The Drunk Utilitarian Revisited: Does Alcohol Really Increase Utilitarianism in Moral Judgment?

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The "drunk utilitarian" phenomenon suggests that people are more likely to accept harm for the greater good when they are under the influence of alcohol. This phenomenon conflicts with the ideas that (1) acceptance of pro-sacrificial harm requires inhibitory control of automatic emotional responses to the idea of causing harm and (2) alcohol impairs inhibitory control. The current preregistered experiment aimed to provide deeper insights into the effects of alcohol on moral judgments by using a formal modeling approach to disentangle three factors in moral dilemma judgments and by distinguishing between instrumental harm and impartial beneficence as two distinct dimensions of utilitarian psychology. Despite the use of a substantially larger sample and higher doses of alcohol compared to the ones in prior studies, alcohol had no significant effect on moral judgments. The results pose a challenge to the idea that alcohol increases utilitarianism in moral judgments.

Keywords: alcohol, CNI model, moral dilemmas, moral judgment, utilitarianism

Most people would probably agree that physically harming people is wrong; but what if doing so (e.g., by torturing someone) would save the lives of ten innocent people? Such moral dilemmas are often used to highlight the tension between deontology and consequentialism. Utilitarianism, as a particular type of consequentialism, posits that moral decisions should be guided solely by what brings about the best consequences and so, if torturing someone saves lives, it can be acceptable (e.g., Mill, 1863). In contrast, deontological ethical theories posit that morality is about more than just consequences, but should be guided by rights, duties, and obligations (e.g., Kant, 1916), and therefore often assume that harming someone is morally wrong.

In the current research, we investigated how alcohol influences moral judgments when adhering to "deontological" moral norms conflicts with the "utilitarian" maximization of outcomes for the greater good. According to the dual-process model of moral dilemma judgments, "utilitarian" acceptance of harm requires inhibitory control of automatic emotional responses to the idea of causing harm (Greene et al., 2001, 2004). In line with these assumptions, acceptance of harm for the greater good has been found to decrease under conditions assumed to impair inhibitory control, including time pressure and cognitive load (Białek & De Neys, 2017; Greene et al., 2008; Suter & Hertwig, 2011). However, one intriguing finding that seems rather puzzling in light of these results is the phenomenon of the "drunk utilitarian" (Duke & Bègue, 2015). This phenomenon suggests that people are more likely to accept harm for the greater good when they are under the influence of alcohol, which seems difficult to reconcile with the ideas that (1) acceptance of harm for the greater good requires inhibitory control of automatic emotional responses to the idea of causing harm (Greene et al., 2001, 2004) and (2) alcohol impairs inhibitory control (Day et al., 2015; Noël et al., 2010; Weafer & Fillmore, 2016).

The main goal of the current research was to provide deeper insights into the effect of alcohol on utilitarian moral judgment by using a formal modeling approach to disentangle sensitivity to consequences, sensitivity to moral norms, and general action tendencies in responses to moral dilemmas (Gawronski et al., 2017) and by distinguishing between two dimensions of utilitarian psychology called impartial beneficence and instrumental harm (Everett & Kahane, 2020; Kahane et al., 2018).

Alcohol and Moral Judgment

The "drunk utilitarian" phenomenon was discovered by Duke and Bègue (2015) in two studies that investigated associations between moral judgments and blood alcohol concentration measured with a breathalyzer in patrons of French bars. In the first study, participants were asked to imagine two scenarios in which a runaway trolley is approaching a group of five workers. In a scenario called the *switch*

dilemma, participants were asked if they would pull a switch to redirect the trolley to a different track where it would kill one person and save the lives of the five workers (Foot, 1967). In another scenario called the *footbridge dilemma*, participants were asked if they would push a man from a bridge, which would kill the man but save the five workers (Thomson, 1976). Blood alcohol concentration showed a significant positive correlation with pro-sacrificial judgments in the footbridge dilemma (r = .29, p = .023) but not the switch dilemma (r = .17, p = .17). The second study replicated the correlation between blood alcohol and pro-sacrificial judgments in the footbridge dilemma (r = .32, p = .039), further showing that the obtained relation was *not* driven by self-reported behavioral disinhibition or elevated positive mood.

To rule out ambiguities in Duke and Bègue's (2015) correlational findings, Arutyunova and colleagues (2017) experimentally manipulated blood alcohol levels in a community sample of volunteer participants in a two-session study. In both sessions, participants were asked to respond to a longer battery of moral dilemmas that included the switch and the footbridge dilemma (Cushman et al., 2006). In one of the two sessions, participants responded to the moral dilemmas under the influence of alcohol (i.e., ~42 minutes after drinking juice mixed with vodka; 1 g of alcohol at 40% strength for each 1 kg of body weight). In the other session, they completed the same dilemmas while being sober (i.e., after drinking juice mixed with water). Results did not reveal any significant difference in moral judgments across the two conditions.

Francis and colleagues (2019) investigated effects of alcohol on moral dilemma judgments among psychology students who were randomly assigned to one of three experimental conditions: (1) placebo, (2) low-intoxication level (0.4 g of alcohol at 37.5% strength for each 1 kg of body weight), and (3) high intoxication-level (0.8 g of alcohol at 37.5% strength for each 1 kg of body weight). Twenty minutes after drinking either plain juice or juice mixed with different amounts of vodka, participants responded to a battery of moral dilemmas including the footbridge dilemma (Greene et al., 2001). Similar to Arutyunova et al.'s (2017) findings, moral judgments did not significantly differ across experimental conditions.

The Current Research

In the current preregistered experiment, we aimed to address five limitations of prior research on the effects of alcohol on moral judgment: (1) relatively low (or inconsistent) levels of alcohol consumption; (2) lack of a placebo condition in some studies; (3) small sample sizes; (4) confounds in the measurement of moral dilemma judgments; and (5) generalization to utilitarian judgments writ large based on responses to sacrificial dilemmas.

First, because Duke and Bègue's (2015) study used a correlational design, the obtained relations between blood alcohol concentration and moral judgment may not necessarily reflect a causal effect of alcohol. Subsequent laboratory experiments (Arutyunova et al., 2017; Francis et al., 2019) aimed to address this concern, and these studies did not find any significant effects of alcohol on moral judgments. However, the consumed doses of alcohol were relatively small in these experiments. To illustrate this concern: with the experimentally induced levels of blood alcohol in permille, participants would have still been allowed to drive in many countries (< 0.5‰). Thus, it is possible that the lack of a significant effect of alcohol in experimental studies is due to the relatively low levels of alcohol, not lack of a causal effect. In the current study, we aimed to address this issue by administering a comparatively higher dose of alcohol than previous experiments.

Second, only one of the three studies (Francis et al., 2019) included a placebo condition in which participants believed they were consuming alcohol without actually consuming alcohol. Placebo conditions are essential in this line of research to distinguish actual effects of alcohol from effects of people's naïve beliefs about the influence of alcohol (Bodnár et al., 2020). In the context of moral judgments, it is also possible that people believe that being intoxicated gives them a license to make more pro-sacrificial judgments, even when alcohol itself has no causal effect on moral judgments. In the current study, we aimed to address this issue by using three experimental conditions: (1) alcohol, (2) no-alcohol control, (3) placebo control.

Third, the sample sizes in prior studies were rather small overall, with N = 61 and N = 42 in the two studies by Duke and Bègue (2015), N = 40 in the study by Arutyunova et al. (2017), and N = 48 in the study by Francis et al. (2019). Because small sample sizes can lead to both false negatives (Maxwell et al., 2015) and false positives (Button et al., 2013), evidence from a larger sample would be helpful to reconcile the conflicting findings in previous studies. In the current experiment, we aimed to address this issue by recruiting a relatively large sample of 300 participants.

Fourth, all three studies relied on the traditional approach of using moral dilemmas that pit "characteristically utilitarian" against "characteristically deontological" options (Conway et al., 2018). A major disadvantage of this approach is that it includes two confounds in the measurement of moral dilemma judgments. First, endorsement of the "utilitarian" option requires rejection of the "deontological" option, and vice versa. This approach

confounds the measurement of utilitarian and deontological tendencies underlying moral judgments, which conflicts with the idea that the processes underlying the two kinds of tendencies are independent (Conway & Gawronski, 2013). Second, "utilitarian" judgments are conflated with action (i.e., pulling the lever, pushing the man) while "deontological" judgments are conflated with inaction (i.e., not pulling the lever, not pushing the man), confounding the two moral tendencies with general action tendencies (Crone & Laham, 2017). These considerations suggest that differences in responses to traditional moral dilemmas (e.g., switch dilemma, footbridge dilemma) may reflect either (1) differences in outcome maximization, or (2) differences in adherence to moral norms, or (3) differences in general action tendencies (or any combination of the three). In the current research, we aimed to disentangle these three factors by using a mathematical model called the CNI model to quantify (1) sensitivity to consequences, (2) sensitivity to moral norms, and (3) general preference for inaction versus action in responses to moral dilemmas (Gawronski et al., 2017). The CNI model disentangles these three factors by comparing responses to four kinds of moral dilemmas that differ in terms of (1) whether the benefits of the described action are greater or smaller than the costs and (2) whether the described action is prohibited or prescribed by a moral norm. Disentangling the three factors underlying moral dilemma judgments may prove helpful for understanding the "drunk utilitarian" phenomenon, in that alcohol seems unlikely to increase sensitivity to consequences in a utilitarian sense. Instead, it seems more likely that alcohol either (1) reduces sensitivity to moral norms in a deontological sense or (2) increases people's willingness to perform a focal action regardless of its consequences and its consistency with moral norms. In fact, if either of the latter two effects is sufficiently large, they may conceal a simultaneous decrease in sensitivity to consequences, which would suggest that alcohol might reduce rather than increase utilitarian concerns about the greater good (for an example, see Luke & Gawronski, 2021).

Fifth, while work on the "drunk utilitarian" phenomenon—along with work on the dual-process model—has been used to draw conclusions about utilitarian judgment in general, pro-sacrificial judgments are just one part of utilitarian psychology. According to the two-dimensional model of utilitarian psychology (Everett & Kahane, 2020; Kahane et al., 2018), utilitarianism has two dimensions that are conceptually and psychologically distinct. *Instrumental harm* (IH) captures willingness to cause harm to achieve positive consequences for the greater good. *Impartial beneficence* (IB) taps the extent to which people endorse the radically demanding and impartial helping utilitarianism requires. Different from previous work inferring utilitarianism from responses to sacrificial dilemmas, research guided by the two-dimensional model of utilitarian psychology infers endorsement of IH and IB from participants' agreement with broad ethical statements about key ideas of the two dimensions (Kahane et al., 2018). Previous work using this approach has shown that the two dimensions of utilitarianism show different patterns of correlations with individual-difference measures (Kahane et al., 2018), are affected differently by priming manipulations (Capraro et al., 2019), and have distinct consequences for social perception (Everett et al., 2018, 2021). Moreover, although endorsement of pro-sacrificial harm in moral dilemmas has been found to be positively correlated with IH, moral dilemma judgments were found to be unrelated to IB (Kahane et al., 2018). Thus, based on the known effects of alcohol, it seems possible that alcohol increases the endorsement of IH. However, it seems rather implausible that alcohol would increase endorsement of IB.

In sum, the current study aimed to address the five identified limitations in a preregistered lab experiment testing the effects of a comparatively higher dose of alcohol (1.6 g of alcohol at 40% strength for each 1 kg of body weight) on "utilitarian" preferences. The study included three types of measures: (1) traditional sacrificial moral dilemmas (Foot, 1967; Thomson, 1976), (2) a battery of moral dilemmas for research using CNI model (Körner et al., 2020), and (3) the Oxford Utilitarianism Scale (OUS) measuring IH and IB (Kahane et al., 2018). Participants were randomly assigned to one of three experimental conditions: (1) alcohol, (2) no-alcohol, (3) placebo. To obtain greater statistical power than prior studies, we aimed for a sample of 300 participants (100 per condition).

Preregistered Hypotheses

For responses to the two variants of the trolley problem, we expected to obtain effects that correspond to Duke and Bègue's (2015) correlational findings. For responses to the footbridge dilemma, we predicted greater pro-sacrificial responding in the alcohol condition compared to the no-alcohol and placebo conditions. For responses to the switch dilemma, pro-sacrificial responding was not expected to differ across experimental conditions.

For the three factors captured by the CNI model, we predicted that alcohol, compared to no-alcohol and placebo conditions, would (1) decrease sensitivity to consequences, (2) decrease sensitivity to moral norms, and (3) decrease general preference for inaction over action.

Finally, for the IH dimension of the OUS, we predicted that alcohol would increase scores compared

to no-alcohol and placebo conditions. For the IB dimension, scores were not expected to differ across experimental conditions.

Method

The study was approved by the Ethics Committee of the University of Silesia. The preregistration, data, analysis codes, and study materials are available at https://osf.io/9vn5z/.

Participants

Our target sample size was 300 participants after preregistered exclusions, 100 (~50% female) per experimental condition. For the predicted interaction between experimental condition and type of trolley problem, a sample of 300 provides 80% power in detecting a small effect of $f = 0.107$, assuming a correlation of $r = .30$ between measures and nonsphericity correction of $\varepsilon = 1$. The same is true for detecting the predicted interaction between experimental condition and type of OUS subscale. For the three parameters of the CNI model, a sample of 300 provides 80% power in detecting a small effect of $f = 0.097$, assuming a correlation of $r = .30$ between measures and nonsphericity correction of $\varepsilon = 1$.

Participants were recruited through advertisements in various media (e.g., university websites, Facebook, newspapers). Individuals with health problems, who were pregnant, who reported alcohol addiction, or were younger than 18 years before the laboratory invitation were not eligible for participation. To verify these criteria, all individuals who responded to the advertisements completed an online screening questionnaire before receiving an invitation to the lab study. Of the 1079 volunteers who completed the screening survey, 387 met the criteria and were invited to the laboratory (198 women, 189 men; $M_{age} = 25.7$, $SD_{age} = 7.4$; age range: 18 to 52 years). All of the invited volunteers accepted the invitation and participated in the study voluntarily without monetary compensation. Participants were asked to refrain from drinking alcohol for 24 hours, taking any medication (e.g., painkillers) for 10 hours, and from eating for at least 3 hours before coming to the laboratory. Following our preregistered exclusion criteria, data from 58 participants were excluded from analyses because they failed to pass one or more of our attention checks. The final sample included 329 participants, whose age ranged from 18 to 52 years ($M = 25.1$, $SD = 6.2$). Of the 329 participants in the final sample, 106 participants were in alcohol condition (53 women, 53 men), 114 in placebo control condition (57 women, 57 men), and 109 in the no-alcohol control condition (53 women, 56 men). Following our preregistered stopping rule, we ended the data collection on the day we reached our target sample of 300 participants, but included the data from all participants who had an appointment on the same day. This led to an excess of 29 participants beyond our target sample of 300 participants. All future appointments after the day of completion were canceled in line with our preregistered stopping rule.

Measures

Trolley problems. Participants were presented with the switch dilemma (Foot, 1967) and the footbridge dilemma (Thomson, 1976) and asked to indicate whether they would perform the described action on 7-point rating scales. The end-points were labeled "*I would definitely do nothing"* (1) and "*I would definitely pull the level"* (7) for the switch dilemma, and *"I would definitely do nothing"* (1) and "*I would definitely push the man onto the track"* (7) for the footbridge dilemma.

CNI dilemmas. Participants were asked to respond to a validated battery of 48 moral dilemmas for research using the CNI model (Körner et al., 2020). The battery included four variants of 12 basic dilemmas, varying as a function of (1) whether the benefits of the described action are greater or smaller than the costs and (2) whether the described action is prohibited or prescribed by a moral norm. Participants were asked if they would perform the described action. Responses were measured with dichotomous *yes* vs. *no* response options. Using the CNI model template files provided by Körner et al. (2020), the total numbers of *yes* vs. *no* responses on each type of dilemma were used to estimate three scores for each participant via multinomial modeling (Hütter & Klauer, 2016): a score reflecting sensitivity to consequences (*C* parameter); a score reflecting sensitivity to moral norms (*N* parameter); and a score reflecting general preference for inaction versus action (*I* parameter). Toward this end, the CNI model was fitted to the data for each participant following the procedures by Körner et al. (2020). CNI parameter estimations were conducted with the freeware multiTree (Moshagen, 2010), using random start values, two replications, and a maximum of 90,000 iterations.

OUS. Dimensions of utilitarianism were measured using the OUS (Kahane et al., 2018). The IB subscale includes five items measuring the extent to which people endorse the utilitarian demand for impartial helping (e.g., "*It is morally wrong to keep money that one doesn't really need if one can donate it to causes that provide effective help to those who will benefit a great deal"*). The IH subscale includes four items measuring willingness to cause harm to achieve positive consequences for the greater good (e.g., "*It is morally right to harm an innocent person if harming them is a necessary means to helping several other innocent people"*). Participants were asked to indicate how much they agree with each statement, using 7-

point rating scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

CRT. For exploratory purposes, the study also included Primi et al.'s (2016) modified version of the Cognitive Reflection Test (Frederick, 2005). The CRT was included to identify potential effects of alcohol on cognitive reflection and to explore whether effects of alcohol on moral judgments are mediated by differences in cognitive reflection.

Procedure

Three research assistants were responsible for different tasks during a given session. The first assistant (informally referred to as *policeman*) was responsible for measuring participants' weight and taking breathalyzer measurements. The second assistant (informally referred to as *bartender*) was responsible for preparing the drinks and the randomized assignment to the three experimental conditions. The third assistant (informally referred to as *courier*) was responsible for ensuring that all documents are signed before the study and for serving the drinks (being unaware of the experimental condition).

Participants in the *no-alcohol* condition consumed a drink that included only juice and no alcohol. Participants in this condition were told that there was no alcohol in their drink. Participants in the *placebo* condition were told that there was alcohol in the drink and consumed a drink that included only juice and no alcohol, but was sprayed with alcohol to create the impression of alcohol consumption. Participants in the *alcohol* condition consumed an alcoholic drink that was prepared to contain 1.6 grams of alcohol at 40% strength for each 1 kg of the participant's body weight. The drink was mixed with the same juice as in other conditions. After the study, participants in the alcohol condition had to wait to become sober or return home with a sober driver.

Figure 1 presents an overview of the procedure. When participants arrived in the laboratory, they provided informed consent, had their weight and blood alcohol measured using a breathalyzer, and then completed a demographic survey that included questions about participants' age, marital status, employment status, religion, political views, subjectively perceived social status, and COVID diagnoses for themselves close family and friends. Next, participants consumed their assigned drink (up to 10 minutes), after which they watched two emotionally neutral movie clips comprising a period of 51 minutes to allow for alcohol absorption: (1) *The World From Above*, season 10, episode 6 titled *Iceland - From Vatnajokull National Park to Gullfoss Waterfall* and (2) *The World From Above*, season 4, episode 7 titled *Yellowstone National Park*. After the movie, blood alcohol levels were measured a second time (using the same sound signal in the placebo and experimental groups). Next, participants completed the main dependent measures. Participants first completed the CNI dilemma battery and the OUS, with the order of the two instruments being counterbalanced across participants. Both the CNI dilemmas and the items of the OUS were presented in a fixed randomized order that was held constant for all participants. The two measures were followed by the two versions of the trolley problem, with their order being counterbalanced independent of the order of the CNI battery and the OUS. Finally, participants completed the CRT and several supplementary measures that were unrelated to the primary purpose of this study.[1] The study concluded with a debriefing and third measurement of blood alcohol. After the debriefing, participants were also asked to guess the condition to which they had been assigned.

Results

Descriptive statistics of all measured variables are presented in Table 1. Correlations between all measured variables are presented in Table 2. Endorsement of pro-sacrificial harm in the switch dilemma showed significant positive correlations with endorsement of pro-sacrificial harm in the footbridge dilemma, the CNI model's *C* parameter, and the IH subscale of the OUS, as well as significant negative correlations with the CNI model's *N* parameter and CRT scores. These results suggest that stronger endorsement of pro-sacrificial harm in the switch dilemma was associated with (1) stronger endorsement of pro-sacrificial harm in the footbridge dilemma, (2) stronger sensitivity to consequences, (3) stronger endorsement of IH, (4) weaker sensitivity to moral norms, and (5) weaker cognitive reflection. Endorsement of pro-sacrificial harm in the footbridge dilemma showed significant positive correlations with the CNI model's *C* parameter and the IH subscale of the OUS, as well as a significant negative correlation with the CNI model's *N* parameter. These results suggest that stronger endorsement of pro-sacrificial harm in the footbridge dilemma was associated with (1) stronger sensitivity to consequences, (2) stronger

[1] Because conducting a high-powered laboratory study on the effects of alcohol requires a considerable amount of resources, we aimed to maximize the utility of the invested resources by including several survey instruments for a different project at the end. These instruments included measures of self-concept (Stake, 1994), moral identity (Aquino & Reed, 2002), personality (Gosling et al., 2003), and moral foundations (Graham & Haidt, 2012). Because these supplementary measures were not intended for the current study and the measures were administered at the end, the preregistration did not include any of these instruments. Separate preregistrations were submitted for the analyses of data obtained with these supplementary measures.

endorsement of IH, and (3) weaker sensitivity to moral norms. Beyond these correlations, the *C* parameter showed a significant negative correlation with the *N* parameter, and significant positive correlations with the *I* parameter, the IH subscale of the OUS, and CRT scores. These results suggest that stronger sensitivity to consequences was associated with (1) weaker sensitivity to moral norms, (2) stronger action aversion, (3) stronger endorsement of IH, and (4) stronger cognitive reflection. Moreover, the *N* parameter showed a significant positive correlation with the *I* parameter and a significant negative correlation with the IH subscale of the OUS, suggesting that stronger sensitivity to moral norms was associated with (1) weaker action aversion and (2) weaker endorsement of IH. Finally, the IH subscale of the OUS showed a significant positive correlation with the IB subscale and CRT scores, suggesting that stronger endorsement of IH was associated with (1) stronger endorsement of IB and (2) stronger cognitive reflection.

Manipulation Check

To test the effectiveness of our alcohol manipulation, blood alcohol levels measured with breathalyzer were submitted to a 3 (Alcohol Group: alcohol vs. no alcohol vs. placebo, between-subjects) × 3 (Time: baseline vs. before survey vs. after survey, within-subjects) mixed ANOVA, which revealed a significant two-way interaction between Group and Time, $F(4, 652) = 872.00$, $p < .001$, $\eta_p^2 = .842$ (see Table 1). Further analyses revealed that blood alcohol levels significantly differed across the three groups before the survey, $F(2, 326) = 1248.75$, $p < .001$, $\eta_p^2 = .885$, and after the survey, $F(2, 326) = 2275.00$, $p < .001$, $\eta_p^2 = .933$, but not at baseline, $F(2, 326) = 0.00$, $p = 1.00$, $\eta_p^2 = .000$. Before the survey, blood alcohol levels were significantly higher in the alcohol group compared to the no-alcohol group, $t(326) = 43.20$, $p < .001$, $d = 5.90$, and compared to the placebo group, $t(326) = 43.70$, $p < .001$, $d = 5.90$. Similarly, after the survey, blood alcohol levels were significantly higher in the alcohol group compared to the no-alcohol group, $t(326) = 58.30$, $p < .001$, $d = 7.96$, and compared to the placebo group, $t(326) = 59.00$, $p < .001$, $d = 7.96$. Together, these results confirm the effectiveness of our manipulation of blood alcohol.

Confirmatory Analyses

Trolley problems. Responses to the two variants of the trolley problem were submitted to a 3 (Alcohol Group: alcohol vs. no alcohol vs. placebo, between-subjects) × 2 (Dilemma Type: switch vs. footbridge, within-subjects) mixed ANOVA. The ANOVA revealed a significant main effect of Dilemma Type, indicating that participants were more willing to redirect the trolley to a different track than to push a man off the bridge, $F(1, 326) = 332.02$, $p < .001$, $\eta_p^2 = .505$ (see Table 1). Critically, there was no significant main effect of Alcohol Group, $F(2, 326) = 2.76$, $p = .065$, $\eta_p^2 = .017$, and no significant interaction between Alcohol Group and Dilemma Type, $F(2, 326) = 1.57$, $p = .210$, $\eta_p^2 = .010$.

CNI dilemmas. The three parameters of the CNI model were submitted to a 3 (Alcohol Group: alcohol vs. no alcohol vs. placebo, between-subjects) × 3 (Parameter: *C* vs. *N* vs. *I*, within-subjects) mixed ANOVA (see Table 1).[2] Neither the main effect of Alcohol Group, $F(2, 326) = 1.24$, $p = .291$, $\eta_p^2 = .008$, nor the interaction between Parameter and Alcohol Group, $F(4, 652) = 1.30$, $p = .269$, $\eta_p^2 = .008$, were statistically significant.

OUS. Responses on the OUS were submitted to a 3 (Alcohol Group: alcohol vs. no alcohol vs. placebo, between-subjects) × 2 (Dimension: IH vs. IB, within-subjects) mixed ANOVA (see Table 1). The main effect of Alcohol Group was not significant, $F(2, 326) = 0.005$, $p = .995$, $\eta_p^2 = .000$, but the interaction between Dimension and Alcohol Group was statistically significant, $F(2, 326) = 3.04$, $p = .049$, $\eta_p^2 = .018$. Descriptively, the placebo group showed higher IH scores and lower IB scores compared to the other two groups, but none of the relevant post-hoc tests reached statistical significance (all *t*s < 1.35, all *p*s > .193).

Exploratory Analyses

Guessed condition. Participants in the no-alcohol condition were highly accurate in identifying the condition to which they had been assigned (99.1%). The same was true for participants in the alcohol condition (96.3%). Accuracy was considerably lower for participants in the placebo condition (65.8%), with 23.7% falsely believing that they had consumed alcohol. Accuracy levels significantly differed across the three groups, $\chi^2(2) = 65.72$, $p < .001$. To investigate whether participants' naïve beliefs about alcohol consumption are associated with moral judgments, we repeated the main analyses using "guessed alcohol group" instead of "actual alcohol group" in the ANOVA. There were no significant main or interaction effects involving Guessed Alcohol Group for responses to the trolley problems (all *F*s < 2.51, all *p*s > .083), the three CNI model parameters (all *F*s < 1.54, all *p*s > .217), and the two dimensions of the OUS (all *F*s < 2.85, all *p*s > .059).

CRT. We performed a univariate ANOVA with three conditions (alcohol vs. no alcohol vs. placebo) on CRT scores, which revealed a significant difference

[2] Note that the main effect of Parameter is uninterpretable, because the neutral reference point of the *I* parameter (0.5) differs from the neutral reference point of the *C* and the *N* parameter (0), and *N* scores are estimated in a manner that is conditional on *C*.

across groups, $F(2, 326) = 3.06$, $p = .048$, $\eta_p^2 = .018$. A planned simple-contrast analysis indicated that this effect was driven by higher CRT scores in the placebo group (ΔCRT = 0.35), $t(326) = 2.39$, $p = .017$, and the alcohol group (ΔCRT = 0.26), $t(326) = 1.74$, $p = .083$, compared to the no-alcohol group ($M_{CRT} = 1.45$). These results suggest that believing one has consumed alcohol led to improved performance on the CRT.

Discussion

The "drunk utilitarian" phenomenon poses an intriguing challenge to the dual-process model of moral judgment, which suggests that alcohol-related impairments in inhibitory control should reduce rather than increase utilitarian judgments. However, because the initial demonstration of the phenomenon was based on correlational data (Duke & Bègue, 2015) and subsequent experimental studies failed to obtain significant effects of alcohol on moral dilemma judgments (Arutyunova et al., 2017; Francis et al., 2019), the reliability of the phenomenon is still unclear. This state of affairs is exacerbated by several limitations of prior research on the effects of alcohol on moral judgment, which include (1) relatively low (or inconsistent) levels of alcohol consumption; (2) lack of a placebo condition in some studies; (3) small sample sizes; (4) confounds in the measurement of moral dilemma judgments; and (5) generalization to utilitarian judgments writ large based on responses to sacrificial dilemmas. To address these concerns, the current preregistered experiment included a manipulation of blood alcohol levels with comparatively higher doses of alcohol and a placebo condition to disentangle actual effects of alcohol from effects of naïve beliefs about effects of alcohol. To overcome the known problems associated with small samples, the current study tested effects of alcohol with a sample that was substantially larger compared to prior studies. Finally, to overcome conceptual limitations in the interpretation of pro-sacrificial judgments in trolley problems, the current study used the CNI model to disentangle different aspects of moral dilemma judgments and the OUS to measure different dimensions of utilitarian psychology.

Despite these improvements, we failed to obtain any significant effect of alcohol on moral judgments. Although our manipulation was highly effective in influencing blood alcohol levels (measured with a breathalyzer), there was no significant effect of alcohol on pro-sacrificial judgments in the trolley problem, the three parameters of the CNI model, and only a weak, placebo-driven effect on the two dimensions of utilitarian psychology captured by the OUS. Moreover, although performance on the CRT tended to be higher in the alcohol condition compared to the no-alcohol condition, participants in the placebo condition showed a similar performance boost, suggesting that participants who believed that they consumed alcohol invested extra efforts when completing the CRT. Together, these results pose a challenge to the "drunk utilitarian" phenomenon and raise important questions about how alcohol may influence moral judgments, if it has any such effect at all.

One possible explanation for the obtained null effects is that the influence of alcohol on inhibitory control might be more complex than commonly assumed, given that effects of alcohol on inhibitory control seem to be highly variable across tasks and situations. Consistent with this concern, some studies support the hypothesis that alcohol impairs inhibitory control, while other studies report null effects of alcohol on inhibitory control (e.g., Bartholow et al., 2018). These mixed findings seem to be be partly rooted in different conceptualizations of inhibitory control and different approaches to measuring inhibitory control. Although inhibitory control is generally understood as the ability to suppress attention, behavior, thoughts and/or emotions (Diamond, 2013), inhibitory control is a multifaceted construct that subsumes diverse aspects such as the inhibition of prepotent response tendencies, suppression of thoughts and memories, and delayed gratification. A more nuanced analysis suggests that alcohol might differentially affect different aspects of inhibitory control (Riedel et al., 2021). Moreover, although alcohol has been found to impair response inhibition in the stop-signal (de Wit et al. 2000; Loeber & Duka 2009; Gan et al. 2014; Roberts et al. 2016) and go/no-go tasks (Fillmore & Weafer 2004; Marczinski et al. 2005; Field et al. 2010; Korucuoglu et al. 2017; Stock et al. 2016), recent evidence suggests that the impact of alcohol on response inhibition may depend on the particular measure of response inhibition (Bartholow et al., 2018; Riedel et al., 2021). Based on these findings, the influence of alcohol on inhibitory control seems much more complex than presumed in research on the effects of alcohol on moral judgment, including the current study (see Button et al., 2013).

Nevertheless, it is worth noting that the lack of experimental effects of alcohol in the current study and prior research (Arutyunova et al., 2017; Francis et al., 2019) does not necessarily question Duke and Bègue's (2015) correlational findings. Yet, the lack of experimental effects does suggest a somewhat different interpretation of their original findings, in that blood alcohol may not have been the cause of the obtained correlations. Instead, these correlations may have been driven by individual differences that are systematically associated with both alcohol consumption and moral dilemma judgments. For example, it is possible that individuals who tend to

engage in excessive alcohol consumption are less concerned about causing harm to themselves and others, which could promote a positive correlation between blood alcohol levels after a night at the bar and pro-sacrificial judgments in the trolley problem. To the extent that this association is more pronounced for harm that involves direct contact, it would also explain why Duke and Bègue (2015) found a stronger correlation between blood alcohol and pro-sacrificial judgments in the footbridge dilemma than in the switch dilemma.

Limitations

Although our findings provide more compelling evidence regarding the effect of alcohol on moral judgment than previous studies, it seems appropriate to acknowledge a few limitations. The first limitation is the controlled lab setting of the current study. Alcohol consumption often occurs in social settings (e.g., with friends at a party) and effects of alcohol may differ depending on whether it is consumed individually or in a social setting. Similar contextual influences have been found for placebo effects, which can be different in individual and social settings (Bodnár et al., 2020). Thus, our lab findings may not be representative of the effects of alcohol and alcohol-related beliefs in general if their influence on moral judgments depends on the context. This idea is consistent with findings suggesting that moral dilemma judgments differ depending on whether they are made in an individual or social setting (Rom & Conway, 2018). Future research comparing effects of alcohol in individual and social settings may help to provide deeper insights into the interactive role of alcohol and social contexts in shaping moral judgments.

A second limitation is that we did not control for biphasic effects of alcohol, in which blood alcohol concentration rises to a peak following consumption (i.e., ascending limb) and then gradually declines to a sober state (i.e., descending limb). With the design employed in the current study, it is possible that participants' blood alcohol concentration peaked before the movie ended and was already on the descending limb by the time they completed the moral judgment tasks. Because alcohol can have different effects during times of ascending vs. descending blood alcohol concentrations, future studies should either ensure that participants are making moral judgments at the peak time of blood alcohol concentration or directly test differential effects of alcohol during the ascending vs. descending limb.

Third, although the current study used a comparatively higher dose of alcohol than previous studies, it is possible that the administered dose was still too low to produce a detectable effect of alcohol on moral judgments. Although higher doses of alcohol may raise ethical questions about potential harm that might be caused to participants, it is possible that the correlations in Duke and Bègue's (2015) study were driven by intoxicated participants with higher levels of blood alcohol after a night bar, and that the "drunk utilitarian" phenomenon would emerge in experimental studies with higher levels of blood alcohol. In this case, insufficiently high doses of alcohol might explain the discrepancy between Duke and Bègue's findings and the results of experimental studies, including the current one.

Fourth, when determining the amount of to-be-consumed alcohol, we followed the procedures of past studies (e.g., Francis et al., 2019) and did not differentiate alcohol doses according to gender. However, because men and women differ in terms of their alcohol metabolism (e.g., Bates et al., 2011; Cofresí et al., 2020), one could argue that women should have been given smaller doses than men to obtain the comparable effects of alcohol even when their body weight was comparable (Thomasson, 2002). Yet, counter to this concern about potential gender differences, a 2 (Time) × 2 (Gender) mixed ANOVA did not reveal any significant effects of Gender on blood alcohol concentration; there was neither a significant main effect of Gender, $F(1, 327) = 0.48$, $p = .488$, nor a significant two-way interaction between Time and Gender, $F(1, 327) = 0.66$, $p = .419$.

Finally, following previous studies on moral judgment under the influence of alcohol (e.g., Francis et al., 2019), we used body weight to determine the amount of to-be-consumed alcohol. However, an alternative approach is to use participants' total body water (rather than weight) to determine the ideal dose of alcohol in laboratory studies (Watson, 1989). In this method, the dose of alcohol required to produce a specific peak blood alcohol level is assumed to be a function of the participant's total body water, duration of the drinking period, time to peak blood alcohol level, and alcohol metabolism rate. Future studies might use Watson's published formulas for this alternative approach to determine the ideal dose of alcohol (Curtin & Fairchild, 2003).

Conclusions

There are reasons to believe that alcohol may influence moral judgments. On the one hand, alcohol may impair inhibitory control and extant theories suggest that impaired inhibitory control should reduce the endorsement of pro-sacrificial harm for the greater good. On the other hand, "drinking is […] like taking one's foot off the brake" (Heath & Hardy-Vallée, 2015, p. 2), which is consistent with the greater willingness to cause pro-sacrificial harm in the "drunk utilitarian" phenomenon. However, counter to either of these ideas, we did not find any effects of alcohol

on moral judgments. Because the current study addressed several limitations of prior research on this question and nevertheless did not find any evidence for a causal effect of alcohol on moral judgments, we conclude that the "drunk utilitarian" phenomenon needs to be revisited.

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Open Practices

The preregistration, materials, raw data, and analysis files for the current study are publicly available at https://osf.io/9vn5z/.

Figure 1
Overview of the study procedure

Note. The schematic individuals in the lower right corner represent three research assistants (informally referred to as *policeman*, *bartender*, and *courier*) responsible for the different tasks described in the Procedure section.

Table 1

Descriptive statistics for all measured variables

	Alcohol		No Alcohol		Placebo	
	M	95% CI	*M*	95% CI	*M*	95% CI
BAC						
Baseline	0.00	[0.00, 0.00]	0.00	[0.00, 0.00]	0.00	[0.00, 0.00]
Before Survey	0.69	[0.65, 0.73]	0.00	[0.00, 0.00]	0.00	[0.00, 0.00]
After Survey	0.54	[0.51, 0.56]	0.00	[0.00, 0.00]	0.00	[0.00, 0.00]
Trolley Problems						
Switch	5.01	[4.65, 5.37]	4.96	[4.61, 5.32]	5.25	[4.92, 5.58]
Footbridge	3.12	[2.76, 3.49]	2.62	[2.30, 2.95]	3.31	[2.94, 3.68]
CNI Model						
C Parameter	0.23	[0.21, 0.26]	0.26	[0.23, 0.30]	0.30	[0.27, 0.33]
N Parameter	0.60	[0.54, 0.66]	0.60	[0.54, 0.66]	0.58	[0.52, 0.64]
I Parameter	0.67	[0.61, 0.72]	0.73	[0.68, 0.78]	0.69	[0.64, 0.75]
OUS						
IH	3.28	[3.06, 3.49]	3.24	[3.01, 3.46]	3.43	[3.24, 3.62]
IB	3.68	[3.46, 3.91]	3.71	[3.47, 3.95]	3.50	[3.31, 3.70]
CRT	1.71	[1.49, 1.93]	1.45	[1.25, 1.65]	1.80	[1.60, 2.00]

Note. BAC = Blood Alcohol Concentration in Permille (‰) Measured with Breathalyzer. Switch = Switch Dilemma, Footbridge = Footbridge Dilemma, *C* = Sensitivity to Consequences, *N* = Sensitivity to Moral Norms, *I* = General Preference for Inaction versus Action, OUS = Oxford Utilitarianism Scale, IH = Instrumental Harm, IB = Impartial Beneficence, CRT = Cognitive Reflection Test.

Table 2

Pearson's correlations between measured variables

	2.	3.	4.	5.	6.	7.	8.
1. Switch	.40**	.25**	-.17**	.02	.24**	.10	-.14**
2. Footbridge	-	.20**	-.34**	-.06	.30**	.08	-.01
3. *C* Parameter		-	-.14*	.12*	.25**	.05	.18**
4. *N* Parameter			-	.20**	-.31**	-.02	-.05
5. *I* Parameter				-	.04	-.04	.08
6. OUS-IH					-	.35**	.16**
7. OUS-IB						-	-.02
8. CRT							-

Note. * $p < .05$; ** $p < .01$. Switch = Switch Dilemma, Footbridge = Footbridge Dilemma, *C* = Sensitivity to Consequences, *N* = Sensitivity to Moral Norms, *I* = General Preference for Inaction versus Action, OUS = Oxford Utilitarianism Scale, IH = Instrumental Harm, IB = Impartial Beneficence, CRT = Cognitive Reflection Test. Breathalyzer scores are not included in the table, because two thirds of participants in the sample (i.e., those in the no-alcohol and the placebo conditions) have a score of zero.