Suffering Physical Pain Increases Dishonest Behavior

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Abstract

Unethical behaviors have an intricate relationship with physical pain. For instance, prior research found that individuals have a greater tendency to self-inflict physical pain after committing unethical acts. The present study sought to contribute to the literature by investigating if the link between physical pain and unethical behavior is bi-directional. Specifically, we examined if experiencing physical pain would increase the tendency to subsequently behave dishonestly for financial gains in the die-under-cup task. We found that participants randomly assigned to suffer physical pain (by submerging their hands in cold water) behaved more dishonestly than those who did not experience physical pain. Our findings provide evidence for the causal effect of physical pain on dishonest behavior. We suggest that the investigation of the mediating mechanisms is a fruitful avenue for future research and we propose several potential mechanisms.

Suffering Physical Pain Increases Dishonest Behavior

Unethical behaviors have an intricate relationship with physical pain and suffering. One aspect of this relationship, deeply rooted in many religious practices, is the tendency to self-inflict physical pain and suffering after committing sinful acts. A common example is fasting, which is widely practiced today to atone for past sins by Muslim during the month of *Ramadan* (Badawi, n.d); by Jews during *Yom Kippur* (i.e., Day of Atonement; Tauber, 2014); by Hindus during religious occasions (Klostermaier, 2007); and by Catholics during the season of Lent (Dues, 2006). More extreme acts involving the self-infliction of physical pain and suffering can still be found in some cultures today. For example, in the Philippines, during Good Fridays, hundreds of Roman Catholics engage in self-flagellation and crucifixion. Those who undertake this religious ritual whip their backs till they bleed, with some going even further by nailing themselves to crosses. One of several reasons for participating in the ritual is to cleanse their own sins (Gripaldo, 2009).

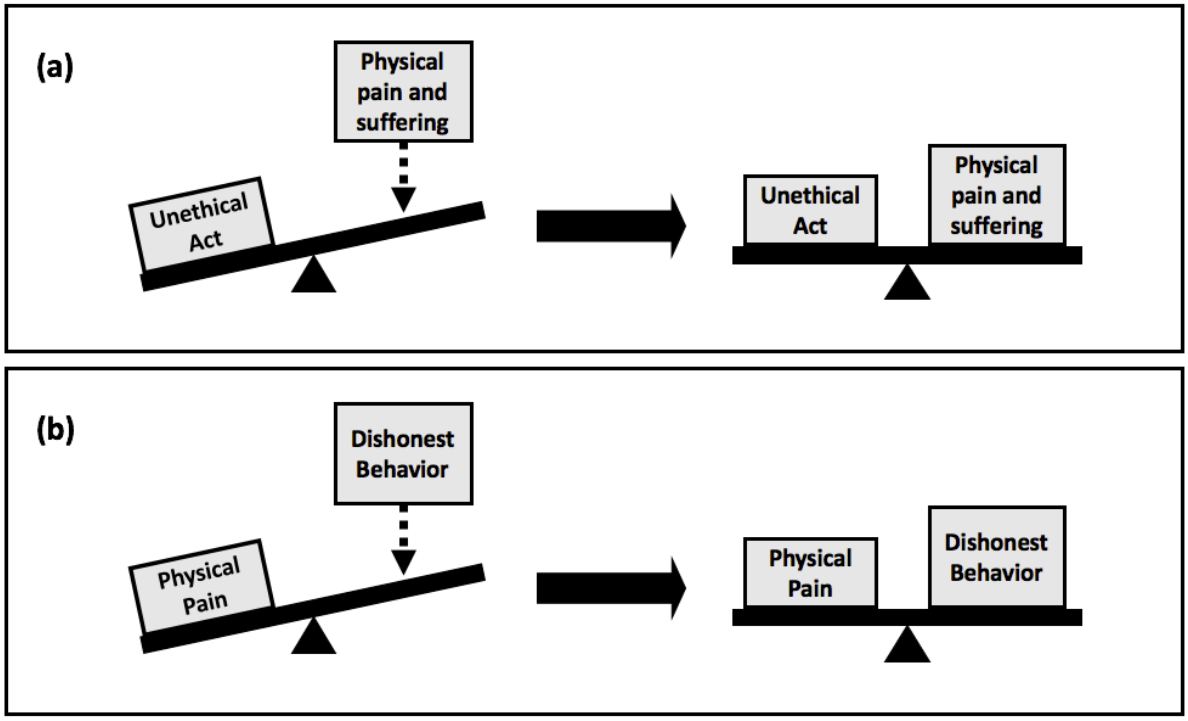
Psychological Research on Self-inflicting of Physical Pain

The tendency to self-inflict pain after committing unethical acts was also supported by modern psychological research. A study by Bastian, Jetten and Fasoli (2011) found that participants who recalled a past unethical deed submerged their hands in a container with cold water for longer periods of time than participants in the control condition did. Another study found that participants who recalled a guilt-inducing event self-administered more intense electrical shocks than those who recalled a sad or neutral event (Inbar, Pizarro, Gilovich, & Ariely, 2013). The authors of the two above-mentioned studies proposed that self-punishment could serve to reduce guilt arising from the unethical deeds (see also Nelissen & Zeelenberg, 2009).

To conceptualize this metaphorically, committing or recalling unethical deeds would tip the balance of a metaphorical balancing scale and self-punishment could serve to "balance" the scale (see Figure 1a)[1].

Figure 1

Graphical representation of (a) how physical pain and suffering can "balance out"a past unethical act, and (b) how physical pain may result in an imbalance and dishonest behavior can serve to restore the balance



Physical Pain and Subsequent Unethical Behaviors

While the effect of unethical behaviors on the tendency to subsequently self-inflict physical pain has been well-documented by psychological research, there is relatively little

[1] We acknowledge that self-punishment is probably just one of many ways to balance the scale. Other possible ways to balance the scale includes physical cleansing (e.g., Zhong & Liljenquist, 2006) and engaging in prosocial behaviors (e.g., Jordan, Mullen, & Murnighan, 2011).

studies examining the reverse causality of this effect. That is, it is not clear if experiencing physical pain can also influence the tendency to *subsequently* engage in unethical behaviors. To conceptualize this using the balancing scale metaphor (see Figure 1b), it remains unanswered if (i) experiencing physical pain will tip the balance of the scale, and (ii) engaging in unethical behaviors will restore balance to the scale. In the present study, we sought to contribute to the theoretical literature by investigating if physical pain can influence the tendency to subsequently engage in unethical behaviors. While there is a wide array of unethical behaviors, we focused specifically on one type of unethical behavior: *dishonest behaviors*, which pose a significant problem to all parts of society (e.g., corporate businesses, governments, scientific institutions). Formally stated, our research question was as follows.

Research Question: What are the effects of physical pain on the tendency to subsequently engage in dishonest behaviors?

While past studies found that physical pain can decrease the tendency to make amends (van Bunderen & Bastian, 2014) and increase the tendency to indulge in guilt-evoking pleasures (Bastian, Jetten, & Stewart, 2013), there is scant research examining the effects of physical pain on dishonest behavior.

Nonetheless, research on social pain may provide indirect evidence for the effect of physical pain on dishonest behavior. A previous study by Poon, Chen and DeWall (2013; Experiments 4 and 5) found evidence that social pain (i.e., ostracism) could increase the tendency to engage in dishonest behaviors. As social and physical pain may share important commonalities in their neural mechanisms (DeWall et al., 2010; Eisenberger, Lieberman, & Williams, 2003; Kross, Berman, Mischel, Smith, & Wager, 2011), it seems possible that physical pain may also increase dishonest behavior.

However, this is not a foregone conclusion. The alleged overlap between social and physical pain remains a controversial theory, with recent studies challenging this notion. For example, a study by Woo and colleagues (2014) argued that "pain and rejection do not share neural representations within core pain-processing brain regions" (p. 9).

Poon and colleagues (2013; Experiment 3) tried to compare the relative effects of social pain (i.e., ostracism) and physical pain on dishonest intentions. Participants in the experiment were randomly assigned to recall either a past experience where they were ostracized or where they had experienced physical pain. Next, participants were asked to imagine themselves in a hypothetical scenario (i.e., salary negotiation) and to rate the likelihood that they would behave dishonestly in the scenario. The authors found that participants who recalled an ostracized experience indicated greater dishonest intention than those who recalled a physical pain experience. However, the primary focus of the study was on ostracism and therefore does not allow firm conclusions to be drawn regarding the effects of physical pain on dishonesty for three key reasons. First, the absence of a neutral control group in the study did not allow for the examination of the effects of physical pain in isolation. Second, while a recall task can be effective in inducing some emotions (e.g., guilt, sadness), physical pain is (usually) triggered by the nervous system and it is doubtful that a recall task can induce *actual* physical pain[2]. Third, the use of self-reported intentions to engage in dishonest behavior in a hypothetical scenario may not be able to provide strong evidence for *actual* dishonest behavior. Research on 'moral hypocrisy' indicate that people sometimes do not practice what they preach when it comes to moral behaviors (Batson, Kobrynowicz, Dinnerstein, Kampf, & Wilson, 1997; Monin & Merritt, 2012). For example, a

[2] Note however, we do not claim that mental states have no influence over the experience of physical pain. Indeed, studies have found that experience of pain can be moderated by mental states (e.g., Gray & Wegner, 2008; Zhou, Vohs, & Baumeister, 2009). Instead, we are merely proposing that a recall task could be ineffective in inducing physical pain.

study found a substantial difference between real and hypothetical moral choices (d = 2.05; FeldmanHall et al., 2012; Study 1b). Therefore, whether physical pain can influence subsequent dishonest behaviors remains an open question.

Psychological Entitlement: A Potential Mediating Mechanism

Drawing on past research that linked psychological entitlement to both physical pain and dishonest behaviors, we further propose that psychological entitlement could potentially serve as a mediating mechanism between physical pain and dishonest behaviors. By psychological entitlement, we refer to a "sense that one deserves more and is entitled to more than others" (p. 31; Campbell, Bonacci, Shelton, Exline, & Bushman, 2004). Psychological entitlement has been conceptualized as both a stable individual *trait* (e.g., Campbell et al., 2004) and a *state* which can be temporarily changed (e.g., Poon et al., 2013; Zitek, Jordan, Monin, & Leach, 2010).

Physical pain increases entitlement. People have a general tendency to believe that the world is just and that people "get what they deserve" (p. 11, Lerner, 1980; see also Furnham, 2003). Hence, when people suffer physical pain *and* perceive the pain to be unjust, they might feel that they deserve more and are entitled to more things in life to offset the injustices they are suffering. This reasoning has some support from both clinical and experimental research. For instance, among patients suffering from chronic pain, a common response is an elevated sense of injustice. These patients may perceive the pain they suffer as being unfair (e.g., "it all seems so unfair") and attempt to restore justice through means such as seeking financial compensation (McParland & Eccleston, 2013; Sullivan, Scott, & Trost, 2012). Similarly, the authors of an experimental study that investigated the effects of physical pain on self-indulgent behaviors concluded that physical pain induced by submerging one's hand in cold water (between 0-2 °C) could "increase a sense of entitlement to indulge the self" (Bastian et al., 2013, p. 218).

Entitlement increases dishonest tendencies. An increased sense of psychological entitlement, in turn, had been found to increase the tendency to engage in dishonest behaviors. For example, increased psychological entitlement was found to mediate the effects of ostracism (Poon et al., 2013), winning a competition (Schurr & Ritov, 2016) and creativity (Vincent & Kouchaki, in press) on dishonest behaviors. Another study found that among college students, entitlement was positively correlated (r = .20) with cheating tolerance (Shapiro, 2012).

Overview of Current Study

In the current study, we examined the effects of physical pain on dishonest behavior. Participants were randomly assigned to experience either physical pain or no physical pain. Physical pain was induced through an adapted cold pressor test (Lovallo, 1975) where participants submerged their hands in cold water. Subsequently, participants were presented with the opportunity to behave dishonestly for financial gain in the die-under-cup task (Shalvi, Handgraaf, & De Dreu, 2011; Fischbacher & Heusi, 2008).

The die-under-cup task requires participants to roll a die using an opaque cup several times (thrice in our current study) but to report only the outcome of the *first* die roll. Participants will then be paid an additional financial bonus proportional to the reported die roll outcome, thereby incentivizing dishonesty. As participants' behavior in the task cannot be verified by the researcher, the task allows for the measurement of participants' intrinsic (dis)honesty[3]. While the desire to see oneself as an honest person may deter one from behaving dishonestly (Mazar, Amir, & Ariely, 2008), rolling the die multiple times can provide counterfactuals that allow one to behave dishonestly while still maintaining an honest self-image. This task had been successfully used in past studies to investigate how factors

[3] By 'intrinsic honesty', I refer to people's pure intrinsic preference for honesty that are not influenced by external factors (e.g., punishments, sanctions, reputational costs; Gächter & Schulz, 2016).

such as cognitive load (van't Veer, Stel, & van Beest, 2014) and time pressure (Shalvi, Eldar, & Bereby-Meyer, 2012) may influence dishonest behavior. However, a drawback of this task is that it only allows us to to examine dishonest behavior at the aggregate level but not at the individual level. Consequently, this would preclude us from testing any mediating models.

For our current study, we hypothesized that the reported outcome of the first die roll would be higher among participants in the pain condition (compared to those in the no pain condition). We also sought to conduct three exploratory analyses to help guide and inform future studies in this line of research. First, we administered the Psychological Entitlement Scale (Campbell et al., 2004). In order to minimize the time delay between the cold pressor test and die-under-cup task, we opted to administer the scale *after* the die-under-cup task. In doing so, we acknowledged that we would not be able to directly examine the effect of physical pain on entitlement (and therefore precludes the testing of mediation models) because participants' behavior on the die-under-cup task might also influence their level of psychological entitlement. Second, environmental temperature has been found to influence pain perception (Strigo, Carli, & Bushnell, 2000) and social behaviors such as cooperation in the Prisoner's Dilemma game (Storey & Workman, 2013), forgiveness of a peer's dishonest behavior (Wei, Ma & Wang, 2015) and prosocial behaviors among children (IJzerman, Karremans, Thomsen, & Schubert, 2013). Building on this body of work, we sought to explore in our study if environmental temperature (e.g., room temperature) might be associated with pain-related measures in the cold pressor test and dishonest behavior in the die-under-cup task. Third, we examined if participants' compensation mode (i.e., compensated with either money or course credit) may influence dishonest behavior. For these three exploratory analyses, we did not have any *a priori* hypothesis or prediction.

Method

Participants and Design

Participants were 71 university students at Tilburg University who received either course credit or €4 for participation, and an additional bonus between €1-6 (see 'Procedures' section for payment structure). We *a priori* decided that data collection would be terminated either at a pre-determined cutoff date or when the sample size specified by an a priori power analysis ($N = 148$) is attained[4]. The sample size for the current study was the result of the former condition (i.e., pre-determined cutoff date). The study was approved by the Ethics Committee of Tilburg University.

The study employed a between-subject design with two conditions (pain vs. no pain). Two participants in the pain condition were excluded from analyses for reporting no pain (a '0' on a 0-10 point scale), leaving 69 participants (23 males; $M_{age} = 21.39$, $SD_{age} = 2.37$). Participants were randomly assigned to the one of the two conditions ($N_{pain} = 32$, $N_{no\ pain} = 37$).

Procedures

The experiment was conducted in an empty office specially set-up for the purpose of the experiment. When participants arrived at the room, they were seated in front of a desk with a laptop, a roll of paper towels, a die and a paper cup. The experimenter then asked the participants if they were left or right-handed (i.e., if they usually operate a computer mouse using their left or right hand). The experimenter then shifted a movable cabinet drawer with the two water containers on top to the side of the participants' non-dominant hand (see Figure 2 for a photo depicting the experimental set-up). One of the container was labelled "Cold Water" containing water at 4.46 °C (SD = 0.56), while the other was labelled "Warm Water" with water at 31.52 °C (SD = 0.96). An Aqualantis Easyflux-200 aquarium pump circulated

[4] Power analysis was conducted using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). In conducting the power analysis, the estimated effect size used was $d = 0.50$, the statistical test was Mann Whitney test, with the most conservative "minimum asymptotic relative efficiency (min ARE)" selected as a response distribution.

the water in each of the containers. Water temperatures were recorded by the experimenter using a Mastech digital multi-meter (model MS8233CL) with a thermocouple function.

Figure 2

Photo depicting experimental set-up

Participants were told that they would receive all instructions for the experiment through the computer (via Qualtrics web-survey) in front of them but they could ask the experimenter if they encountered any problems during the session. After instructing participants to start, the experimenter proceeded to sit at a desk to the left of the participant. To provide participants with more privacy, a large cupboard separated the participant and the experimenter such that their view of each other was completely obstructed.

Participants started the experiment by selecting the language they preferred for the web survey (either English or Dutch). Thereafter, all instructions were given through the web survey. Participants were first provided with some information about the experiment.

Specifically, they were told that the experiment consisted of three sequential tasks: (i) assessing water temperature, (ii) rolling a die and reporting the outcome, and (iii) filling out questionnaires. Next, participants provided informed consent and proceeded to the first task.

Cold Pressor test. To control for potential differences in initial hand temperature, all participants were first instructed to place their non-dominant hand in the warm water container for 40 seconds. A countdown timer was displayed on the computer and participants were prompted to remove their hands from the container when the timer reached zero.

Participants were then told that in the first task, they would be assessing the temperature of either the cold or warm water, with the purpose of calibrating the procedure for use in future research. Next, they were informed that they would be randomly assigned to assess the water temperature of one of the water containers by rolling a die. Importantly, participants were not provided with any details on how this assignment would be implemented (i.e., they did not know how die roll outcomes correspond to the conditions). Consequently, there was no clear incentive for participants to over or under report the die roll outcome.

Unbeknown to the participants, they were actually randomly assigned to their condition by a randomizer independent of the die roll they reported. This randomization was implemented in real-time (i.e., after participants reported the die roll outcome) by the web survey. This ensured that the experimenter was blind to participants' condition, minimizing experimenter bias.

After reporting the die roll outcome, participants were informed about the water container they were assigned to. They were instructed to submerge their non-dominant hand in the assigned container for 40 seconds. Nonetheless, it was mentioned that they could remove their hands earlier if they found the sensation unbearable. The duration which they submerged their water in the container was recorded via the web survey – participants who

removed their hand before 40 seconds were instructed to click a button on the web survey at the same time.

Next, participants were asked to rate the level of pain they experienced during the task (0 = No pain at all, 10 = A lot of pain) and how annoying the pain was (0 = Not annoying at all, 10 = Very annoying). Next, they provided estimates of the water temperature and room temperature (in °C). After which, they proceeded to the second task.

Die-under-cup task. Participants were first provided with instructions on how to roll a die with the cup. They were told that they should (i) place the cup over the die, (ii) shake the cup, and (iii) check the die roll outcome by looking through a hole in the cup. After watching a video demonstration[5], they were told to practice rolling the die at least three times.

Participants then started the actual task. They were informed that they were required to roll the die three times, report the outcome of the first die roll, and that they would receive a bonus payment dependent on the outcome they reported (€1 for each point of the die roll). All participants received this additional monetary bonus regardless of their compensation mode.

Questionnaires. After completing the die-under-cup task, participants proceeded to fill out the Psychological Entitlement Scale (Campbell et al., 2004). The scale comprises nine statements and respondents were required to indicate the extent to which they agreed with the statements on a 7-point scale (1 = Strong Disagreement, 7 = Strong Agreement). The scale was also translated to Dutch for the current study (see Appendix A). Next, participants provided demographic information and were then debriefed, paid and thanked for their participation.

[5] Video available at: https://www.youtube.com/watch?v=iSgzJ4jIDY8

Environmental temperatures. The experimenter measured the room temperature at the start of the experiment using the same digital multi-meter used for measuring water temperature. The daily average temperature of the city (i.e., Tilburg, Netherlands) was retrieved at a later time from a weather forecasting website (Weather Underground, 2016).

Results

Manipulation check

All participants in the no pain (i.e., warm water) condition kept their hands in the water container for 40 seconds, while 59% of the participants in the pain condition (i.e. cold water) managed to do so (mean duration = 32.78 seconds, $SD = 9.90$). The difference in duration was statistically significant, $t(31) = 4.13$, $p < .001$[6]).

Participants in the pain condition reported experiencing more pain ($M = 7.01$, $SD = 1.51$ vs. $M = 0.01$, $SD = 0.06$; $t(31) = 26.21$, $p < .001$[7]) and higher level of annoyance ($M = 7.15$, $SD = 1.74$ v. $M = 0.03$, $SD = 0.13$; $t(31) = 23.10$, $p < .001$[8]), than those in the no pain condition. Among participants in the pain condition[9], the pain and annoyance ratings were highly correlated, $r(31) = .83$, $p < .001$. We then computed a 'composite pain-related measure' for subsequent analyses by averaging the two ratings. This two-item scale was highly reliable among participants in the pain condition (Cronbach's alpha = .90)[10].

Overall, our findings indicate that the cold pressor test had successfully induced physical pain among participants in the pain condition but not among those in the no pain

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[6] Levene's test indicated unequal variance ($F = 123.52$, $p < .001$), so degree of freedoms was adjusted from 67 to 31.
[7] Levene's test indicated unequal variance ($F = 34.79$, $p < .001$), so degree of freedoms was adjusted from 67 to 31.
[8] Levene's test indicated unequal variance ($F = 34.80$, $p < .001$), so degree of freedoms was adjusted from 67 to 31.
[9] We did not examine the correlation between pain and annoyance ratings across all participants (in both conditions) as it cannot be easily interpreted (c.f., Simpson's Paradox).
[10] The Cronbach's alpha of the two-item scale across participants in both condition is .99. However, this statistic cannot be readily interpreted (c.f., Simpson's Paradox).

condition.

Die roll which determined condition

The reported die roll outcome for determining participants' condition (hereafter '*die roll (condition)*') was neither significantly different from the expected value (i.e., 3.5) across all participants ($M = 3.54$, $SD = 1.75$; Wilcoxon Signed Rank Test $Z = 0.19$, $p = .853$), among participants in the pain condition ($M = 3.88$, $SD = 1.64$; Wilcoxon Signed Rank Test $Z = 1.27$, $p = .204$) nor among those in the no pain condition ($M = 3.24$, $SD = 1.80$; Wilcoxon Signed Rank Test $Z = 0.83$, $p = .404$). *Die roll (condition)* was also not significantly different across the two conditions (Mann Whitney $Z = 1.52$, $p = .128$). Finally, *die roll (condition)* was also not significantly correlated with the die roll that determined participants' bonus payment (Spearman's rho = .119, $p = .331$). These findings indicate that in the absence of financial incentive, participants did not over or under report die roll outcome.

Table 1

Means and SDs for die roll outcomes across condition

	Condition		Overall
	Pain	No Pain	
Die roll (condition)	3.88 (1.64)	3.24 (1.80)	3.54 (1.75)
Die roll (bonus)	4.34 (1.54)	3.68 (1.36)	3.99 (1.47)

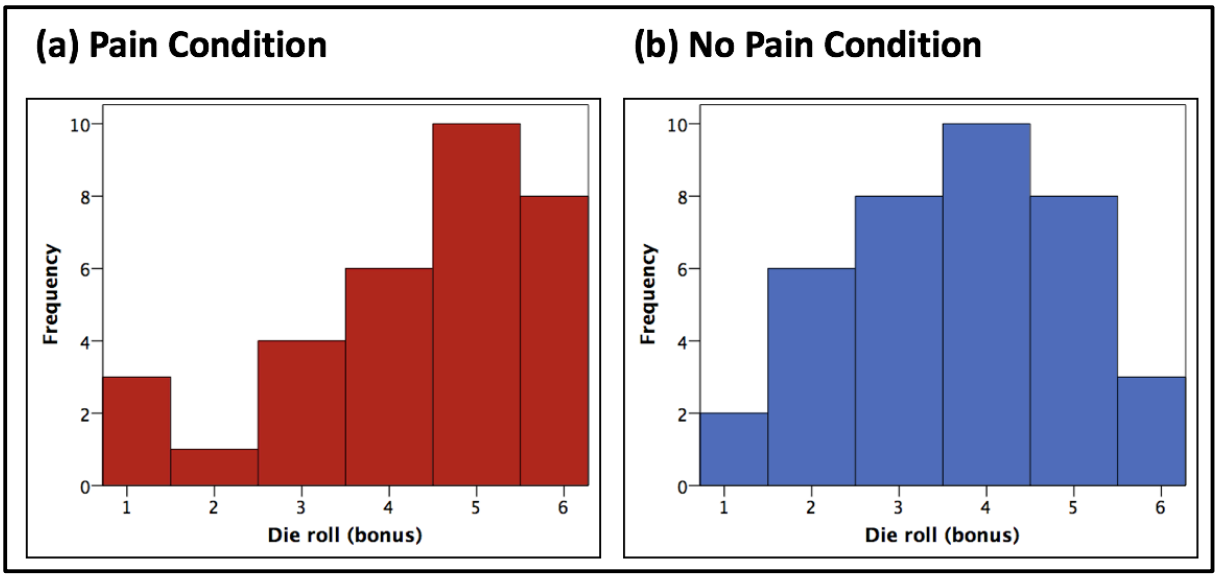
Die roll for bonus payment

Our main dependent variable of interest was the reported die roll outcome which determined the bonus payment participants received (hereafter, '*die roll (bonus)*'). We found that *die roll (bonus)* was higher among participants in the pain condition ($M = 4.34$, $SD = 1.54$) as compared to those in the no pain condition ($M = 3.68$, $SD = 1.36$; Mann Whitney $Z = 2.14$, $p = .033$; see also Table 1 and Figure 3). *Die roll (bonus)* was significantly different

from the expected 3.5 in the pain condition (Wilcoxon Signed Rank Test $Z = 2.75$, $p = .006$) but not so in the no pain condition (Wilcoxon Signed Rank Test $Z = 0.81$, $p = .419$). This supports our hypothesis that physical pain can increase the tendency to dishonestly over-report die roll outcome for financial gains.

Figure 3

Histograms of die roll (bonus) in (a) Pain condition (n = 32), and (b) No pain condition (n = 37)



Robustness check 1. Previously, we reported that 2 out of 71 participants in the pain condition were excluded from analyses as their reported pain rating was '0'. Including the two participants in the analysis did not change the statistical significance of our finding. The *die roll (bonus)* in the pain condition ($M = 4.26$, $SD = 1.60$, N = 34) remained significantly higher than that in the no pain condition ($M = 3.68$, $SD = 1.36$, N = 37; Mann Whitney $Z = 1.97$, $p = .048$).

Robustness check 2. We also examined the robustness of this finding when including only participants whose composite pain and annoyance ratings were at least '5' (on the 0-10

point scale) in the analysis. The statistical significance also remained unchanged. The *die roll (bonus)* in the pain condition ($M = 4.39$, $SD = 1.47$, $N = 28$) was still significantly higher than that in the no pain condition ($M = 3.68$, $SD = 1.36$, $N = 37$; Mann Whitney $Z = 2.17$, $p = .030$).

Robustness check 3. While we did not find a significant difference in *die roll (condition)* across conditions, we nonetheless examined the effect of pain on *die roll (bonus)* after controlling for *die roll (condition)*. Results of ordinal regression indicates that the partial effect of the pain manipulation was statistically significant (coefficient = - 0.92, $p = .040$; see also Table 2).

All in all, these findings supported our hypothesis that physical pain could increase dishonest behavior. We found that that participants who suffered physical pain had behaved dishonestly by over-reporting the die roll outcome and their reported die roll outcome was higher than participants who did not experience physical pain.

Table 2

Results of ordinal regression examining effects of physical pain and die roll (condition) on die roll (bonus)

		Parameter estimate	SE	*p*-value
Intercept				
	Die roll = 1 | 2	-2.85	0.72	< .001
	Die roll = 2 | 3	-1.85	0.63	< .001
	Die roll = 3 | 4	-0.88	0.59	.134
	Die roll = 4 | 5	0.14	0.58	.814
	Die roll = 5 | 6	1.57	0.62	.011
Coefficient				
	Die roll (condition)	0.09	0.13	.455
	Condition = No Pain	-0.92	0.45	.040
	Nagelkerke R^2		.078	

Exploratory Analyses

Psychological Entitlement. The Psychological Entitlement Scale (Campbell et al., 2004) was found to be reliable in the current sample (Cronbach's alpha = .88). There was no significant difference in entitlement score between participants in the pain (M = 3.27, SD = 0.98) and no pain conditions (M = 3.06, SD = 1.01), $t(67) = 0.85$, $p = .400$. Across all the participants, entitlement was not significantly correlated with *die roll (bonus)* (Spearman's rho = .05, $p = .694$). Among participants in the pain condition, entitlement score was not significantly correlated with the composite of pain and annoyance ratings, $r(30) = -.04$, $p =$

.834).

Compensation mode. We found that participants who signed up to receive money had higher *die roll (outcome)* (Mann Whitney $Z = 2.64$, $p = .008$; see Table 3 for means and SDs) and *die roll (bonus)* than those who received credit hours (Mann Whitney $Z = 2.30$, $p = .021$; see also Table 3). Participants' compensation mode did not significantly differ across experimental conditions, $\chi^2 (1) = 3.84$, $p = .050$[11].

Table 3

Means and SDs for die roll outcomes across compensation modes and conditions

	N	Die roll (condition)		Die roll (bonus)	
		Mean	SD	Mean	SD
Money					
Pain	23	4.26	1.66	4.52	1.41
No Pain	18	3.67	1.91	4.11	1.28
Total	41	4.00	1.77	4.34	1.35
Credit Hours					
Pain	9	2.89	1.17	3.89	1.83
No Pain	19	2.84	1.64	3.26	1.33
Total	28	2.86	1.48	3.46	1.50

[11] A more exact *p*-value is .05007. While it is technical not statistically significant, some may interpret this *p*-value as 'marginally significant'. Hence, we also present supplementary analyses examining the incremental predictive value of condition over and above compensation mode in Appendix B. Briefly, the results provide tentative evidence that condition has incremental predictive value over and above compensation mode alone.

Environmental temperature and dishonest behavior. Results indicate that *die roll (bonus)* was not significantly correlated with the city's average daily temperature, room temperatures estimated by the participant and measured by the experimenter (see Table 4). Among participants in the pain condition, there was also no significant correlation between environmental temperature variables and pain ratings (see Table 5).

Table 4

Spearman's rhos between environmental temperature variables and die roll (bonus) (n = 69)

Variables	1	2	3
1. Die roll (bonus)	-		
2. Estimated room temperature	-.035	-	
3. Measured room temperature	-.120	.420**	-
4. Average daily temperature in city	-.028	.103	.432**

** $p < .01$

Note: Pearson's correlations led to the same statistical conclusions.

Table 5

Pearson's correlations between environmental temperature variables and pain ratings among participants in the pain condition (n = 32)

Variables	1	2	3	4	5
1. Pain rating	-				
2. Annoyance rating	.828**	-			
3. Composite pain-related measures	.949**	.962**	-		
4. Estimated room temperature	.165	.232	.210	-	
5. Measured room temperature	.192	.313	.268	.363*	-
6. Average daily temperature in city	.121	.149	.143	.274	.715**

* $p < .05$, ** $p < .01$

Discussion

Our study provides the first evidence for our hypothesis that physical pain can increase the tendency to subsequently engage in dishonest behavior. Our findings also extend prior research on physical pain and dishonesty behavior by suggesting that the link between physical pain and dishonest behaviors can be bi-directional. While previous research found that reminders of past unethical deeds can lead to the self-infliction of physical pain, our findings indicate that experiencing physical pain could also lead to subsequent dishonest behavior.

Although physical pain is usually thought to be harmful, researchers are beginning to highlight the potential benefits of pain (e.g., Leknes & Bastian, 2014). One of these benefits is that pain may serve to demonstrate virtues. For example, virtues such as patience, endurance and self-mastery are often associated with individuals who suffered pain (e.g., sportspersons, soldiers). Consequently, when an individual's integrity is challenged (e.g., due to committing unethical acts), suffering pain could serve to restore virtues (Bastian, Jetten, Hornsey, & Leknes, 2014).

Our findings suggest that this purported benefit of pain may paradoxically come with a dark side. Just as engaging in virtuous or prosocial behaviors can increase subsequent dishonest behaviors (cf. moral self-licensing effect; Merritt, Effron, & Monin, 2010), physical pain can also increase the tendency to engage in dishonest behaviors.

Besides testing our main hypothesis, we also conducted several exploratory analyses. First, we found that the Psychological Entitlement Scale (Campbell et al., 2004) is a reliable measure in our sample. While we did not find a significant difference in entitlement scores across condition, this should *not* be taken as evidence against psychological entitlement as a mediating mechanism. This is because the scale was administered after participants performed the die-under-cup task, which might have 'cancelled out' the effects of pain on

entitlement. Second, we found that both the un-incentivized and incentivized reported die roll outcomes were higher among individuals who participated for monetary payment (compared to those who participated for course credit). This is suggestive that there might be some differences in participants' characteristics across compensation modes. Future research can attempt to verify and further examine this finding. Third, environmental temperature variables were not significantly associated with dishonest behavior and pain-related measures in our current study.

Limitations and Future Directions

While we had argued that our findings provide evidence for a bi-directional link between pain and unethical behaviors, our current study had only examined the 'pain to unethical behaviors' pathway but not the 'unethical behaviors to pain' pathway. Nonetheless, several past studies had provided evidence for the latter pathway (e.g., Bastian et al., 2011; Inbar et al., 2013). As such, we believe that our current study, together with these past studies, do provide evidence for a bi-directional link.

Another potential limitation of our study was that we were not able to investigate what mediates the effect of physical pain on dishonest behavior. This was mainly because the die-under-cup task allows the measurement of dishonest behavior at the aggregate level but not at the individual level. We believe that the investigation of the mediating mechanisms is a fruitful avenue for future research and this can be achieved by using tasks that allow for individual-level measure of dishonest behaviors.

While we had earlier proposed psychological entitlement as a possible mediating mechanism, there are numerous other possible mechanisms. In this section, we briefly outline four such mechanisms. First, suffering physical pain may provide an individual with the moral license to subsequently engage in dishonest behaviors (Merritt et al., 2010). Second, according to moral typecasting theory (Gray & Wegner, 2009), individuals who suffered

physical pain will tend to be perceived as less blameworthy. This might consequently mitigate the potential interpersonal costs (e.g., damage to reputation) of engaging in dishonest acts. Third, physical pain could induce negative affect, and dishonest behavior could serve an emotional self-regulation function by evoking positive affect (i.e., cheater's high; Ruedy, Moore, Gino, & Schweitzer, 2013). Fourth, it had been proposed that self-justifications could allow individuals to behave dishonestly while still maintaining a positive moral self-image (also referred to as 'fudge factor'; Ariely, 2012; Shalvi, Dana, Handgraaf, & De Dreu, 2011). In our current experiment, suffering physical pain could serve to facilitate self-justification (e.g., "this is so painful, I deserve to be compensated more for participating in this study"), thereby increasing dishonest behaviors.

Conclusions

Our current findings provide first evidence that suffering physical pain could increase dishonest behavior. Not only did our findings suggest that the link between physical pain and dishonest behavior could be bi-directional, our study also contributed to the literature by proposing another determinant of dishonest behavior: physical pain. Future research attempting to unravel the underlying mechanisms could potentially allow the identification of ways to reduce dishonest behaviors in society.

References

Ariely, D. (2012). *The (Honest) Truth About Dishonesty: How We Lie to Everyone – Especially Ourselves*. New York, NY: Harper Collins.

Badawi, J. (n.d.). *Fasting and Ramanda.* Retrieved from: http://www.muslimummah.org/articles/articles.php?itemno=174&&category=Ramadan

Bastian, B., Jetten, J., & Fasoli, F. (2011). Cleansing the Soul by Hurting the Flesh: The Guilt-Reducing Effect of Pain. *Psychological Science, 22*(3), 334-335.

Bastian, B., Jetten, J., & Stewart, E. (2013). Physical Pain and Guilty Pleasures. *Social Psychological and Personality Science, 4*(2), 215-219

Bastian, B., Jetten, J., Hornsey, M. J., & Leknes, S. (2014). The Positive Consequences of Pain: A Biopsychosocial Approach. *Personality and Social Psychology Review, 18*(3), 256-279.

Batson, D., Kobrynowicz, D., Dinnerstein, J. L., Kampf, H. C., & Wilson, A. D. (1997). In a very different voice: unmasking moral hypocrisy. *Journal of Personality and Social Psychology, 72*(6), 1335-1348.

Campbell, W. K., Bonacci, A. M., Shelton, J., Exline, J. J., & Bushman, B. J (2004). Psychological Entitlement: Interpersonal Consequences and Validation of a Self-Report Measure. *Journal of Personality Assessment, 83*(1), 29-45.

DeWall, C. N., MacDonald, G., Webster, G. D., Masten, C. L., Baumeister, R. F., Powell, C., Combs, D., Schurtz, D. R., Stillman, T. F., Tice, D. M., & Eisenberger, N. I. (2010). Acetaminophen Reduces Social Pain: Behavioral and Neural Evidence. *Psychological Science, 21*(7), 931-937.

Dues, G. (2006). *Catholic Customs & Traditions: A Popular Guide.* New London, CT: Twenty-Third Publication.

Eisenberger, N. I., Lieberman, M. D., & Williams, K. D. (2003). Does rejection hurt? An FMRI study of social exclusion. *Science, 302*(5643), 290-292.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160.

FeldmanHall, O., Mobbs, D., Evans, D., Hiscox, L., Navrady, L., & Dalgleish, T. (2012). What we say and what we do: The relationship between real and hypothetical moral choices. *Cognition, 123*(3), 434-441.

Fishbacher, U., & Heusi, F. (2008). *Lies in disguise, an experimental study on cheating.* TWI Working paper 40, Thurgau Institute of Economics, University of Konstanz.

Furnham, A. (2003). Belief in a just world: research progress over the past decade. *Personality and Individual Differences, 34*, 795-817.

Gächter, S., & Schulz, J. F. (2016). Intrinsic honesty and the prevalence of rule violations across societies. *Nature, 531*(7595), 496-499.

Gray, K., & Wegner, D. M. (2008). The Sting of Intentional Pain. *Psychological Science, 19*(12), 1260-1262.

Gray, K., & Wegner, D. M. (2009). Moral Typecasting: Divergent Perceptions of Moral Agents and Moral Patients. *Attitudes and Social Cognition, 96*(3), 505-520.

Gripaldo, R. M. (2009). Roman Catholicism and Filipino Culture. In G. Arivia & D. G. Adian (Eds*.), Relations Between Religions and Cultures in Southeast Asia* (pp. 111-140). Washington, DC: Council for Research in Values and Philosophy.

IJzerman, H., Karremans, J. C., Thomsen, L., & Schubert, T. W. (2013). Caring for Sharing: How Attachment Styles Modulates Communal Cues of Physical Warmth. *Social Psychology, 44*(2), 160-166.

Inbar, Y., Pizarro, D., Gilovich, T., & Ariely, D. (2013). Moral Masochism: On the Connection Between Guilt and Self-Punishment. *Emotion, 13*(1), 14-18.

Jordan, J., Mullen, E., & Murnighan, J. K. (2011). Striving for the Moral Self: The Effects of Recalling Past Moral Actions on Future Moral Behavior. *Personality and Social Psychology Bulletin, 37*(5), 701-713.

Klostermaier, K. K. (2007). *Survey of Hinduism* (3rd eds.). Albany, NY: State University of New York Press.

Kross, E., Berman, M. G., Mischel, W., Smith, E. E., & Wager, T. D. (2011). Social rejection shares somatosensory representations with physical pain. *Proceedings of the National Academy of Sciences, 108*(15), 6270-6275.

Leknes, S., & Bastian, B. (2014). The Benefits of Pain. *Review of Philosophy and Psychology, 5*(1), 57-70.

Lerner, M. (1980). *The belief in a just world: a fundamental delusion.* New York, NY: Plenum.

Lovallo, W. (1975). The Cold Pressor Test and Autonomic Function: A Review and Integration. *Psychophysiology, 12*(3), 268-282.

Mazar, N., Amir, O., & Ariely, D. (2008). The Dishonesty of Honest People: A Theory of Self-Concept Maintenance. *Journal of Marketing Research, 45*(6), 633-644.

McParland, J. L., & Eccleston, C. (2013). "It's Not Fair": Social Justice Appraisals in the Context of Chronic Pain. *Current Directions in Psychological Science, 22*(6), 484-489.

Merritt, A. C., Effron, D. A., & Monin, B. (2010). Moral Self-Licensing: When Being Good Frees Us to Be Bad. *Social and Personality Psychology Compass, 4*(5), 344-357.

Monin, B., & Merritt, A. (2012). *Moral hypocrisy, moral inconsistency, and the struggle for moral integrity.* In M. Mikulincer & P. Shaver (Eds.), The social psychology of morality: Exploring the causes of good and evil. Herzzliya Series of Personality and

Social Psychology (pp. 167-184). Washington, DC: American Psychological Association.

Nelissen, R. M. A., & Zeelenberg, M. (2009). When Guilt Evokes Self-Punishment: Evidence for the Existence of a Dobby Effect. *Emotion, 9*(1), 118-122.

Poon, K-T., Chen, Z., & DeWall, C. N. (2013). Feeling Entitled to More: Ostracism Increases Dishonest Behavior. *Personality and Social Psychology Bulletin, 39*(9), 1227-1239.

Ruedy, N., E., Moore, C., Gino, F., & Schweitzer, M. E. (2013). The Cheater's High: The Unexpected Affective Benefits of Unethical Behavior. *Attitudes and Social Cognition, 105*(4), 531-548.

Schurr, A., & Ritov, I. (2016). Winning a competition predicts dishonest behavior. *Proceedings of the National Academy of Science, 113*(7), 1754-1759.

Shalvi, S., Dana, J., Handgraaf, M. J. J., & De Dreu, C. K. W. (2011). Justified Ethicality: Observing desired counterfactuals modifies ethical perception and behavior. *Organizational Behavior and Human Decision Process, 115*, 181-190.

Shalvi, S., Eldar, O., & Bereby-Meyer, Y. (2012). Honesty Requires Time (and Lack of Justifications). *Psychological Science, 23*(10), 1264-1270.

Shalvi, S., Handgraaf, M. J. J., & De Dreu, C. K. W. (2011). Ethical maneuvering: Why people avoid both major and minor lies. *British Journal of Management, 22*, S16-S27.

Shapiro, P. D. (2012). Entitled to Cheat: An Examination of Incoming Freshmen at a Small Regional University. *Journal of Public and Professional Sociology, 4*(1), 2.

Strigo, I. A., Carli, F., & Bushnell, M. C. (2000). Effect of ambient temperature on human pain and temperature perception. Anesthesiology, 92(3), 699-707.

Storey, S., & Workman, L. (2013). The Effects of Temperature Priming on Cooperation in the Iterated Prisoner's Dilemma. *Evolutionary Psychology, 11*(1), 52-67.

Sullivan, M. J. L., Scott, W., & Trost, Z. (2012). Perceived Injustice: A Risk Factor for Problematic Pain Outcomes. *Clinical Journal of Pain, 28*(6), 484-488.

Tauber, R. (2014). *The Little Book of Jewish Celebrations.* San Francisco, CA: Chronicle Books.

van Bunderen, L., & Bastian, B. (2014). "I have paid my dues": When physical pain reduces interpersonal justice motivations. *Motivation and Emotion, 38*(4), 540-546.

van't Veer, A. E., Stel, M., & van Beest, I. (2014). Limited capacity to lie: Cognitive load interferes with being dishonest. *Judgment and Decision Making, 9*(3), 199-206.

Vincent, L., & Kouchaki, M. (in press). Creative, Rare, Entitled, and Dishonest: How Commonality of Creativity in One's Group Decreases and Individual's Entitlement and Dishonesty. *Academy of Management Journal.* Advance online publication.

Weather Underground (2016). *Tilburg, Netherlands Forecast*. Retrieved from: https://www.wunderground.com/cgi-bin/findweather/getForecast?query=Tilburg

Wei, W., Ma, J., & Wang, L. (2015). The 'warm' side of coldness: Cold promotes interpersonal warmth in negative contexts. *British Journal of Social Psychology, 54*(4), 712-727.

Woo, C-W., Koban, L., Kross, E., Lindquist, M. A., Banich, M. T., Ruzic, L., Andrews-Hanna, J. R., & Wager, T. D. (2014). Separate neural representations for physical pain and social rejection. *Nature Communications, 5*(5380), 1-12.

Zhong, C-B., & Liljenquist, K. (2006). Washing Away Your Sins: Threatened Morality and Physical Cleansing. *Science, 313*(5792), 1451-1452.

Zhou, X., Vohs, K. D., & Baumeister, R. F. (2009). The Symbolic Power of Money: Reminders of Money Alter Social Distress and Physical Pain. *Psychological Science, 20*(6), 700-706.

Zitek, E. M., Jordan, A. H., Monin, B., & Leach, F. R. (2010). Victim Entitlement to Behave Selfishly. *Journal of Personality and Social Psychology, 98*(2), 245-255.

Appendix A

Dutch Version of the Psychological Entitlement Scale used in the Current Study

Taak 3: Vragenlijsten

Selecteer de verklaringen onder het nummer dat u het beste uitkomt. Gebruik hierbij de 7-puntsschaal:

1. Ik ben echt van mening dat ik meer rechten heb dan anderen.

helemaal mee oneens	mee oneens	beetje me oneens	niet mee oneens/niet mee eens	beetje mee eens	mee eens	helemaal mee eens
○	○	○	○	○	○	○

2. Fantastische dingen moeten mij overkomen.

helemaal mee oneens	mee oneens	beetje me oneens	niet mee oneens/niet mee eens	beetje mee eens	mee eens	helemaal mee eens
○	○	○	○	○	○	○

3. Als ik op de Titanic had gezeten, dan had ik het verdiend om op de *eerste* reddingsboot te mogen.

helemaal mee oneens	mee oneens	beetje me oneens	niet mee oneens/niet mee eens	beetje mee eens	mee eens	helemaal mee eens
○	○	○	○	○	○	○

(Continued on next page)

4. Ik eis het beste omdat ik het waard ben.

helemaal mee oneens	mee oneens	beetje me oneens	niet mee oneens/niet mee eens	beetje mee eens	mee eens	helemaal mee eens
○	○	○	○	○	○	○

5. Ik verdien niet per se een speciale behandeling.

helemaal mee oneens	mee oneens	beetje me oneens	niet mee oneens/niet mee eens	beetje mee eens	mee eens	helemaal mee eens
○	○	○	○	○	○	○

6. Ik verdien meer dingen in mijn leven.

helemaal mee oneens	mee oneens	beetje me oneens	niet mee oneens/niet mee eens	beetje mee eens	mee eens	helemaal mee eens
○	○	○	○	○	○	○

7. Mensen zoals ik verdienen een extra meevaller zo nu en dan.

helemaal mee oneens	mee oneens	beetje me oneens	niet mee oneens/niet mee eens	beetje mee eens	mee eens	helemaal mee eens
○	○	○	○	○	○	○

8. Dingen moeten gaan zoals ik het wil.

helemaal mee oneens	mee oneens	beetje me oneens	niet mee oneens/niet mee eens	beetje mee eens	mee eens	helemaal mee eens
○	○	○	○	○	○	○

9. Ik voel dat ik bij alles recht heb op meer.

helemaal mee oneens	mee oneens	beetje me oneens	niet mee oneens/niet mee eens	beetje mee eens	mee eens	helemaal mee eens
○	○	○	○	○	○	○

Klik op de ">>" knop om verder te gaan.

>>

Appendix B

Supplementary Analyses examining the incremental predictive value of experimental condition on die roll (bonus) over and above compensation mode.

To examine if physical pain if had any incremental predictive value for the die roll, which determined bonus payment over and above that of participants' compensation mode, we examined three ordinal regression models. Model 1 included only *condition* as a predictor, Model 2 included only *compensation mode* as a predictor, while Model 3 included both *compensation mode* and *condition* as predictors. Results were shown in Table B1.

In Model 1, *condition* significantly predicted the reported die roll outcome for bonus payment ($p = .030$)[12], Of particular interest is the comparison between Models 2 and 3. Model 3 had higher pseudo R^2 values (e.g., Nagelkerke $R^2 = .118$) and lower AIC value (241.46) than Model 2 (Negelkerke $R^2 = .078$; AIC = 242.35). Model 3 also had lower residual deviance (-2 Log Likelihood) as compared to Model 2, though this approached but did not reach statistical significance (likelihood ratio test: χ^2 (1) = 2.89, $p = .089$). The partial effect of *condition* (controlled for *compensation mode*) was also marginally significant ($p = .091$)[13]. Taken together, these findings seemed to provide tentative evidence that physical pain had incremental predictive value over and above participants' compensation mode.

(Continued on next page)

[12] This analysis reached the same conclusions as the previously reported Mann Whitney test which examined differences in the reported die roll for bonus payment across experimental conditions.

[13] However, due to collinearity (i.e., correlation between condition and compensation mode), the coefficient and its corresponding *p*-value may be unstable.

Table B1

Results of ordinal regression examining the incremental predictive value of physical pain

	Model 1			**Model 2**			**Model 3**		
	Parameter estimate	SE	*p*-value	Parameter estimate	SE	*p*-value	Parameter estimate	SE	*p*-value
Intercepts									
Die roll = 1 | 2	-3.19	0.56	< .001	-3.06	0.53	< .001	-3.49	0.59	< .001
Die roll = 2 | 3	-2.18	0.44	< .001	-2.04	0.39	< .001	-2.46	0.47	< .001
Die roll = 3 | 4	-1.22	0.38	.001	-1.07	0.32	.001	-1.47	0.41	< .001
Die roll = 4 | 5	-0.21	0.35	.551	-0.09	0.30	.778	-0.44	0.37	.237
Die roll = 5 | 6	1.21	0.38	.002	1.31	0.36	< .001	1.00	0.40	.013
Coefficients									
Compensation Mode = Credit hours	-	-	-	-1.03	0.45	.021	-0.85	0.46	.063
Condition = No Pain	-0.97	0.45	.030	-	-	-	-0.78	0.46	.091
Model fit indices & Pseudo R^2									
AIC		242.98			242.35			241.46	
Residual Deviance		230.98			230.35			227.46	
Cox and Snell R^2		.068			.076			.114	
Nagelkerke R^2		.070			.078			.118	
McFadden R^2		.020			.023			.035	