaviors that may be fertile for future study.

Regret: Deviation from the action-effect

The classic action-effect (Kahneman & Tversky, 1982) findings were that actions leading to a negative outcome are regretted more than inactions leading to the same negative outcomes. We added a regret measure to examine whether the action-effect findings would extend to situations of morality involving intended harmful behavior. Our findings were opposite to the expected action-effect omission-commission asymmetry with participants rating omissions as more regretted than commissions ($d = 0.18$ to 0.26).

One explanation for this surprising finding may be an intermingling of the perception of an actors' regret for their behavior with their regret for the outcome. In typical action-effect scenarios, actors behave in a way that is morally neutral but are faced with an outcome that deviates from expectations, such as losing money over an investment. In this study's omission bias scenarios, the actors behaved immorally to harm others for personal or

interpersonal gain, and then are faced with an outcome that deviates from expectation. We hypothesized that participants would perceive actors as being more regretful for taking action that would immorally harm another person rather than allowing that harm through inaction. Yet it is plausible that participants were focused on the regret that actors would feel for not taking more direct action towards their goal of personal or interpersonal gain.

Another possible explanation for the regret finding is the side-taking hypothesis (DeScioli, 2016; Descoli & Kurzban, 2013). This states that group members side against a wrongdoer who has performed an action that is perceived morally wrong by also attributing lack of remorse or regret. The negative relationship observed between the positive characteristic of regret and the negative characteristics of immorality, causality, and intentionality is in support of this explanation. Future research may be able to explore the true mechanisms of regret in such scenarios.

Outcome bias: Deviations from original findings

Spranca et al. (1991) also examined an "outcome bias", comparing participants' judgements of an actor's intentionally harmful behavior that lead either to the intended harmful outcome or to a no-harm outcome for the victim. The replication of these comparisons yielded inconsistent findings across the two scenarios. In The Eyewitness scenario, the strongest effects were for immorality and responsibility ($d = -0.40$ and -0.49 , respectively), with weak effects for causality, intentionality, and regret ($d = 0.04$, -0.17 , and -0.10 , respectively), whereas in The Tennis Tournament scenario, the strongest effects were for causality, intention, and regret ($d = -0.30$, -0.42 , and 0.29 , respectively), with weaker effects for morality and responsibility ($d = -0.11$ and -0.20 , respectively).

These suggest some underlying difference between the two scenarios regarding the harmful outcome, despite the consistent findings for the omission bias action-inaction asymmetry. Spranca et al. (1991) noted that outcome bias could be related to the within-

subject design, explaining that "we placed the cases next to each other to determine whether anyone *knowingly* evaluates decisions according to their outcome" (p. 82; italics in original text). Since the experimental design was adapted to a between-subject design, the subjects in the replication were not aware of the outcome differences between conditions, especially in the first scenario where participants had not yet been exposed to any other outcomes.

A possible distinction between the two scenarios involves the reason for harm. In The Tennis Tournament scenario harm is inflicted for personal benefit (winning the tournament), whereas in The Eyewitness scenario harm is inflicted to help a member of the ingroup (protect a fellow resident). Factors related to causality, intention, and regret could be more relevant when situation is more complex in terms of moral reasoning in an interpersonal context. Future research on outcome bias should examine what in these two scenarios may have led to such differences.

Limitations and future directions

We set out to replicate a cornerstone omission bias study following growing concerns in psychological science regarding the reproducibility, replicability, reliability, and generalizability of classic psychological effects. Our replication updates the original study to meet current open-science standards including a pre-registered study design, sample size determined by power analysis, advanced statistical analyses, robust results reporting with effect-size estimations, and openly available materials, data, and code. However, in conducting a direct close replication (according to the criteria set by LeBel et al., 2018) we decided on several important theoretical and empirical adjustments to go try and go beyond the original to add extensions that would shed new insights on the phenomenon. We adjusted the study design to a between-subject design to test the generalizability of the effect and added extensions with hypotheses for causality, intentionality, and regret. The close replication and extension approach adds to the literature and more recent theoretical

developments (e.g. prosocial motivations in Levine et al., 2018 and counterfactual thinking in Henne et al., 2019).

Our findings are in line with several other recent empirical demonstrations finding support for omission bias using adjusted conceptual replications yet recognizing boundary conditions (Bostyn & Roets, 2016; Siegel et al., 2017). An important future direction would be to conduct a systematic review and meta-analysis of the omission bias literature (Yeung, Yay, & Feldman, 2020).

In any close replication, replicators face multiple decisions on tradeoffs in design. In this study, a methodological limitation worth noting was our decision to administer two randomized conditions in succession to each participant. Consequently, Scenario 1 offers the clearest picture of between-subjects results, with responses to Scenario 2 possibly affected in some way from exposure to Scenario 1. However, we do not believe these affect results for a number of reasons. First, we successfully replicated the core results from the original findings. Second, there were major differences in nature of the scenarios (personal, interpersonal) as well as their designs and complexity (Tennis Tournament scenario with 3x2 structure versus Eyewitness scenario with 2x2 design) minimize such concerns. Third, other similar replication work directly tested order effects of two different experiments testing the same phenomenon concluded no order effects (Kutscher & Feldman, 2019; Ziano, Yao, Gao, & Feldman, 2020). Future studies would ideally address this limitation by fixing participants to one condition throughout both scenarios, randomizing order, or directly testing order effects.

Another decision we faced was about study design, whether to run the same within-person design or switch to a between-person design. We saw value in adjusting the design to a between design, given our reading of the literature and the debate about within-between designs, and the extensions we planned to examine causality and intentionality. Further, we

sought to make the study more realistic and representative of real-life situations, and learned from previous experience involving challenges when using within designs in our specific target online sample. Yet, that decision also has limitations. Differences between conditions become salient in the within-subject design used in the original study, making circumstances and outcomes clearer to readers, and this may have affected our results regarding outcome bias. Future research may further contrast the two designs against each other in a single study to examine whether this truly has any effect on either outcome bias or omission bias.

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Tables

Table 1

Means, standard deviations, and correlations for all variables under all conditions

Scenario 1: The Tennis Tournament	<i>M</i>	<i>SD</i>	Commission	Harm Outcome	1	2	3	4
1. Immorality ^a	74.70	24.77	.21** [.10, .31]	-.06 [-.17, .06]				
2. Responsibility ^b	6.21	4.03	.24** [.14, .35]	.10 [-.01, .21]	.20** [.09, .30]			
3. Causality ^c	6.13	1.27	.12* [.01, .23]	.15** [.04, .26]	.33** [.23, .42]	.09 [-.02, .20]		
4. Intentionality ^c	6.11	1.35	.13* [.02, .24]	.21** [.10, .31]	.27** [.16, .37]	.10 [-.01, .21]	.77** [.72, .81]	
5. Regret ^c	2.60	1.43	-.09 [-.20, .02]	-.14* [-.25, -.03]	-.24** [-.34, -.13]	-.11 [-.21, .01]	-.26** [-.36, -.15]	-.25** [-.35, -.15]
Scenario 2: The Eyewitness	<i>M</i>	<i>SD</i>	Commission	Harm Outcome	1	2	3	4
1. Immorality ^a	71.24	26.48	.23** [.12, .33]	.20** [.09, .30]				
2. Responsibility ^b	6.35	3.82	.20** [.09, .30]	.24** [.13, .34]	.23** [.12, .33]			
3. Causality ^c	6.16	1.04	.10 [-.01, .21]	-.02 [-.13, .09]	.40** [.30, .49]	.16** [.05, .26]		
4. Intentionality ^c	4.18	1.73	.28** [.17, .38]	.08 [-.03, .19]	.16** [.05, .27]	.13* [.02, .24]	.22** [.12, .33]	
5. Regret ^c	2.95	1.49	-.13* [-.24, -.02]	.05 [-.06, .16]	-.25** [-.36, -.15]	-.09 [-.19, .03]	-.33** [-.42, -.22]	-.24** [-.34, -.13]

Note. N = 313. * $p < .05$, ** $p < .01$, *** $p < .001$. Values in square brackets indicate the 95% confidence interval for each correlation (Cumming, 2014).

^a Omission condition for The Tennis Tournament scenario is reported using the pooled condition of commission before and commission after. Immorality scale is from 0 to 100. ^b Responsibility is a positive number with no range restriction, and was log-transformed to address skewness. ^c Causality, intentionality, and regret are scale of 1-7.

Table 2

Means and standard deviations for all conditions in The Tennis Tournament scenario and The Eyewitness scenario

Scenario 1: The Tennis Tournament	Harm outcome								No-harm outcome							
	Commission after (N = 51)		Commission before (N = 51)		Pooled commission (N = 101)		Omission (N = 101)		Commission after (N = 54)		Commission before (N = 54)		Pooled commission (N = 108)		Omission (N = 54)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Immorality ^a	82.36	23.01	73.12	28.44	77.69	26.18	64.32	27.57	80.96	19.93	76.93	21.49	78.94	20.73	70.20	23.95
Responsibility ^b	7.59	3.88	6.96	3.97	7.28	3.92	5.32	4.38	7.35	3.30	5.76	3.68	6.55	3.57	4.35	4.07
Causality ^c	6.50	1.09	6.49	0.86	6.50	0.98	5.98	1.25	5.94	1.61	6.06	1.19	6.00	1.40	5.83	1.37
Intentionality ^c	6.62	0.97	6.51	0.86	6.56	0.91	6.06	1.08	5.83	1.66	6.00	1.41	5.92	1.54	5.67	1.64
Regret ^c	2.26	1.66	2.45	1.36	2.36	1.51	2.46	1.25	2.70	1.34	2.63	1.39	2.67	1.36	3.07	1.46
Scenario 2: The Eyewitness	Harm outcome								No-harm outcome							
	Commission (N = 76)				Omission (N = 79)				Commission (N = 79)				Omission (N = 79)			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Immorality ^a	79.75	21.88			73.37	24.24			74.99	27.15			57.19	27.01		
Responsibility ^b	7.85	3.40			6.71	3.59			6.38	3.58			4.50	3.96		
Causality ^c	6.17	1.08			6.10	1.26			6.35	0.79			6.00	0.97		
Intentionality ^c	4.75	1.73			3.92	1.48			4.59	1.70			3.48	1.73		
Regret ^c	2.80	1.65			3.24	1.54			2.71	1.28			3.04	1.44		

^a Immorality scale is from 0 to 100. ^b Responsibility is a positive number with no range restriction and was log-transformed to address skewness. ^c Causality, intentionality, and regret are scale of 1-7.

Table 3

Main-effects and interactions

<i>Scenario 1: The Tennis Tournament</i>	Omission vs commission (before)				Omission vs commission (after)				Commission (before) vs commission (after)			
	<i>t</i>	<i>p</i>	<i>d</i>	[95% CI]	<i>t</i>	<i>p</i>	<i>d</i>	[95% CI]	<i>t</i>	<i>p</i>	<i>d</i>	[95% CI]
Immorality	-2.19	.030	-0.30	[-0.58, -0.03]	-4.34	< .001	-0.60	[-0.88, -0.32]	2.04	.043	0.28	[0.01, 0.55]
Responsibility	-2.73	.007	-0.38	[-0.65, -0.10]	-4.88	< .001	-0.68	[-0.96, -0.39]	2.18	.030	0.30	[0.03, 0.58]
Causality	-2.20	.029	-0.30	[-0.58, -0.03]	-1.63	.104	-0.23	[-0.50, 0.05]	-0.32	.749	-0.04	[-0.32, 0.23]
Intentionality	-2.17	.031	-0.30	[-0.57, -0.03]	-1.82	.071	-0.25	[-0.53, 0.02]	-0.20	.843	-0.03	[-0.3, 0.24]
Regret	1.23	.219	0.17	[-0.10, 0.44]	1.43	.154	0.20	[-0.08, 0.47]	-0.26	.793	-0.04	[-0.31, 0.23]
<i>Scenario 1: The Tennis Tournament</i>	Omission vs commission (pooled)				No-harm outcome vs harm outcome				Omission x no-harm outcome			
	<i>t</i>	<i>p</i>	<i>d</i>	[95% CI]	<i>t</i>	<i>p</i>	<i>d</i>	[95% CI]	<i>F</i>	<i>p</i>	n_p^2	[95% CI]
Immorality	-3.65	< .001	-0.45	[-0.69, -0.21]	0.98	.328	0.11	[-0.11, 0.33]	0.63	.428	.00	[0.00, 0.02]
Responsibility	-4.27	< .001	-0.53	[-0.78, -0.29]	-1.77	.078	-0.20	[-0.42, 0.02]	0.07	.796	.00	[0.00, 0.01]
Causality	-2.17	.031	-0.27	[-0.50, -0.03]	-2.67	.008	-0.30	[-0.53, -0.08]	1.34	.247	.00	[0.00, 0.03]
Intentionality	-2.27	.024	-0.28	[-0.52, -0.04]	-3.83	< .001	-0.43	[-0.65, -0.20]	0.65	.421	.00	[0.00, 0.02]
Regret	1.55	.123	0.18	[-0.05, 0.42]	2.57	.011	0.29	[0.07, 0.51]	0.80	.371	.00	[0.00, 0.03]
<i>Scenario 2: The Eyewitness</i>	Omission vs commission				No-harm outcome vs harm outcome				Omission x no-harm outcome			
	<i>t</i>	<i>p</i>	<i>d</i>	[95% CI]	<i>t</i>	<i>p</i>	<i>d</i>	[95% CI]	<i>F</i>	<i>p</i>	n_p^2	[95% CI]
Immorality	-4.13	< .001	-0.47	[-0.69, -0.24]	-3.55	< .001	-0.40	[-0.63, -0.17]	4.01	.046	.01	[0.00, 0.05]
Responsibility	-3.53	< .001	-0.40	[-0.62, -0.17]	-4.36	< .001	-0.49	[-0.72, -0.26]	0.77	.380	.00	[0.00, 0.03]
Causality	-1.83	.068	-0.21	[-0.43, 0.02]	0.35	.724	0.04	[-0.18, 0.26]	1.48	.226	.00	[0.00, 0.03]
Intentionality	-5.14	< .001	-0.58	[-0.81, -0.35]	-1.49	.137	-0.17	[-0.39, 0.05]	0.59	.444	.00	[0.00, 0.02]
Regret	2.30	.022	0.26	[0.04, 0.48]	-0.90	.367	-0.10	[-0.32, 0.12]	0.11	.746	.00	[0.00, 0.02]

Note. Bolded values indicate consistent patterns of significant findings ($p < .05$) across the two scenarios. Italicized values mark inconsistent significant findings ($p < .05$). Confidence intervals are reported at 95%. Omission condition for The Tennis Tournament scenario is reported using the pooled condition of commission before and commission after.

Table 4

Summary of replication and extension results

Experimental conditions	Hypotheses Rater attributions to actor characteristics	Results of original study		Results of replication and extension study		Replication outcome	
		Scenario 1: The Tennis Tournament	Scenario 2: The Eyewitness	Scenario 1: The Tennis Tournament	Scenario 2: The Eyewitness	Signal / no signal	Consistent / inconsistent
Omission will be associated with a bias towards lower attributions of	immorality	-1.21 [-1.55, -0.86]	-1.46 [-1.83, -1.08]	-0.45 [-0.69, -0.21]	-0.47 [-0.69, -0.24]	Signal	Consistent
	responsibility	-1.26 [-1.61, -0.90]		-0.53 [-0.78, -0.29]	-0.40 [-0.62, -0.17]	Signal	Consistent
	causality			<i>-0.27</i> [-0.50, -0.03]	<i>-0.21</i> [-0.43, 0.02]		
	intentionality			-0.28 [-0.52, -0.04]	-0.58 [-0.81, -0.35]		
No-harm outcomes will be associated with a bias towards lower attributions of	regret			0.18 [-0.05, 0.42]	<i>0.26</i> [0.04, 0.48]		
	immorality	-0.40 [-0.67, -0.13]	-0.34 [-0.61, -0.07]	0.11 [-0.11, 0.33]	<i>-0.40</i> [-0.63, -0.17]	No-signal	Inconsistent
	responsibility			-0.20 [-0.42, 0.02]	<i>-0.49</i> [-0.72, -0.26]		
	causality			<i>-0.30</i> [-0.53, -0.08]	0.04 [-0.18, 0.26]		
	intentionality			<i>-0.43</i> [-0.65, -0.20]	-0.17 [-0.39, 0.05]		
	regret			<i>0.29</i> [0.07, 0.51]	-0.10 [-0.32, 0.12]		

Note. Bolded values indicate consistent patterns of significant findings ($p < .05$) across the two scenarios in the replication and extension study. Italicized values mark inconsistent significant findings ($p < .05$) across the two scenarios in the replication and extension study. Confidence intervals are reported at 95%. Results of original study calculated here using one sample T-Tests and are reported as Cohen's d . Results of the replication study calculated using independent sample T-Tests and effects are reported as Cohen's d . Replication outcomes taken from LeBel et al., 2019.

Supplementary Materials

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Open Science

Data and code will be shared using the Open Science Framework. Files are available using the following link: <https://osf.io/9gsqe/>

Pre-registration link: <https://osf.io/6nn57>

Procedure and data disclosures

Ethics approval

ERCPN_172_03_10_2016_S6 from Maastricht University, Netherlands

Data collection

Data collection was completed before conducting an analysis of the data.

Conditions reporting

All collected conditions are reported.

Data exclusions

There were no data exclusions. All data is included in the provided data.

Variables reporting

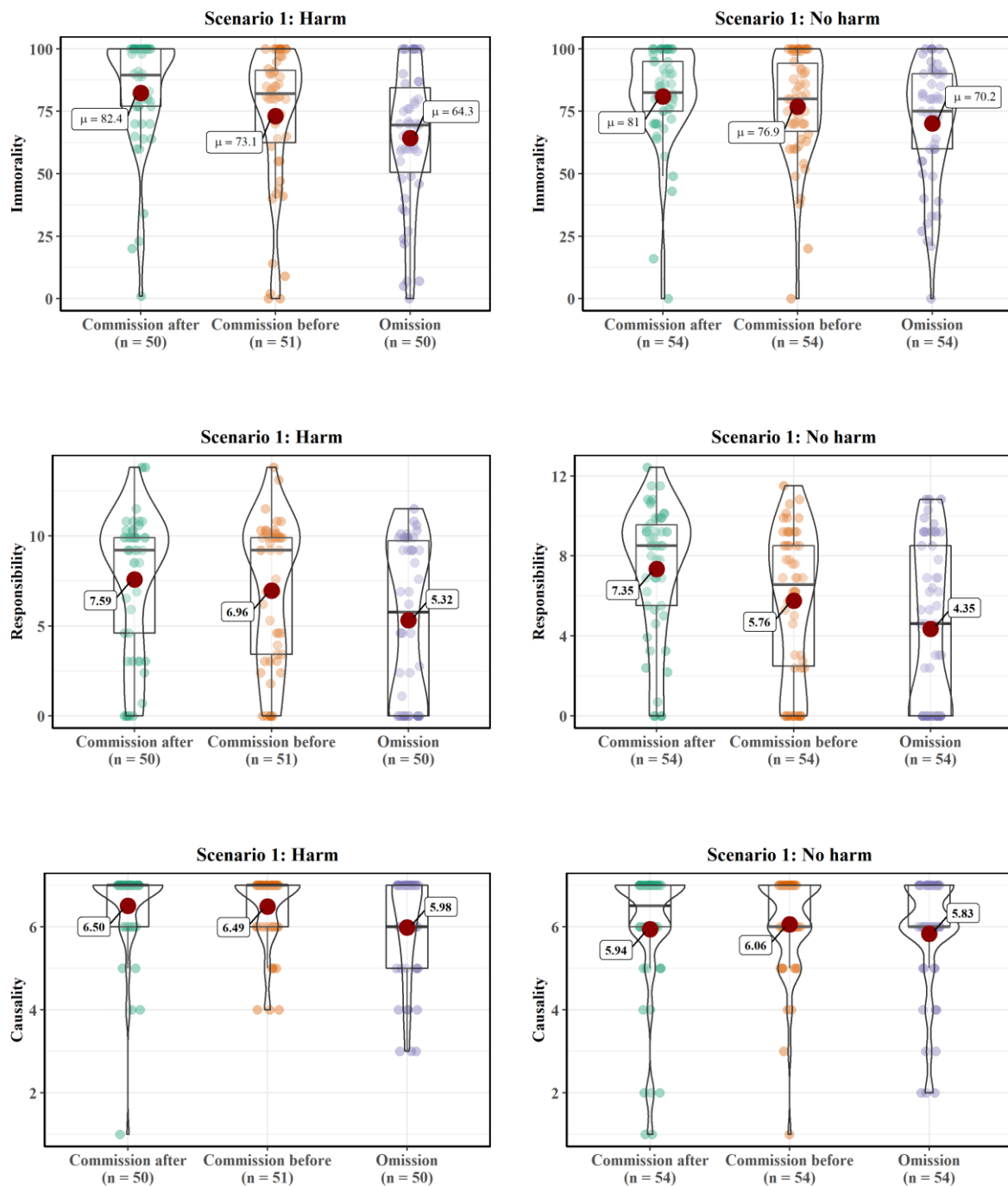
All variables collected for this study are reported and included in the provided data.

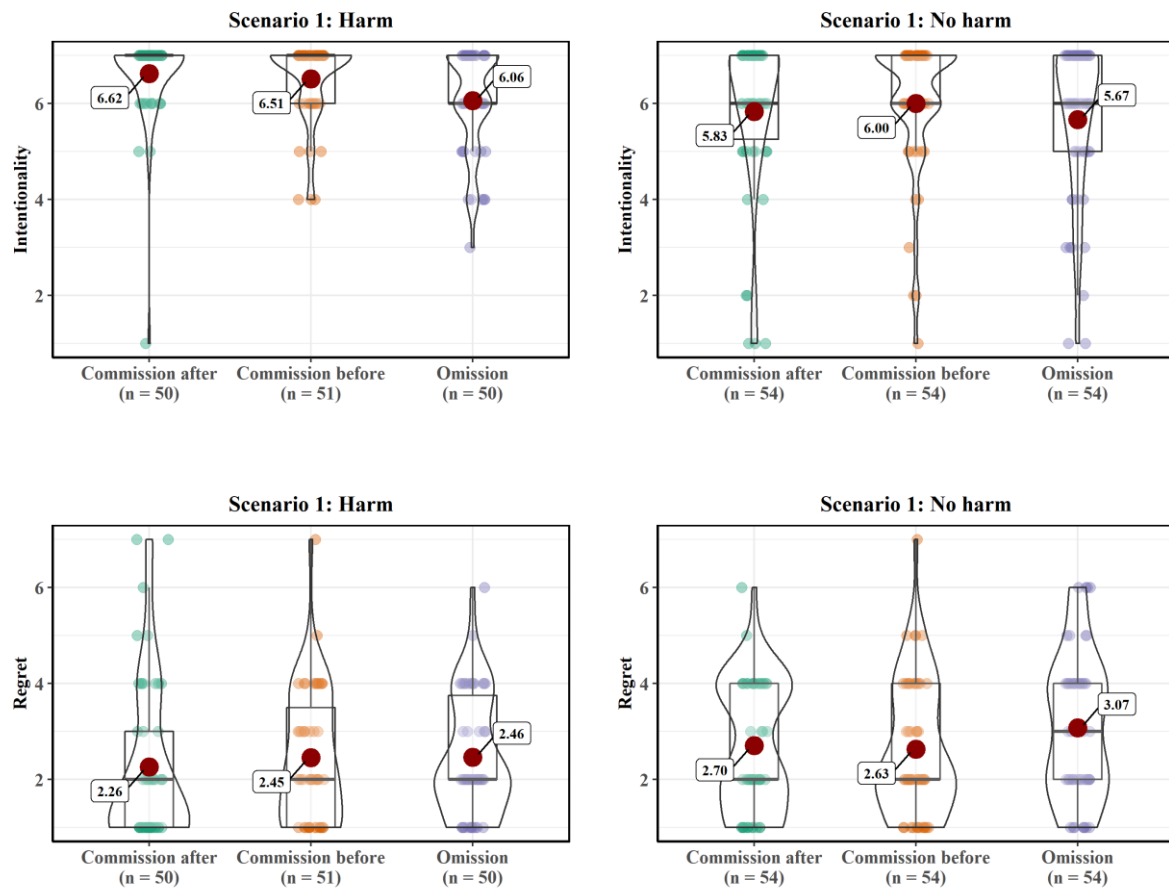
Plots: Mean ratings for all DVs

Scenario 1: Plots of immorality, responsibility, causality, intentionality, and regret.

Causality, intention, and regret are scale of 1-7. Responsibility is a positive number with no range restriction, and was log-transformed to address skewness.

(created using ggstatsplot R package)

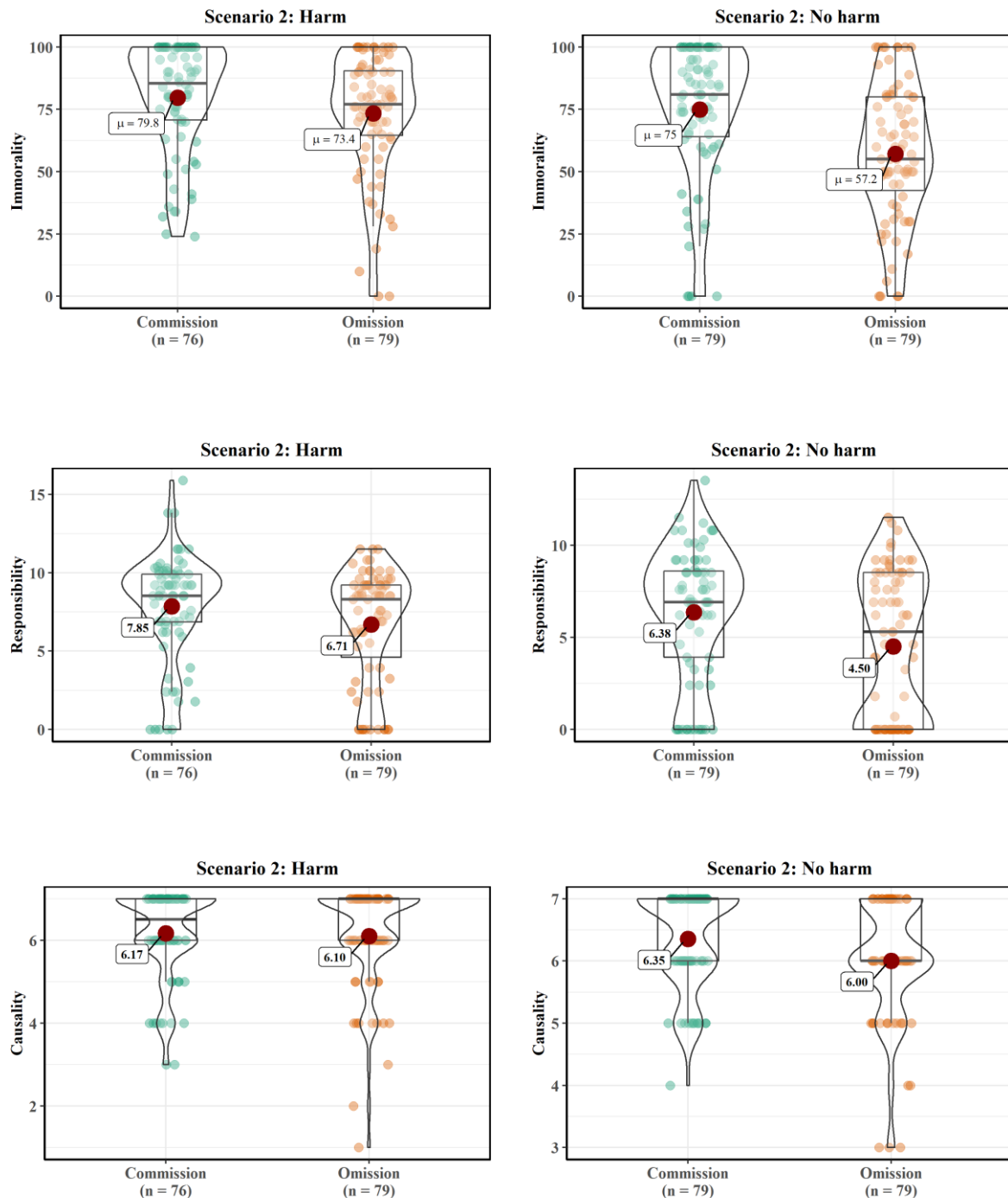


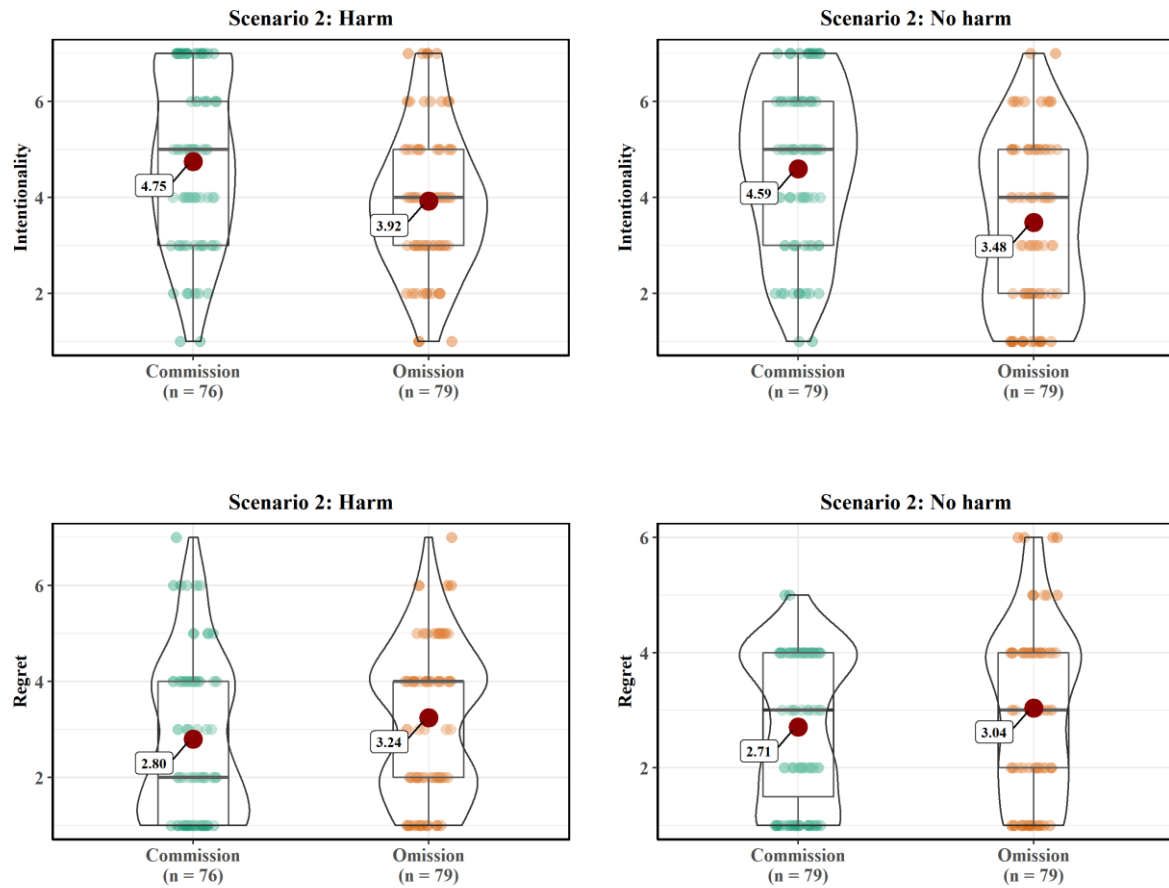


Scenario 2: Plots of immorality, responsibility, causality, intentionality, and regret.

Causality, intention, and regret are scale of 1-7. Responsibility is a positive number with no range restriction, and was log-transformed to address skewness.

(created using ggstatsplot R package)





Moderation and mediation tests: Supplemental analyses

Methods and results

As stated in our pre-registration, we also examined causality, intentionality, and regret attributions as possible mediators and moderators of the hypothesized conditions on morality and harm attributions. The moderation test was conducted using linear multiple regression for two-way interactions between the terms. As stated in our pre-registration, we tested conditions of commission and harm as our IV, morality and responsibility as DVs, and used causality, intentionality, and regret as moderators. The effects were very weak, with one significant interaction effect for omission-commission and causality on immorality in scenario 1 ($b = -8.96$, $p = .004$). There were no consistent interactions observed across the two scenarios.

Mediation tests were also conducted. Following theoretical predictions, conditions for commission and harm as the IV with intentionality included as a control variable. Intentionality was also allowed to covary with both commission and harm. Test was conducted using 10,000 bootstrapped iterations. Model fit was assessed based on guidelines taken from Hooper, Coughlan, & Mullen (2008). For those wishing to further examine these tests, the tests are included in this paper's R code which will produce outputs for regressions and model fit for each scenario.

Models were first run with immorality and responsibility as the DVs and causality as the mediator (Figure 1 and Figure 2). Model fit was good for these models for both scenario 1 (RMSEA = .000, SRMR = .001) and scenario 2 (RMSEA = .000, SRMR = .002). In both scenarios, intentionality showed a significant indirect effect on immorality ($b = 4.07$ [1.36, 7.19]; $b = 1.26$ [.55, 2.14]). In scenario 2, a small indirect effect was also observed between intentionality and responsibility ($b = .06$ [.01, .15]).

Next, models were run with causality judgements removed and regret added as the DV (Figure 3 and Figure 4). Model fit was slightly outside of normal acceptable thresholds for scenario 1 (RMSEA = .093, SRMR = .031) and acceptable for scenario 2 (RMSEA = .087, SRMR = .029). In both scenarios, harm condition showed a significant indirect effect on regret through immorality judgements, though these effects were observed in opposite directions ($b = .06$ [.00, .15]; $b = -.16$ [-.27, -.04]). In scenario 2, an indirect effect was also observed between commission condition and regret through immorality ($b = -.14$ [-.26, -.05]).

Finally, full models were run with regret used as the DV, causality used as a first-stage mediator, and immorality and responsibility used as second-stage mediators. Model fit for scenario 1 was slightly outside of normal acceptable RMSEA threshold but acceptable SRMR (RMSEA = .094, SRMR = .026). Model fit for scenario 2 was acceptable (RMSEA = .087, SRMR = .029). Coefficients and significance levels of direct effects are shown in Figure 5 and Figure 6.

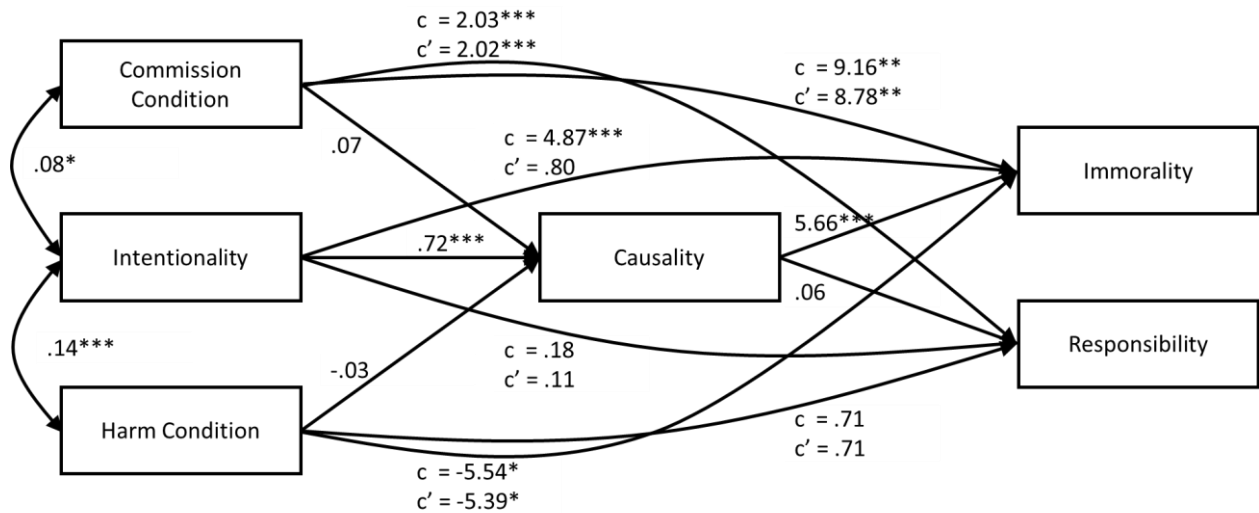
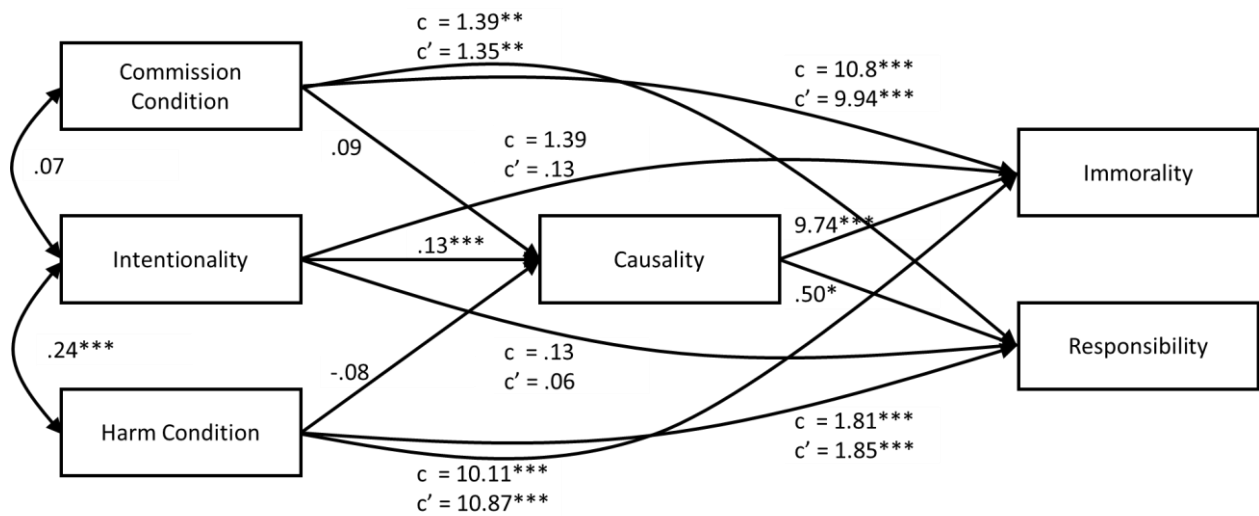
Figure 1**Scenario 1 causality mediation model with total (c) and direct (c') effects****Figure 2****Scenario 2 causality mediation model with total (c) and direct (c') effects**

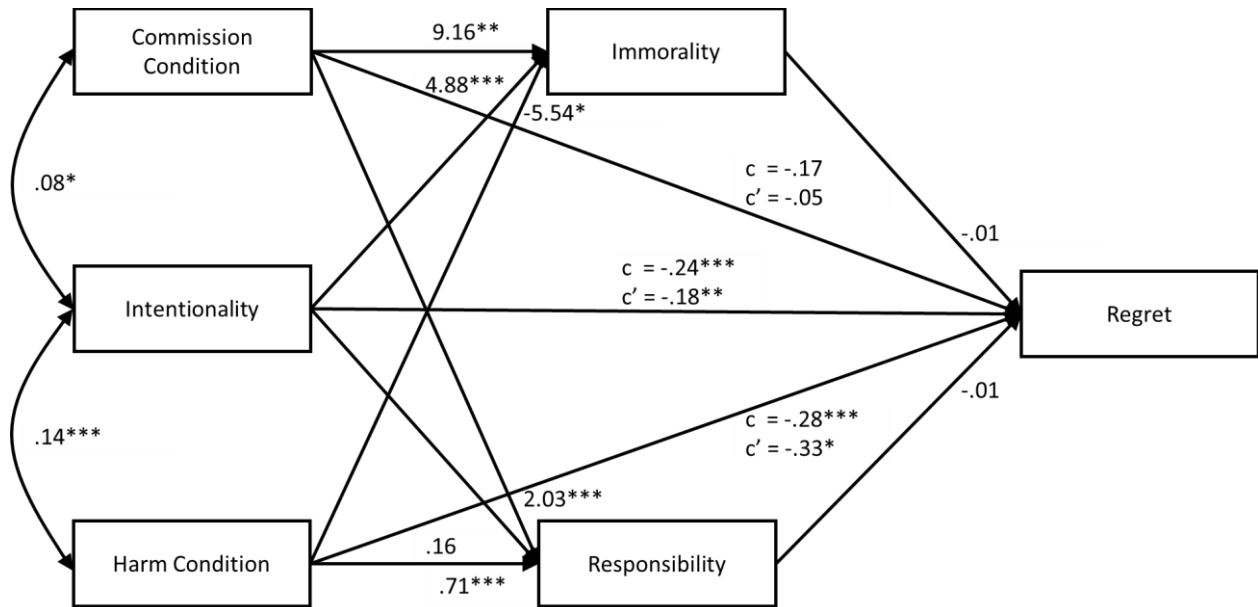
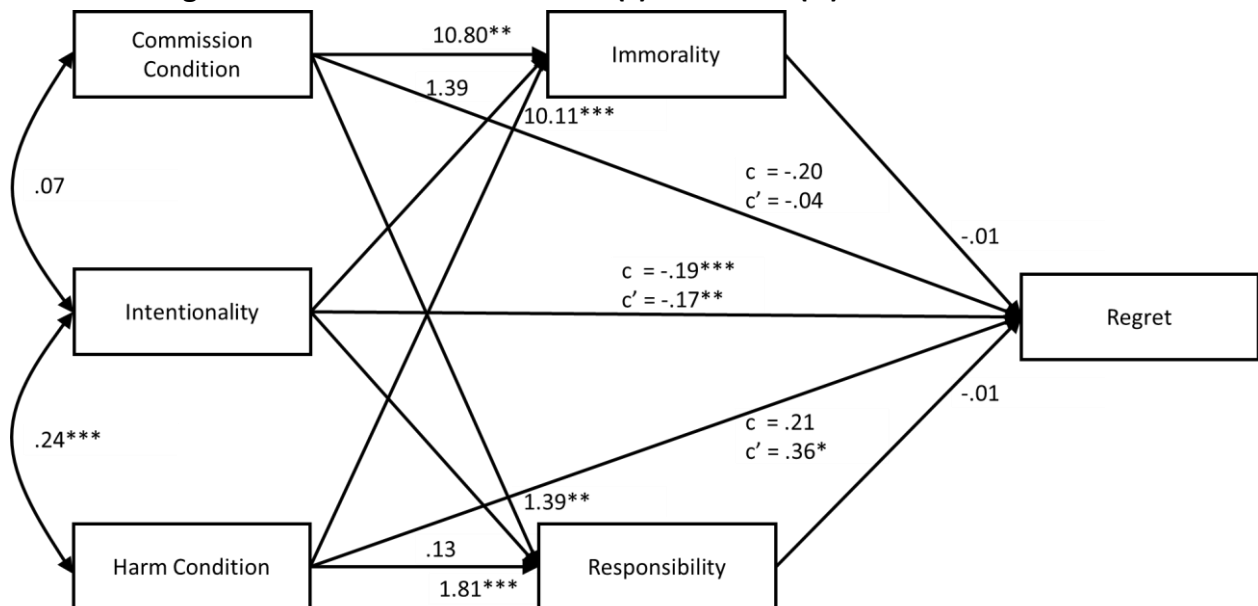
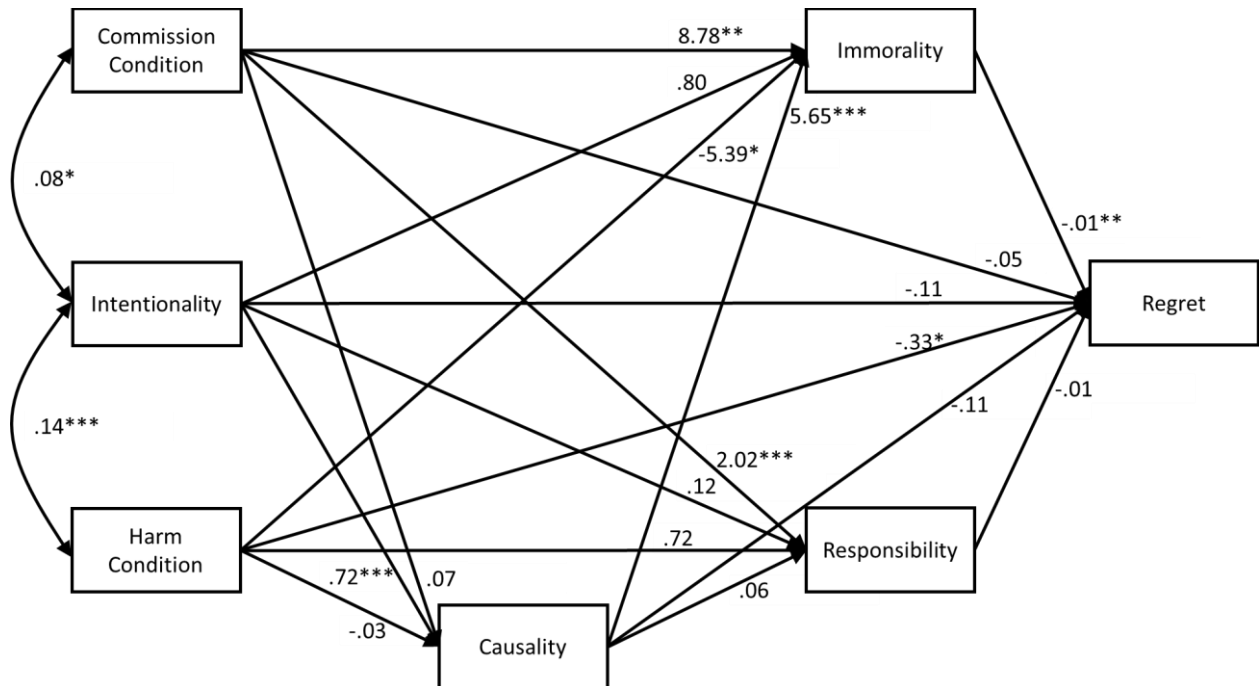
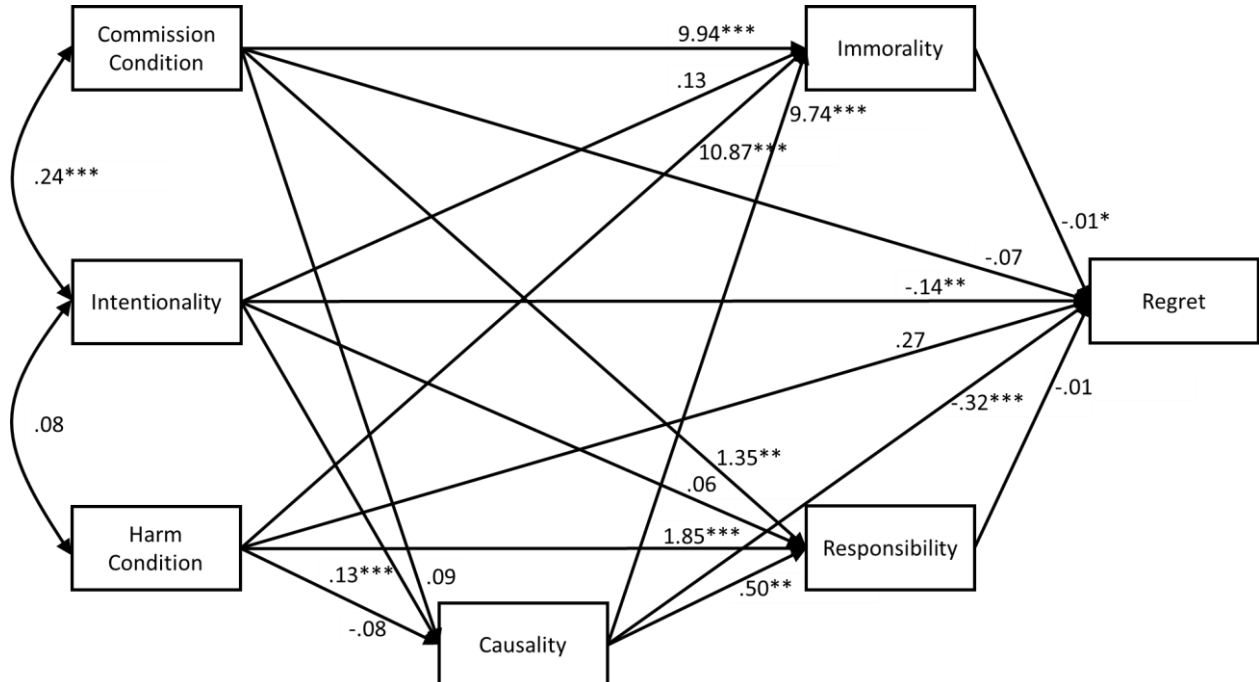
Figure 3**Scenario 1 regret mediation model with total (c) and direct (c') effects****Figure 4****Scenario 2 regret mediation model with total (c) and direct (c') effects**

Figure 5**Scenario 1 overall mediation model****Figure 6****Scenario 2 overall mediation model**

Pre-registration

We pre-registered the experiment on the Open Science Framework and data collection was launched after approval by the [OSF pre-registration challenge](#) team.

Hypotheses

It is expected that participants would rate the negative outcome through omission as more moral than the corresponding negative outcome through commission.

Adaptations to the original study:

To adapt the study for MTurk online we made the following changes to the original design intended for (1) a much shorter survey with little repetition, (2) an integration of comprehension checks to increase quality of responses, and (3) extensions:

1. We changed from a within-subjects design to a between-subjects design. Each of the participants will be randomly assigned to a condition and will only see a single version of each of the two scenarios.
2. We added mandatory comprehension questions that the participants have to answer correctly before proceeding to the evaluations questions.
3. We removed the open-ended questions to explain evaluations.
4. We added three attributions questions after the original morality question intended to examine the role of the theory of blame model and factors in the omission-bias (Malle, Guglielmo, & Monroe, 2014, Psychological Inquiry). Namely, we added measures of causality, intentionality, feelings of regret, and responsibility, to examine possible mechanisms for the classic effect.

Methods

Design

All participants will be presented with every single condition of both scenarios in a between-subjects design. Participants will be randomized into a condition.

1. Scenario one:
 - a. *Independent variables:*
 - i. Omission-commission: omission condition (inaction), commission condition (action) and control condition (action after a decision)
 - ii. Outcome: whether the target person was eventually harmed [*note post data collection: this should have been - whether the intended harm resulted in the intended outcome or not*]
 - b. *Dependent variable* (*scales for measurement are explained in analysis plan):
 - i. Replication: Morality– how people perceive the morality of the decision made in the situation
 - ii. Extensions:
 1. Causality - whether the decision maker understood his behavior affecting the other person
 2. Intent– whether the decision maker had the intent of affecting the other person in the way that he did
 3. Regret – whether the decision maker is experienced regret over the behavior

4. Responsibility/blame – how much money the harmed person should receive in compensation for the experienced harm
2. Scenario two:
- a. *Independent variable:*
 - i. Omission-commission: omission condition (inaction), commission condition (action)
 - ii. Outcome: whether the target person was eventually harmed
 - b. *Dependent variable* (*scales for measurement are explained in analysis plan):
 - i. Replication: Morality– how people perceive the morality of the decision made in the situation
 - ii. Extensions:
 1. Causality - whether the decision maker understood his behavior affecting the other person
 2. Intent– whether the decision maker had the intent of affecting the other person in the way that he did
 3. Regret – whether the decision maker is experienced regret over the behavior
 4. Responsibility/blame – how much money the harmed person should receive in compensation for the experienced harm

Planned Sample

The online market place Amazon Mechanical Turk (MTurk) will be used to recruit 306 participants to take part in the research to obtain data collection. This sample includes young women and men over 18 years of age from the US population. The sample size was determined by using the G-power analysis based on the calculation of the effect sizes in the classic experiment. This analysis covers an $\alpha = 0.05$ (one-tailed) and a power of at least 0.95. A protocol of the power analysis is provided in the attached Appendix 1.

Exclusion Criteria

The research will consider some exclusion criteria:

- Only participants who have been actively working on that platform and have a high approval rate will be included in the online survey
- All participants with a low English proficiency (values below 5)
- Participants who rate themselves as being not serious about filling in the survey (values below 4)
- Based on timers, a fast response time for the questions (3SD from mean)

In any case, we will report exclusion criteria in detail in either the manuscript or the supplementary.

Procedure

A Qualtrics survey will be used for this study. The survey design is attached to the project to reconstruct the idea.

See attached exported Qualtrics survey for full procedure and questions.

Analysis planConfirmatory analyses

1. number of participants: G*Power Analysis
2. the statistical technique:
 - a. Case 1: 2x3 two-way ANOVA with t-test contrasts for each of the DVs
 - b. Case 2: 2x2 two-way ANOVA with t-test contrasts for each of the DVs
 - c. Correlations between the DVs
 - d. Replication: The focal contrast of interest is between the omission and each of the 2 commission conditions. The outcome or target-person DV and the differences between the commission conditions is for replication of the original design informational purposes only (since it did not show effects in the original manuscript).
 - e. Extensions:
 - We will examine causality, intentionality, and regret attributions as possible mediators/moderators of the IV-morality and IV-responsibility/blame effects based on the theory of blame.
 - We will examine how omission-commission affects attributions of causality, intentionality, regret. and responsibility.

Answer the following final questions:

Has data collection begun for this project?

- No, data collection has not begun

Power analysis

Case 1 (Tennis tournament)

In the original design with $N = 57$ subjects the results were:

Omission: 37 (65%)

Commission: 20 (35%)

No means and SD reported in original manuscript, only omission versus commission.

Therefore, we'll compute a chi-square and convert to Cohen's d to do independent t-test contrasts between the omission and commission conditions.

The chi-square effect-size is: 5.686, converted to Cohen's $d = .66$.

To achieve power of .95 one-tail alpha .05 we require 51 participants in each condition.

t tests - Means:

Difference between two independent means (two groups)

Analysis:

A priori: Compute required sample size

Input:

Tail(s) = One
 Effect size $d = 0.66$
 α err prob = 0.05
 Power ($1-\beta$ err prob) = 0.95
 Allocation ratio $N2/N1 = 1$

Output:

Noncentrality parameter $\delta = 3.3328366$
 Critical $t = 1.6602343$
 Df = 100
 Sample size group 1 = 51
 Sample size group 2 = 51
 Total sample size = 102
 Actual power = 0.9520742

Case 2 (The eyewitness)

$N = 57$ subjects

Omission: 39 (68%)

Commission: 18 (32%)

No means and SD reported in original manuscript, only omission versus commission.

Therefore, we'll compute a chi-square and convert to Cohen's d to do independent t-test contrasts between the omission and commission conditions.

The chi-square effect-size is: 8.494, converted to Cohen's $d = .83$.

To achieve power of .95 one-tail alpha .05 we require 33 participants in each condition.

t tests - Means: Difference between two independent means (two groups)

Analysis: A priori: Compute required sample size

Input:

Tail(s) = One
 Effect size $d = 0.83$

α err prob = 0.05
 Power (1- β err prob) = 0.95
 Allocation ratio N2/N1 = 1

Output:

Noncentrality parameter δ = 3.3714759
 Critical t = 1.6690130
 Df = 64
 Sample size group 1 = 33
 Sample size group 2 = 33
 Total sample size = 66
 Actual power = 0.9545489

Therefore, Case 1 had a weaker effect, and with 6 conditions we will collect 306 participants.

Used sources

<http://graphpad.com/quickcalcs/chisquared1/>

<https://www.polyu.edu.hk/mm/effectsizefaq/calculator/calculator.html>

G*Power Version 3.1.9.2

Calculation of effect sizes from the original study

Since the original study did not report means and standard deviations to allow a more accurate estimate of the effect, we therefore based our estimates on the raw counts reported in the original study (see Table 1 below). Although our pre-registered power analysis calculates the original study's effect sizes from a chi square method, further review revealed that a Student's t-test method would be more appropriate for calculating effects. The rationale for making this decision and a comparison of the two methods is discussed in detail in the attached RMarkdown output "Method-for-calculating-original-study-effect-sizes.html". Since t-test method returned a greater effect size than the pre-registration method, the only effect on the pre-registered power analysis would be to lower the required sample size, which our collection had already met and surpassed.

For the final paper submission then, effect sizes were calculated by conducting a one sample Student's t-test to calculate the t-statistic and Cohen's d of each original finding. Effect sizes reflect a deviation from the null hypothesis that all participants would make equal attributions of immorality and responsibility regardless of omission and no-harm outcomes (i.e. that there is no omission bias or outcome bias). Responses concerning the relationship between the no-harm outcome and immorality in scenario 2 were not reported sufficiently in the original article to make a calculation. Code for our calculations is included in our attached R code.

Table 1: Statistics reported in the original study by Spranca et al. (1991)

Condition	Attribution	Scenario	Participants making higher attribution	Participants making equal attribution	Participants making lower attribution	t	d
Omission	Immorality	1	1	19	37	-9.13	-1.21
Omission	Immorality	2	0	18	39	-11.02	-1.46
Omission	Responsibility	1	0	21	34	-9.35	-1.26
No-harm outcome	Immorality	1	0	49	8	-3.02	-0.40
No-harm outcome	Immorality	2	0	51	6	-2.57	-0.34

Note: Participant $n=57$ except in the omission-responsibility relationship in scenario 1 where two participants answers were not accounted for. Negative t -statistics and Cohen's d indicates that the omission or no-harm condition led participants to make lower attributions of immorality or responsibility to the actor in the scenario.

Materials used in the experiment

Case 1 (Tennis tournament)

Condition 1: commission before choice; John wins

John West plays tennis at the Wyncote Tennis Club two or three times a week. John is the best player belonging to the club, but he is not good enough to play professionally.

The club holds an annual tennis tournament, which occasionally attracts a big-name tennis player in need of a warm-up before Wimbledon. The first prize is \$20,000, and the prize for the runner-up (who plays in the final but loses it) is \$10,000. This year, Ivan Lendl agreed to play in the tournament. John and Ivan quickly advanced until they were to meet in the final. John would of course love to win, but he realizes that he is at a large disadvantage.

The tradition at Wyncote is for both finalists to meet for dinner at the club before the final the next morning. While getting dresses for dinner John remembers reading that Ivan is allergic to Cayenne pepper. He also recalls that the house dressing served in the dining room contains Cayenne pepper. John thinks "If Ivan eats the house dressing, he will probably get a stomach ache that will keep him up much of the night. Then I'll have chance to win."

At the dinner, Ivan orders first. After he orders his main course, the waiter asks him whether he prefers the house dressing or Italian dressing. Ivan does not think that the house dressing might contain Cayenne pepper.

Before Ivan makes a choice, **John recommends that Ivan try the house dressing**. Ivan orders it and gets the stomach ache, as predicted. If John has said nothing, Ivan would have ordered Italian dressing, but John does not know this for sure. **John wins** the match.

Condition 2: omission before choice; John wins

John West plays tennis at the Wyncote Tennis Club two or three times a week. John is the best player belonging to the club, but he is not good enough to play professionally.

The club holds an annual tennis tournament, which occasionally attracts a big-name tennis player in need of a warm-up before Wimbledon. The first prize is \$20,000, and the prize for the runner-up (who plays in the final but loses it) is \$10,000. This year, Ivan Lendl agreed to play in the tournament. John and Ivan quickly advanced until they were to meet in the final. John would of course love to win, but he realizes that he is at a large disadvantage.

The tradition at Wyncote is for both finalists to meet for dinner at the club before the final the next morning. While getting dresses for dinner John remembers reading that Ivan is allergic to Cayenne pepper. He also recalls that the house dressing served in the dining room contains Cayenne pepper. John thinks "If Ivan eats the house dressing, he will probably get a stomach ache that will keep him up much of the night. Then I'll have chance to win."

At the dinner, Ivan orders first. After he orders his main course, the waiter asks him whether he prefers the house dressing or Italian dressing. Ivan does not think that the house dressing might contain Cayenne pepper.

Ivan orders the house dressing and gets a stomach ache, as predicted. **John says nothing.** John realizes that if he had warned Ivan about the Cayenne, even after Ivan announced his choice, Ivan would have ordered Italian dressing. **John wins** the match.

Condition 3: commission after choice; John wins

John West plays tennis at the Wyncote Tennis Club two or three times a week. John is the best player belonging to the club, but he is not good enough to play professionally.

The club holds an annual tennis tournament, which occasionally attracts a big-name tennis player in need of a warm-up before Wimbledon. The first prize is \$20,000, and the prize for the runner-up (who plays in the final but loses it) is \$10,000. This year, Ivan Lendl agreed to play in the tournament. John and Ivan quickly advanced until they were to meet in the final. John would of course love to win, but he realizes that he is at a large disadvantage.

The tradition at Wyncote is for both finalists to meet for dinner at the club before the final the next morning. While getting dresses for dinner John remembers reading that Ivan is allergic to Cayenne pepper. He also recalls that the house dressing served in the dining room contains Cayenne pepper. John thinks "If Ivan eats the house dressing, he will probably get a stomach ache that will keep him up much of the night. Then I'll have chance to win."

At the dinner, Ivan orders first. After he orders his main course, the waiter asks him whether he prefers the house dressing or Italian dressing. Ivan does not think that the house dressing might contain Cayenne pepper.

Ivan orders Italian dressing. John then recommends that Ivan try the house dressing. Ivan changes his mind, orders the house dressing, and gets stomach ache, as predicted. **John wins** the match.

Condition 4: commission before choice; Ivan wins

John West plays tennis at the Wyncote Tennis Club two or three times a week. John is the best player belonging to the club, but he is not good enough to play professionally.

The club holds an annual tennis tournament, which occasionally attracts a big-name tennis player in need of a warm-up before Wimbledon. The first prize is \$20,000, and the prize for the runner-up (who plays in the final but loses it) is \$10,000. This year, Ivan Lendl agreed to play in the tournament. John and Ivan quickly advanced until they were to meet in the final. John would of course love to win, but he realizes that he is at a large disadvantage.

The tradition at Wyncote is for both finalists to meet for dinner at the club before the final the next morning. While getting dresses for dinner John remembers reading that Ivan is allergic to Cayenne pepper. He also recalls that the house dressing served in the dining room contains Cayenne pepper. John thinks "If Ivan eats the house dressing, he will probably get a stomach ache that will keep him up much of the night. Then I'll have chance to win."

At the dinner, Ivan orders first. After he orders his main course, the waiter asks him whether he prefers the house dressing or Italian dressing. Ivan does not think that the house dressing might contain Cayenne pepper.

Before Ivan makes a choice, John recommends that Ivan try the house dressing. Ivan orders it and gets the stomach ache, as predicted. If John has said nothing, Ivan would have ordered Italian dressing, but John does not know this for sure. **Ivan wins** the match.

Condition 5: omission before choice; Ivan wins

John West plays tennis at the Wyncote Tennis Club two or three times a week. John is the best player belonging to the club, but he is not good enough to play professionally.

The club holds an annual tennis tournament, which occasionally attracts a big-name tennis player in need of a warm-up before Wimbledon. The first prize is \$20,000, and the prize for the runner-up (who plays in the final but loses it) is \$10,000. This year, Ivan Lendl agreed to play in the tournament. John and Ivan quickly advanced until they were to meet in the final. John would of course love to win, but he realizes that he is at a large disadvantage.

The tradition at Wyncote is for both finalists to meet for dinner at the club before the final the next morning. While getting dresses for dinner John remembers reading that Ivan is allergic to Cayenne pepper. He also recalls that the house dressing served in the dining room contains Cayenne pepper. John thinks "If Ivan eats the house dressing, he will probably get a stomach ache that will keep him up much of the night. Then I'll have chance to win."

At the dinner, Ivan orders first. After he orders his main course, the waiter asks him whether he prefers the house dressing or Italian dressing. Ivan does not think that the house dressing might contain Cayenne pepper.

Ivan orders the house dressing and gets a stomach ache, as predicted. John says nothing. John realizes that if he had warned Ivan about the Cayenne, even after Ivan announced his choice, Ivan would have ordered Italian dressing. **Ivan wins** the match.

Condition 6: commission after choice; Ivan wins

John West plays tennis at the Wyncote Tennis Club two or three times a week. John is the best player belonging to the club, but he is not good enough to play professionally.

The club holds an annual tennis tournament, which occasionally attracts a big-name tennis player in need of a warm-up before Wimbledon. The first prize is \$20,000, and the prize for the runner-up (who plays in the final but loses it) is \$10,000. This year, Ivan Lendl agreed to play in the tournament. John and Ivan quickly advanced until they were to meet in the final. John would of course love to win, but he realizes that he is at a large disadvantage. The tradition at Wyncote is for both finalists to meet for dinner at the club before the final the next morning. While getting dresses for dinner John remembers reading that Ivan is allergic to Cayenne pepper. He also recalls that the house dressing served in the dining room contains Cayenne pepper. John thinks "If Ivan eats the house dressing, he will probably get a stomach ache that will keep him up much of the night. Then I'll have chance to win."

At the dinner, Ivan orders first. After he orders his main course, the waiter asks him whether he prefers the house dressing or Italian dressing. Ivan does not think that the house dressing might contain Cayenne pepper.

Ivan orders Italian dressing. John then recommends that Ivan try the house dressing. Ivan changes his mind, orders the house dressing, and gets stomach ache, as predicted. **Ivan wins** the match.

Comprehension questions

To make sure you understood the scenario, please answer the following comprehension questions:

Which of the two tennis players is better in playing tennis and therefore has a higher chance to win the tournament?

- Ivan (1)
- John (2)

Which of the two tennis players has an allergic to Cayenne pepper?

- Ivan (1)
- John (2)

Which of the two dressings contains Cayenne pepper?

- Italian dressing (1)
- House dressing (2)

Which of the following took place?

- Before Ivan makes a choice, John gives a recommendation to try the house dressing (1)
- After Ivan orders the Italian dressing, John recommends that Ivan try the house dressing (2)
- After Ivan orders the house dressing, John says nothing (3)

Who finally won the match?

- Ivan (1)
- John (2)

Measures

(Displayed in the next page following correctly answering the comprehension questions)

Please rate John's morality in the situation on the given scale: -100 (as immoral as possible to be in this situation) to 0 (not immoral at all)

(Slide instructions: Please move the slider to one point of your choice)

Please indicate your agreement with the following statements:

Scale:

- Strongly disagree (1)
- Disagree (2)

- Somewhat disagree (3)
- Neither agree nor disagree (4)
- Somewhat agree (5)
- Agree (6)
- Strongly agree (7)

Items:

- John understood that his behavior would affect Ivan in the way that it did
- John intended for his behavior to affect Ivan in the way that it did
- John regrets his behavior
- Suppose that Ivan found out that John knew about the dressing and Ivan's allergy and Ivan is now suing John. You are on the jury and are convinced by the evidence that the case is exactly as described above. How much money, if any, do you think Ivan should receive in compensation for his experienced harm? (in USD)

Case 2 (The eyewitness)

Condition 1: commission; Peter charged

Peter, a resident of Ohio, is driving through a small town in South Carolina. At a 4-way stop, he gets into a small accident with a town resident named Lyle. The accident came about like this:

Traveling north, Lyle approached the 4-way stop and failed either to slow down or to stop. Meanwhile, Peter had just finished stopping and began to move east through this intersection. Peter noticed that a car, Lyle's, was crossing the intersection after having failed to stop. Peter slammed on his brakes, but too late to prevent his car from hitting Lyle's car as it passed in front of him. The accident was clearly Lyle's fault, because the accident was caused by his failure to stop. However, because the accident's cause is not clear from its effects, the police may believe that Peter failed to stop and that caused Peter to run into Lyle's car broadside.

Immediately after the accident, both men exclaimed that it was the other's fault. When the police came. Peter told them that the accident was caused by Lyle's failure to stop. Lyle told the police that the accident was caused by Peter's failure to stop.

Unknown to either man, there was an eyewitness to the accident, Ellen. Like Lyle, Ellen is a town resident. She thought to herself, "I know the accident is Lyle's fault, but I know Lyle and do not wish him to be punished. The only way that Lyle will be faulted by the police is if I testify that the accident is indeed Lyle's fault." Ellen told the police that the accident was caused by Peter's failure to stop. Peter is charged with failure to stop and fined. To make sure you understood the scenario, please answer the following comprehension questions:

Condition 2: commission; Lyle is charged

Peter, a resident of Ohio, is driving through a small town in South Carolina. At a 4-way stop, he gets into a small accident with a town resident named Lyle. The accident came about like this:

Traveling north, Lyle approached the 4-way stop and failed either to slow down or to stop. Meanwhile, Peter had just finished stopping and began to move east through this intersection. Peter noticed that a car, Lyle's, was crossing the intersection after having failed to stop. Peter slammed on his brakes, but too late to prevent his car from hitting Lyle's car as it passed in front of him. The accident was clearly Lyle's fault, because the accident was caused by his failure to stop. However, because the accident's cause is not clear from its effects, the police may believe that Peter failed to stop and that caused Peter to run into Lyle's car broadside.

Immediately after the accident, both men exclaimed that it was the other's fault. When the police came. Peter told them that the accident was caused by Lyle's failure to stop. Lyle told the police that the accident was caused by Peter's failure to stop.

Unknown to either man, there was an eyewitness to the accident, Ellen. Like Lyle, Ellen is a town resident. She thought to herself, "I know the accident is Lyle's fault, but I know Lyle and do not wish him to be punished. The only way that Lyle will be faulted by the police is if I testify that the accident is indeed Lyle's fault."

Ellen **told the police** that the accident was caused by Peter's failure to stop. **Lyle is charged** with failure to stop and fined.

Condition 3: omission; Peter charged

Peter, a resident of Ohio, is driving through a small town in South Carolina. At a 4-way stop, he gets into a small accident with a town resident named Lyle. The accident came about like this:

Traveling north, Lyle approached the 4-way stop and failed either to slow down or to stop. Meanwhile, Peter had just finished stopping and began to move east through this intersection. Peter noticed that a car, Lyle's, was crossing the intersection after having failed to stop. Peter slammed on his brakes, but too late to prevent his car from hitting Lyle's car as it passed in front of him. The accident was clearly Lyle's fault, because the accident was caused by his failure to stop. However, because the accident's cause is not clear from its effects, the police may believe that Peter failed to stop and that caused Peter to run into Lyle's car broadside.

Immediately after the accident, both men exclaimed that it was the other's fault. When the police came. Peter told them that the accident was caused by Lyle's failure to stop. Lyle told the police that the accident was caused by Peter's failure to stop.

Unknown to either man, there was an eyewitness to the accident, Ellen. Like Lyle, Ellen is a town resident. She thought to herself, "I know the accident is Lyle's fault, but I know Lyle and do not wish him to be punished. The only way that Lyle will be faulted by the police is if I testify that the accident is indeed Lyle's fault."

Ellen **told the police nothing**. **Peter is charged** with failure to stop and fined.

Condition 4: omission; Lyle is charged

Peter, a resident of Ohio, is driving through a small town in South Carolina. At a 4-way stop, he gets into a small accident with a town resident named Lyle. The accident came about like this:

Traveling north, Lyle approached the 4-way stop and failed either to slow down or to stop. Meanwhile, Peter had just finished stopping and began to move east through this intersection. Peter noticed that a car, Lyle's, was crossing the intersection after having failed to stop. Peter slammed on his brakes, but too late to prevent his car from hitting Lyle's car as it passed in front of him. The accident was clearly Lyle's fault, because the accident was caused by his failure to stop. However, because the accident's cause is not clear from its effects, the police may believe that Peter failed to stop and that caused Peter to run into Lyle's car broadside.

Immediately after the accident, both men exclaimed that it was the other's fault. When the police came. Peter told them that the accident was caused by Lyle's failure to stop. Lyle told the police that the accident was caused by Peter's failure to stop.

Unknown to either man, there was an eyewitness to the accident, Ellen. Like Lyle, Ellen is a town resident. She thought to herself, "I know the accident is Lyle's fault, but I know Lyle and do not wish him to be punished. The only way that Lyle will be faulted by the police is if I testify that the accident is indeed Lyle's fault."

Ellen **told the police nothing**. **Lyle is charged** with failure to stop and fined.

Comprehension questions

Whose fault was the accident?

- Lyle's (1)
- Peter's (2)

Given the scene, the police might attribute the fault to whom?

- Lyle's (1)
- Peter's (2)

Ellen, the eyewitness, knows one of the men. Who?

- Lyle (1)
- Peter (2)

Did Ellen tell the police about the accident?

- Yes, Ellen told the police about the accident (1)
- No, Ellen told the police nothing (2)

Who was finally charged?

- Lyle (1)
- Peter (2)

Measures

Please rate Ellen's morality in the situation on the given scale:

-100 (as immoral as possible to be in this situation) to 0 (not immoral at all)

(Slide instructions: Please move the slider to one point of your choice)

Please indicate your agreement with the following statements:

- Strongly disagree (1)
- Disagree (2)
- Somewhat disagree (3)
- Neither agree nor disagree (4)
- Somewhat agree (5)
- Agree (6)
- Strongly agree (7)

Items:

- Ellen understood that her behavior would affect Peter
- Ellen intended to harm Peter
- Ellen regrets her behavior
- Suppose that Peter found out that Ellen was an eyewitness in the accident and of her behavior, and Peter decided to sue Ellen. You are on the jury and are convinced by the evidence that the case is exactly as described above. How much money, if any, do you think Peter should receive in compensation? (in USD)

Datasets

Main dataset labels, descriptions, and calculations

The main dataset ("dataset.csv") was converted from the original .sav file collected on Qualtrics. We chose to reformat the dataset as a .csv and change some variable labels before importing into R in order to improve the clarity of the labels and to improve the analysis processes. Variables below with no calculated value were those collected directly without any calculation needed (e.g. participant ratings of perceived intentionality of the actor from). For calculated values, we used Excel to make transformations as described in the last column (e.g. reversing the perceived immorality score to range from 0 to 100).

CSV column	Variable label	Variable description	Calculated values (Excel formulas)
A	scenario1.commissionbefore.harm	Scenario 1, condition 1 - commission before, harm	
B	scenario1.omission.harm	Scenario 1, condition 2 - omission, harm	
C	scenario1.commissionafter.harm	Scenario 1, condition 3 - commission after, harm	
D	scenario1.commissionbefore.noharm	Scenario 1, condition 4 - commission before, no harm	
E	scenario1.omission.noharm	Scenario 1, condition 5 - omission, no harm	
F	scenario1.commissionafter.noharm	Scenario 1, condition 6 - commission after, no harm	
G	scenario1.commissionbefore	Scenario 1 – 1=commission before condition	=IF(OR(A2=1,D2=1),1,0)
H	scenario1.omission	Scenario 1 – 1=omission condition	=IF(OR(B2=1,E2=1),1,0)
I	scenario1.commissionafter	Scenario 1 – 1=commission after condition	=IF(OR(C2=1,F2=1),1,0)
J	scenario1.commission	Scenario 1 – Pooled commission, 1=commission before or commission after	=IF(OR(G2=1,I2=1),1,0)
K	scenario1.harm	Scenario 1 - harm=1, no harm =0	=IF(OR(A2=1,B2=1,C2=1),1,0)
L	scenario1.omm.vs.before	Scenario 1 – omission=0, commission before =1	=IF(G2=1, 1, IF(H2=1,0,""))
M	scenario1.before.vs.after	Scenario 1 – omission=0, commission after =1	=IF(I2=1, 1, IF(H2=1,0,""))
N	scenario1.omm.vs.before	Scenario 1 – commission before=0, commission after =1	=IF(G2=1, 1, IF(I2=1,0,""))
O	scenario1.commission.text	Scenario 1 - Commission condition in text format for use in some tables	Copy J and replace (0=Omission, 1=Commission)
P	scenario1.harm.text	Scenario 1 - harm condition in text format for use in some tables	Copy K and replace (0=No harm, 1=Harm)

Q	scenario2.commission.harm	Scenario 2, condition 1 - commission, harm	
R	scenario2.commission.noharm	Scenario 2, condition 2 - commission, no harm	
S	scenario2.omission.harm	Scenario 2, condition 3 - omission, harm	
T	scenario2.omission.noharm	Scenario 2, condition 4 - omission, no harm	
U	scenario2.commission	Scenario 2 - commission=1, omission=0	=IF(OR(Q2=1,R2=1),1,0)
V	scenario2.harm	Scenario 2 - harm=1, no harm=0	=IF(OR(Q2=1,S2=1),1,0)
W	scenario2.commission.text	Scenario 2 – Commission condition in text format for use in some tables	Copy U and replace (0=Omission, 1=Commission)
X	scenario2.harm.text	Scenario 2 - Harm condition in text format for use in some tables	Copy V and replace (0=No Harm, 1=Harm)
Y	scenario1.moral	Scenario 1 – Morality measure	
Z	scenario1.immoral	Scenario 1 – Immorality measure (reverse of Y)	
AA	scenario1.cause	Scenario 1 – Causality measure	
AB	scenario1.intent	Scenario 1 – Intentionality measure	
AC	scenario1.regret	Scenario 1 – Regret measure	
AD	scenario1.resp.raw	Scenario 1 – Responsibility raw measure	
AE	S1_resplog	Scenario 1 - responsibility transformed using natural log +1	=LN(AD2+1)
AF	scenario2.moral	Scenario 2 – Morality measure	
AG	scenario2.immoral	Scenario 2 – Immorality measure (reverse of AF)	
AH	scenario2.cause	Scenario 2 – Causality measure	
AI	scenario2.intent	Scenario 2 – Intentionality measure	
AJ	scenario2.regret	Scenario 2 – Regret measure	
AK	scenario2.resp.raw	Scenario 2 – Responsibility raw measure	
AL	S2_resplog	Scenario 2 - responsibility transformed using natural log +1	=LN(AK2+1)
AM	Age	Control variable (unused)	
AN	Gender	Control variable (unused)	

Simulated dataset labels, descriptions, and calculations

Background: The original study was within-person and reported results of the studies of interest as a ratio of participants who rated different conditions as more/less/equally moral and more/less/equally responsible. We used the numbers of participant ratings reported in the original 1991 study to create a simulated dataset in order to calculate effect sizes for their study. The coding for the simulated variables is:

1=stronger attribution of morality (i.e. lower immorality) or responsibility in conditions of commission or harm

0=equal attribution of morality (i.e. equal immorality) or responsibility in conditions of commission or harm

-1=weaker attribution of morality (i.e. higher immorality) or responsibility in conditions of commission or harm

Analysis:

We used this simulated dataset to calculate their t-statistic and effect size (Cohen's d) using one sample t-tests. This is not ideal with ordinal variables, but it seems the best method available for this data.

CSV column	Variable label	Variable description	Values
A	Subject	Simulated observation number	
B	scenario1.commission.immorality	Scenario 1 – Participants perception of whether the actor was most immoral in the commission or omission conditions of the six scenarios.	1=omission is most immoral -1=commission is most immoral 0=omission and commission are equally immoral
C	scenario2.commission.immorality	Scenario 2 – Participants perception of whether the actor was most immoral in the commission or omission conditions of the six scenarios.	1=no harm outcome is most immoral -1=harm outcome is most immoral 0=no harm and harm are equally immoral
D	scenario1.harm.immorality	Scenario 1 – Participants perception of whether the actor was most immoral in the harm or no harm outcome conditions of the six scenarios.	1=omission is most immoral -1=commission is most immoral 0=omission and commission are equally immoral
E	scenario2.harm.immorality	Scenario 2 – Participants perception of whether the actor was most immoral in the harm or no harm outcome conditions of the six scenarios.	1=omission is most immoral -1=commission is most immoral 0=omission and commission are equally immoral
F	scenario1.commission.responsibility	Scenario 1 – Participants perception of whether the actor was most responsible in the commission or omission conditions of the six scenarios.	1=omission is most responsible -1=commission is most responsible 0=omission and commission are equally responsible

Software used

G*Power: Statistical Power Analyses [Computer software]. (Version 3.1.9.2, 2014) Retrieved from <http://www.gpower.hhu.de/en.html>

GraphPad QuickCalcs: chi square calculator. (2017, July 16) Retrieved from <http://graphpad.com/quickcalcs/chisquared1/>

R Core Team (2019). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>

Patil, I. (2018). ggstatsplot: “ggplot2” Based Plots with Statistical Details. CRAN.

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). Journal of statistical software, 48(2), 1-36.