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Is cleanliness next to godliness? Dispelling old wives' tales: Failure to replicate Zhong and Liljenquist (2006)

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Two conceptual replications of research by Zhong and Liljenquist (2006) are reported. The conceptual replications were carried out by two independent laboratories that did not collaborate or communicate with one another about the current studies. Study 1 ($N = 210$) replicated a study by Zhong and Liljenquist (2006) showing that participants who recalled their unethical behavior expressed a heightened desire to physically cleanse themselves with the addition of an assessment of personality traits. Study 2 ($N = 119$) replicated a second study by Zhong and Liljenquist (2006) in which they showed that recalling unethical behavior followed by actual physical cleansing led to a reduction in moral emotion with the addition of several new conditions to investigate alternative explanations for the effect. Despite larger samples and thus greater power to detect effects, both studies failed to replicate the original work of Zhong and Liljenquist (2006).

Recently, Zhong and Liljenquist (2006) reported a clever series of studies examining what they termed the “Macbeth effect,” or the idea that threats to one’s moral integrity prompt physical cleansing, and this physical cleansing relieves the person of his or her culpability. Across three studies, participants who were asked to recall and describe something unethical they had done demonstrated a stronger inclination toward physical cleansing. For example, in Study 1 participants who recalled an unethical memory completed more cleansing-related words in a word completion task. In Study 2, participants who hand-copied unethical stories in the first person rated cleaning-related products as preferable to non-cleaning products. In Study 3, participants who recalled unethical acts chose an antibacterial hand wipe over a pencil when offered a free gift. Further, a fourth study demonstrated that physical cleansing reduces moral emotions, as evidenced by participants’ reduced tendency to perform an altruistic act after having washed their hands.

In the research reported here, two independent laboratories with separate research agendas attempted two separate conceptual replications of Zhong and Liljenquist’s (2006) Studies 3 and 4. In the first study, we were interested in whether specific people may be more responsive to the guilt manipulation found in Zhong and Liljenquist’s Study 3. Specifically, past research has shown that people who are more conscientious are also more prone to feelings of guilt (Roberts, Jackson, Fayard, Edmonds, & Meints, 2009). Therefore we replicated Zhong and Liljenquist’s Study 3, in which participants who recalled an unethical deed expressed a desire to cleanse themselves of wrongdoing by taking a hand wipe as a free gift. In addition, we asked participants to complete several personality inventories before participating in the study.

In the second study, we sought to replicate and extend Zhong and Liljenquist’s (2006) Study 4. In the original study, the experimental participants recalled an unethical act and washed their hands, and thus were absolved of their guilt. Compared to a control group that did not wash their hands, the experimental group was less motivated to volunteer for another experiment, which presumably reflects the fact that their feelings of guilt were mollified by the washing of their hands. In this conceptual replication, we added several conditions to the original study in order to examine whether aspects of hand washing such as rubbing hands and clean scent were responsible for Zhong and Liljenquist’s (2006) effect.

Both of the current studies improved upon Zhong and Liljenquist’s (2006) work by using much larger samples than the original studies (Study 3 $N = 32$, Study 4 $N = 45$; Zhong & Liljenquist, 2006). Across both studies we expected to obtain the same results as Zhong and Liljenquist (2006). In Study 1 we expected those who were asked to write about an unethical act would be more likely to take a hand wipe than a pencil upon exiting the experiment with the additional expectation that conscientious people would be more likely to show the effect. In Study 2 we expected that cleaning one’s hands after threats to one’s moral integrity would result in lowered moral emotions and a decreased likelihood of volunteering, with the additional expectation of being able to tease apart which aspect of the cleaning was responsible for the effect.

Study 1

Study 1 was a conceptual replication of Zhong and Liljenquist’s (2006) Study 3, in which recalling one’s own unethical behavior resulted in the need for physical cleansing. We

also aimed to extend Zhong and Liljenquist's (2006) original study by examining whether personality traits such as conscientiousness moderated participants' response to the emotion manipulation. Like Zhong and Liljenquist (2006), we expected that a heightened desire for physical cleansing would emerge in response to an emotion manipulation.

Method

Participants

Participants for Study 1 were 264 undergraduates at the University of Illinois who participated in exchange for partial course credit in an introductory psychology course. However, 54 participants' data were discarded because they either declined to take either gift or took one of each gift. A total of 210 participants (117 female) with an average age of 19.13 ($SD = 1.21$) were used in final analyses. Among these, 6% were African American, 19% were Asian, 63% were Caucasian, 9% were Hispanic, and 3% identified themselves as "other."

Measures

The Conscientiousness Adjective Checklist (CAC; Roberts, Bogg, Walton, Chernyshenko, & Stark, 2004) is a 123 item measure consisting of 67 conscientiousness-descriptive adjectives such as "traditional," "industrious," and "organized," as well as various adjectives pertaining to the other Big Five personality traits. Participants rated how descriptive of them each adjective was on a 5-point Likert-type scale from 1 (disagree strongly) to 5 (agree strongly). The CAC contains nine facet scales for conscientiousness, including orderliness ($\alpha = .89$), reliability ($\alpha = .81$), impulse control ($\alpha = .69$), foolhardiness ($\alpha = .50$), decisiveness ($\alpha = .80$), punctuality ($\alpha = .69$), formality ($\alpha = .65$), conventionality ($\alpha = .61$), and industriousness ($\alpha = .43$); reliability for the overall conscientiousness scale was $\alpha = .92$.

The Chernyshenko Conscientiousness Scales (CCS; Chernyshenko, 2002) consists of six 10-item facet scales for conscientiousness, including responsibility, self-control, traditionality, virtue, order, and industriousness. Participants rated statements such as "I have high standards and work toward them" and "I try to be the best at anything I do" on a 4-point scale from 1 (disagree strongly) to 4 (agree strongly). Reliabilities for these scales were $\alpha = .93$ for order, $\alpha = .88$ for industriousness, $\alpha = .81$ for traditionality, $\alpha = .77$ for self-control, $\alpha = .75$ for virtue, and $\alpha = .61$ for responsibility. Alpha for the overall scale was .91.

Materials

For the two "free gifts" we employed individually-wrapped *Nice 'n Clean*® antibacterial moist wipes and *Dixon Ticonderoga*® number two pencils.

Procedure

Following Zhong and Liljenquist (2006), participants were randomly assigned to

either an unethical or an ethical condition. In the unethical condition, participants were asked to “describe in detail an unethical deed you have done in the past, describing any feelings and emotions you experienced.” Following the same instructions, in the ethical condition participants were asked to “describe in detail an ethical deed you have done in the past.” Participants wrote about their experiences using a computer located in a closed private room. Before being asked to recall an ethical or unethical memory, participants also completed both personality questionnaires and nominated one or two people who knew them well enough to provide ratings of participants’ personalities.

Upon completion of the writing exercise, participants were told that the researchers had some materials left over from a previous study and these items were being given away as free gifts. Participants were asked to choose one gift from a choice of an individually wrapped antiseptic wipe or a number two pencil. Both gift choices were visible at all times during the selection process, and previous research has indicated that the two gifts were equally desirable (Zhong & Liljenquist, 2006). All participants were run individually to prevent one participant’s choice of gift influencing another’s decision. Participants’ choice of gift was recorded as the dependent variable.

Results and Discussion

While Zhong and Liljenquist (2006) found compelling evidence that participants who recalled an unethical event were significantly more likely to choose a hand wipe as a free gift (75%, compared to 37.5% in the ethical condition), we found no evidence to this effect. In the current study, participants assigned to the unethical condition were no more likely than participants in the ethical condition to choose the antiseptic wipe over the pencil ($\chi^2 = .23, p = .63$). In the unethical condition ($N = 104$), 35.6% of participants chose the wipe (64.4% chose the pencil), compared to the ethical condition ($N = 106$) in which 31.1% of participants chose the wipe (68.9% chose the pencil).

Further, we found no effects for conscientiousness. We expected that individuals who were higher in conscientiousness would be more receptive to the emotion manipulation and would therefore be more likely to choose the antiseptic wipe as a free gift. However, across both conscientiousness scales, levels of conscientiousness for participants who chose the hand wipe versus those who chose the pencil were virtually identical. Means for conscientiousness for participants who chose the wipe versus the pencil for the CAC were 3.57 ($SD = .40$) and 3.62 ($SD = .36$), respectively, with similar results for the CCS (wipe $M = 2.86, SD = .35$; pencil $M = 2.88 (SD = .32)$).

These data contradict Zhong and Liljenquist’s (2006) finding that increases in moral emotions such as disgust and guilt would lead to a greater desire for physical cleansing. These data also show no evidence that an individual’s level of conscientiousness influences participants’ response to the moral emotion manipulation.

Study 2

Study 1 did not support Zhong and Liljenquist’s (2006) finding that threats to one’s moral self prompt physical cleansing. Study 2 aimed to replicate and extend Zhong and Liljenquist’s (2006) Study 4, in which participants who recalled an unethical act and subsequently washed their hands reported lower moral emotions and felt a reduced need to engage in volunteer behavior. In addition to replicating the two original conditions,

we added several extra conditions to examine the influence of certain aspects of washing one's hands, such as lemon scent (resembling clean scent; Holland, Hendriks, & Aarts, 2005) and hand rubbing (Van Den Hout, Merckelbach, Hoekstra, & Oosterlaan, 1988), on the reduction of moral emotions. We expected to replicate Zhong and Liljenquist's (2006) finding that physical cleansing may serve to alleviate moral emotions.

Method

Participants

Participants consisted of 119 undergraduates from Kwantlen Polytechnic University who participated in exchange for partial course credit in psychology courses. Four participants' data could not be used due to their failure to comply with the experimental procedure.¹

Measures and Materials

The Emotional Experience Questionnaire (Zhong & Liljenquist, 2006) is a 12-item measure designed to assess current emotional experience. Participants responded on a 1 (not at all) to 7 (extremely) scale according to how much they felt certain emotions (e.g., guilty, happy, disgusted) at the current moment. The six items intended to measure moral emotions (guilt, embarrassment, anger, disgust, regret, and shame) showed strong reliability ($\alpha = .88$).

In the hand wipe conditions, we used lemon scented *Clorox*® hand wipes and unscented *Wet Ones*® hand wipes. Additionally, a lemon scented *Lysol*® spray was used for the scented room condition.

Procedure

To control for the effects of washing hands or not, as well as potentially influential aspects of hand washing such as clean scent and rubbing motions, we used a 2 (antiseptic hand wipe or no hand wipe) x 2 (lemon scent or no scent) x 2 (hand rubbing or no hand rubbing) between subjects design. Two of these conditions (hand wipe/no scent/hand rubbing and no hand wipe/no scent/no hand rubbing) were direct replications of Zhong and Liljenquist's (2006) original study. Participants were randomly assigned to conditions and engaged in the unethical recall task described in Study 1.

Next, participants in the scented and unscented hand wipe conditions were instructed to cleanse their hands with the antiseptic wipes after using the computers (to control for hand movement, participants in the wipe/no hand rubbing conditions had their hands wiped for them by the experimenter). Participants in the scent/no hand wipe conditions were told that the experimenter was advised to disinfect the computer keyboards with the lemon scented spray after use, and participants in the hand rubbing/no hand wipe condition were told that they should rub their hands together after typing in order to

¹ Failure to comply with the experimental procedure entailed one participant using his/her own antiseptic cream instead of the standard materials provided, one participant using the antiseptic wipe before he/she was instructed to do so, one participant declining to use the antiseptic wipe, and one participant reporting that he/she did not have an unethical story to write about.

restore blood circulation to their fingers. Participants in the control (no wipe, no scent, no rub) condition were instructed to proceed to the next part of the study.

Participants completed the Emotional Experience Questionnaire, and following Zhong and Liljenquist's (2006) procedure were asked if they would be willing to stay and help a fictional honors student by participating in her project without receiving extra compensation.

Results and Discussion

In terms of the effect of hand washing on moral emotions and altruistic behavior, Study 2 also failed to replicate Zhong and Liljenquist's (2006) results. For volunteer behavior, analysis of variance showed a nonsignificant main effect for hand wipe $F(1, 107) = 1.51$, $p = .22$, $\eta_p^2 = .01$. We also observed no effect for any of the additional conditions. Table 1 shows the means and standard deviations of volunteer behavior for all eight conditions. Regarding the reduction of moral emotions, ANOVA revealed no significant main effects for hand wipe $F(1, 107) = .01$, $p = .93$, $\eta_p^2 = .00$, nor for the added conditions.

These results indicate that neither washing one's hands, nor repetitive hand movement, nor exposure to a clean scent, nor combinations of these factors contribute to lowering negative emotions associated with recalling an unethical deed from one's past. This is evidenced both by a self-report measure of emotion and by an indirect behavioral measure, willingness to volunteer to help another student.

Condition		<i>M</i>	<i>SD</i>	<i>N</i>
Hand wipe				
Scent	Rub	10.67	9.80	15
	No rub	11.79	10.30	14
No scent	Rub	10.33	8.12	15
	No rub	12.69	9.27	13
No hand wipe				
Scent	Rub	16.67	9.00	15
	No rub	15.00	10.99	13
No scent	Rub	12.00	10.66	15
	No rub	10.67	8.84	15

Table 1. Means and Standard Deviations for Amount of Time Volunteered (In Minutes) in Study 2

General Discussion

Contrary to our expectations, neither Study 1 nor Study 2 replicated Zhong and Liljenquist's (2006) finding that physical cleansing, specifically washing one's hands, contributes to the absolution of guilt. Participants who recalled an unethical deed in Study 1 were no more likely than participants who recalled an ethical deed to choose the antibacterial hand wipe as a free gift, indicating that moral emotions may not induce people to cleanse themselves as a reparative strategy. Furthermore, as Study 2 showed, cleansing did not reduce moral emotions such as guilt in participants who recalled unethical deeds, and it did not significantly reduce volunteerism among participants.

It is important to note that these two attempts at conceptual replications of Zhong and Liljenquist's (2006) research were conducted by two independent laboratories that did not collaborate or discuss these studies prior to conducting the studies. Also, in both cases the conceptual replications were carried out on much larger samples than those originally used by Zhong and Liljenquist (2006). These independently obtained null findings should be a cause for serious concern regarding the replicability of Zhong and Liljenquist's (2006) studies.

Limitations

In both cases, these studies were conceptual replications, not exact replications of Zhong and Liljenquist's original work. In Study 1 we assessed personality traits in addition to the original study. However, we do not believe that this change would have undermined the effect of the guilt manipulation. Participants completed personality questionnaires before they were asked to think and write about an unethical or ethical deed, so the path from emotion priming to selection of the free gift was uninterrupted. Furthermore, the personality inventories were wide-ranging and did not include direct questions about moral emotions. Although Study 2 added several conditions to Zhong and Liljenquist's (2006) Study 4, two of the conditions in our study were direct replications of Zhong and Liljenquist's (2006) work. Once again, we were unable to replicate the original data pattern. Thus, our findings contradict claims that moral emotions lead to the need for physical cleansing, and that physical cleansing serves to reduce moral emotions.

Conclusions

Given the notorious "file drawer phenomenon" in which researchers file away null results and non-replications instead of publishing their results, we cannot know how many others have also attempted and failed to replicate Zhong and Liljenquist's (2006) surprising results. Here we report two such attempts and failures, both conducted independently of one another for different reasons. Zhong and Liljenquist's (2006) results carry important theoretical implications, so it is important to publish failed replications such as these so that researchers can have a clearer picture of the plausibility of research findings.

References

- Chernyshenko, O. S. (2002). *Applications of ideal point approaches to scale construction and scoring in personality measurement: The development of a six-faceted measure of conscientiousness*. Unpublished doctoral dissertation. University of Illinois, Urbana-Champaign.
- Holland, R.W., Hendriks, M., & Aarts, H. (2005). Smells like clean spirit: Nonconscious effects of scent on cognition and behavior. *Psychological Science*, 16, 689-693.
- Roberts, B. W., Bogg, T., Walton, K., Chernyshenko, O., & Stark, S. (2004). A lexical approach to identifying the lower-order structure of conscientiousness. *Journal of Research in Personality*, 38, 164-178.
- Roberts, B.W., Jackson, J.J., Fayard, J.V., Edmonds, G., & Meints, J. (2009). Conscientiousness. In M.R. Leary & R.H. Hoyle (Eds.) *Handbook of Individual Differences in Social Behavior* (pp. 369-381). New York: Guilford.
- Van Den Hout, A.M., Merckelbach, H., Hoekstra, R., & Oosterlaan, J. (1988). Is washing a prepared ritual? *Scandinavian Journal of Behavior Therapy*, 17, 201-211.
- Zhong, C.B., & Liljenquist, K. (2006). Washing away your sins: Threatened morality and physical cleansing. *Science*, 313, 1451-1452.

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