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Effect of Physical Cleanliness and Cognitive Cleanliness on Moral Judgment

Leung Ming Sum

Abstract

Objectives: The present study aimed at examining the individual effect of physical cleanliness and cognitive cleanliness on the severity of moral judgment under the condition of previously induced experimental feelings of disgust.

Method: Seventy-five participants were shown 12 disgusting pictures. They were then randomly assigned to one of the three conditions: Condition 1: hand-washing with cognitive cleanliness priming; Condition 2: non-hand-washing with cognitive cleanliness priming; Condition 3: non-hand-washing without cognitive cleanliness priming. Participants were asked to rate six moral dilemmas and the emotion rating for the 12 pictures was collected. Demographic information was obtained and all participants were debriefed before they left.

Results: With the experimentally induced feeling of disgust, the mixed effect of physical cleanliness and cognitive cleanliness significantly reduced the severity of moral judgment. When the individual effects were addressed, however, only cognitive cleanliness and not physical cleanliness significantly reduced the severity of moral judgment.

Conclusions: Cognitive cleanliness alone reduced the severity of moral judgment by removing the feeling of disgust. Physical cleanliness reduced the severity of moral judgment only when it was considered together with cognitive cleanliness.

Introduction

Many religions relate physical cleansing, such as washing hands or bathing, to spiritual or moral purity. For instance, baptism is a ritual which uses water to symbolise the washing away of sins and rebirth in Christianity Sikhism and Hinduism. Likewise, Muslims wash parts of their bodies before they begin to worship. It is interesting that many major religions use bodily cleanliness to signify a pure heart or pure mind as it is believed that this makes one more spiritual or moral. Moral decision, however, is an abstract concept which relies heavily on rational thinking. Thus, can one's moral decisions be altered by simply washing parts of the body? Does bodily cleanliness really contribute to moral purity? If the feeling of cleanliness is related to moral purity, then can the feeling of disgust, a feeling which is often linked with impurity or dirt, alter one's moral decisions

in the opposite way as cleansing does? In addition, can bodily cleanliness, such as washing hands, erase one's feeling of disgust and in turn affect moral decisions?

In this paper, the relationship between feelings of cleanliness and moral judgment is discussed. The effect of both physical cleanliness and cognitive cleanliness on the severity of moral judgment is tested. The study is conducted in such a way that participants are primed with the feeling of disgust. Thus, the question of whether cleansing can erase disgust and in turn contribute to less severe moral judgment can be addressed. In the following sections, literature on the relationship between moral judgment and emotions, especially the feeling of disgust, will be examined. Then, prior findings about physical cleanliness and cognitive cleanliness on moral judgment will be discussed. After that, the common problems which are often overlooked by previous studies will be identified. Lastly, manipulations, hypotheses and predictions in present study will be given.

Literature Review

Moral Judgment and Emotion

Moral judgment is considered as a broad concept for which there is no clear and precise definition. Researchers specialising in social justice and moral psychology have concluded that morality is about issues to do with harm, rights, and justice (Haidt & Graham, 2007). Moral judgments are defined as 'evaluations (good vs. bad) of the actions or character of a person that are made with respect to a set of virtues held to be obligatory by a culture or subculture' (Haidt, 2001, p.817). The definition of moral judgment remains broad and vague. The traditional rationalist approach suggests that moral judgment is a direct result of rational reasoning and one's emotion only alters the reasoning process and indirectly affects moral judgment (Figure 1).

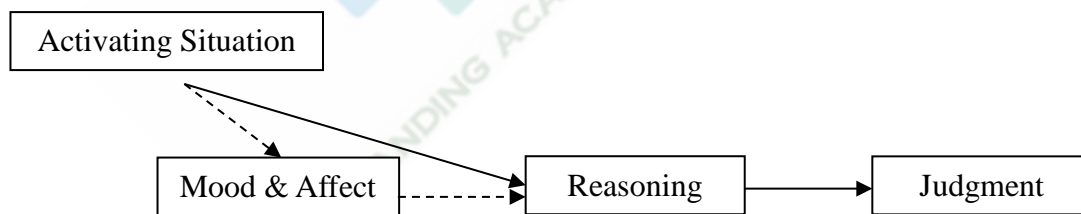


Figure 1. The rationalist model of moral judgment.

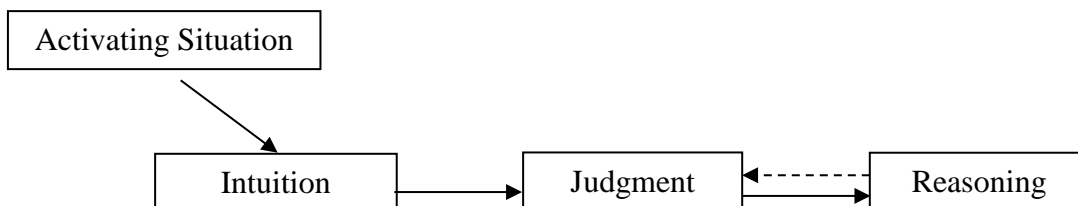


Figure 2. The simplified intuitionist model of moral judgment.

On the other hand, another model adopts a different view of the pathway to moral judgment. The social intuitionist model describes the linkage between moral emotions and moral judgments and claims that moral judgment is caused by rapid moral intuition which is followed by slow moral reasoning when needed (Haidt, 2001). The model suggests that one's judgment is directly linked to one's intuition before one's reasoning take place (Figure 2). Although sometimes moral judgment may be dictated by logic and override intuition (the link is shown by the dotted line in Figure 2), this case is hypothesised to be rare in the model and only occur when processing capacity is high with weak initial intuition. Thus, emotion, rather than deliberate thought process, alters moral judgment. Haidt also considered moral judgment as an intuitive process and defined moral intuition as 'the sudden appearance in consciousness of a moral judgment, including an affective valence (good-bad, like-dislike), without any conscious awareness of having gone through steps of searching, weighing evidence, or inferring a conclusion' (Haidt, 2001, p.818). If moral judgment is intuitive rather than rational, then factors which are haphazard in nature, such as affection and emotion, may contribute to the moral judgment process. Prinz (2006) concluded that emotion and moral judgment were interrelated, showing that when one judges something is wrong, one often has a negative emotional response; conversely, when one has negative emotions, one shows stronger negative appraisal of moral behaviours than one would otherwise do. Thus, negative emotions can alter moral decisions and, conversely, moral decisions also give information which consequently affects emotions. The present study considers whether disgust, a feeling which is often related to an absence of cleanliness or presence of dirt, affects moral decisions.

Disgust and Moral Judgment

Researchers have demonstrated that emotions evolved to cope with particular, recurrent situations (Rozin, Haidt, & McCauley, 2008). Disgust is an emotion which has its own functions. Disgust as a food-related emotion indicates that a substance should be evaded or removed or even expelled if it has already been ingested. According to Darwin (1965), disgust is a feeling of revulsion, primarily related to the sense of taste and secondarily related to anything that causes similar feelings through the sense of smell, touch or sight. Wierzbicka (1986) defined disgust as an aversive feeling about others' actions, which is similar to the feeling one has when something tastes bad in one's mouth and one feels sick. The feeling of disgust is related to physical contaminants such as wounds and spoiled food (Curtis, Aunger, & Rabie, 2004). Researchers who worked on the functions of disgust showed that disgust evolved as an emotion to protect the body from germs, parasites and spoilt food, but its use was then extended to social and moral domains (Rozin et al., 2008). Although disgust is a food-related emotion, it is also used to imply social or moral rejection.

In the moral context, prior studies show that experimentally induced disgusting

feelings contribute to more severe moral judgment. In several studies, participants who were exposed to a bad smell, disgusting room, physically disgusting experience or disgusting video tended to make severer moral judgments than those who were not exposed to any disgusting situations in the control condition, irrespective of whether the actions being judged were disgusting or not (Schnall, Haidt, Clore, & Jordan, 2008b). Thus, simply eliciting the feeling of disgust can alter one's moral decisions.

Physical Cleanliness Affects the Relationship between Moral Judgment and Disgust

If the feeling of disgust contributes to the moral decision process, can the disgusting feeling be erased through physical cleansing interventions such as washing hands? One study found that emotion could be altered by physical intervention in that participants who cleaned their hands after recalling an immoral act reported a decrease in moral emotions (i.e. disgust, guilt, regret, shame, embarrassment and anger) compared with those who did not clean their hands (Zhong & Liljenquist, 2006). Emotion was related to the severity of moral judgment and the physical intervention of cleansing hands could influence the relationship.

Moreover, if one feels dirty after being reminded of one's moral transgressions, it should trigger one's desire to be clean. In the physical domain, the removal of disgusting substances from the contaminated body parts reduces the risk of infection or disease (Curtis et al., 2004). A study showed that participants who were instructed to recall a moral transgression had the desire to be clean, as indicated by their choice of an antiseptic wipe instead of a pencil as a souvenir (Study 3; Zhong & Liljenquist, 2006). This effect is not limited to the recall of one's own moral transgressions but also extends to the memory of others' moral transgressions. Another study demonstrated that participants who were asked to hand-copy an immoral story of others showed stronger preference for cleansing products (e.g. soap, toothpaste) than those who copied a moral story, with no differences between their preference for neutral products (e.g. batteries, CD cases) (Study 2; Zhong & Liljenquist, 2006).

It was also found that the desire to be clean was specific to the body parts which were morally contaminated. A study illustrated that participants who were instructed to tell a lie preferred a mouthwash product rather than hand sanitiser, whereas participants who were instructed to type the same lie in an email preferred a hand sanitiser rather than mouthwash (Lee & Schwarz, 2010). The origin-specific desire for cleansing signified the effect of cleansing on reducing disgusting feelings triggered by morally contaminated body parts.

Emotion, cleansing and moral judgment are interrelated. If one cleans one's hands after being reminded of moral transgressions, it may in turn affect one's emotions, and this effect of physical cleanliness on moral judgment extends to other feeling such as guilt. In a prior study, participants who had not wiped their hands with an antiseptic wipe after recalling an immoral act felt guiltier, as indicated by the increase in their willingness

to participate in another project, than those who had wiped their hands after recalling an immoral act (Study 4; Zhong & Liljenquist, 2006). Physical cleanliness has been shown to be effective in reducing moral emotions such as disgust and guilt.

Cognitive Cleanliness Affects Moral Judgment

In the above-mentioned studies, physical cleanliness has been shown to play an important role in the moral decision process. Many studies on physical cleanliness, however, ignore the cognitive component, namely that the mere sight of a piece of soap can trigger moral cleanliness in the mind. This concept is illustrated in other studies which focus on cognitive cleanliness. Cognitive cleanliness is also shown to be related to moral judgment. A study demonstrated that participants who recalled immoral past behaviours would complete word fragments (e.g. W _ _ H, S _ _ P) with cleansing-related words (e.g. WASH, SOAP) than those who recalled moral past behaviours (Study 1; Zhong & Liljenquist, 2006). Another study showed that cognitive cleanliness was connected to moral judgment whereby participants who were primed with cleansing-related words made less severe moral judgments more often than those who were primed with neutral control words (Schnall, Benton, & Harvey, 2008a). These two findings illustrate the interrelationship between cognitive cleanliness and moral decisions. People who are primed with immoral behaviours have the desire to be clean whereas people who are primed with cleansing-related concepts show less severity in making moral decisions.

It is a serious problem if physical cleanliness is confused with cognitive cleanliness in the moral judgment process. Many prior studies which focus on physical cleanliness did not employ careful manipulation of the hand-washing and control conditions. For instance, participants were randomly assigned to either the experimental group with hand-washing manipulation or the control group without the hand-washing process (Zhong & Liljenquist, 2006; Schnall et al., 2008a). This manipulation ignored the cognitive component whereby simply seeing a piece of soap in the experimental condition could trigger moral cleanliness in the mind. Thus, the results possibly overestimate the effect of physical cleanliness since cognitive cleanliness is included in the manipulation. On the other hand, the imperfect control condition may also contribute to the problem. In other experiments which aimed to observe the relationship between physical cleanliness and moral judgment, the control conditions might actually have induced a priming effect of cleanliness on participants by showing them soap or wipes. For example, in Reyes, Aldao, Kundey, Lee, and Molina (2012) the control group was told to evaluate hand-sanitising wipes by looking at the package. Consequently, participants might have triggered the cognitive concept about cleanliness and thus the control conditions were not perfect. It might have underestimated the actual effect of physical cleanliness on the severity of moral judgment by including cognitive cleanliness in the control conditions.

Manipulations, Hypotheses and Predictions

The goal of the present study is to explore the mixed effect of physical cleaning and cognitive priming, and investigate the contribution of each individual factor. Three groups of participants are identified instead of two in order to clarify the relationship of cognitive cleanliness and physical cleanliness in terms of moral judgment: Condition 1: hand-washing group; Condition 2: non-hand-washing with cognitive cleanliness priming; Condition 3: non-hand-washing without cognitive cleanliness priming. Participants in both Condition 1 and Condition 2 were shown a bottle of foaming hand soap. A neutral stimulus, a pen, instead of a piece of soap or wipe, was used for the control condition in Condition 3 to drive out the cognitive concept triggered by the cleansing products. Both cognitive cleanliness and physical cleanliness were examined individually for a more comprehensive picture of the relationship between cleanliness and moral judgment. All participants were shown pictures which induced the feeling of disgust before the cleansing manipulations. Then, they were randomly assigned to one of the three conditions and went through the cleansing manipulation before being asked to rate the seriousness of certain moral transgressions. The rating for moral transgressions was examined across the three conditions to investigate the separate effect of physical cleanliness and cognitive cleanliness.

Hypothesis 1

The mixed effect of physical and cognitive cleanliness will be examined to verify prior findings on the relationship between cleanliness and moral judgment. Comparison will be made between Conditions 1 and 3. It is hypothesised that with the experimentally induced feeling of disgust, participants who have washed their hands before making moral judgments will make significantly less severe moral judgments than those who do not wash their hands and do not see any products which are related to cleanliness.

Hypothesis 2

The sole effect of physical cleanliness will be investigated by comparing the moral rating between Conditions 1 and 2. It is hypothesised that with the experimentally induced feeling of disgust and cognitive cleansing priming, participants who have washed their hands before making moral judgment will make less severe moral judgments than those who do not wash their hands.

Hypothesis 3

The sole effect of cognitive cleanliness will be investigated by considering only participants who do not wash their hands to eliminate the effect of physical cleanliness. Comparison will be made between Conditions 2 and 3. It is hypothesised that with the experimentally induced feeling of disgust, participants who are shown an object related to cleanliness (i.e. a bottle of hand soap) will make less severe moral judgments than those who are shown a neutral object (i.e. a pen).

Methodology

Participants

Seventy-five young adults (42 females and 33 males) participated in the experiment. Their ages ranged from 18 to 40 (mean age = 23.68 years, $SD = 4.65$). According to the self-reported data, 38 of them had no religion, 35 of them were Christian, one of them was Catholic, and one of them was a Buddhist. All participants were randomly assigned to one of the three conditions. All participants signed a consent form before they started the experiment. The research protocol was approved by the College Research Ethics Subcommittee, College of Liberal Arts and Social Sciences, City University of Hong Kong.

Materials

Moral Dilemmas

Six moral dilemmas devised by Schnall et al. (2008b) were used to measure the severity of moral judgment. Three of the vignettes involved a moral violation with disgusting feelings: Dog (eating a dog after it died), Plane Crash (killing and eating a boy for survival), and Kitten (obtaining sexual pleasure by rubbing a kitten near the genitals); and three of the vignettes involved a moral violation without disgusting feelings: Trolley (preventing the deaths of five men by choosing to just kill one), Wallet (not returning a wallet to its rich owner), and Resume (putting false information on a resume). The order of the cases was as follows: Dog, Trolley, Wallet, Plane Crash, Resume and Kitten. Participants circled a number on a 10-point scale from zero (perfectly acceptable) to nine (extremely wrong) to indicate the level of moral condemnation in each case. A higher rating represented a higher level of moral condemnation. Participants were told follow their initial intuition when they responded.

Emotion Ratings

The questionnaire consisted of nine items: relaxed, angry, happy, sad, afraid, depressed, disgusted, upset, and confused. Participants rated how they felt by drawing a slash through the line of a 10.5 cm analogue scale labelled 'Don't feel at all' and 'Feel very strongly' at either end (Schnall et al., 2008b). Each half-centimetre was equal to one point. The score for each emotion was calculated by measuring the marks on the scale which yielded a number ranging from zero to 21.

Procedure

As a pen was used as a neutral object in the control condition, a pre-test was carried out before the experiment to ensure that the pen was not related to cleanliness in any way. Ten people were picked and randomly asked to think of eight to 10 words which were related to either a bottle of hand soap or a pen. Those who were asked to think of words related to hand soap reported words such as clean, fragrant, white, water, foam, wash room, paper towel, etc. Those who were asked to think of words related to the pen

reported words such as writer, exam, assignment, diary, hard-working, blue ball pen, ink, etc. The pre-test showed that a pen had no connection with cleanliness in any way so one was used as a control object in this experiment.

Participants were tested individually. On a notebook computer they were shown 12 disgusting pictures including images of a dirty toilet, severe disfigurement, worms, insects, etc. Each picture was shown for five seconds which made up a total of 60 seconds per total viewing. The level of disgust induced by the pictures was similar to the level of discomfort that one experiences in daily life and no real pain could be caused. Then, 25 participants were assigned to each of the three conditions. An unrelated product survey served as a cover story for the manipulation of cleansing. The hand-washing group (Condition 1) was told to wash their hands with the bottle of foaming hand soap before completing the product survey for the soap. The cognitive cleansing (without hand-washing) group (Condition 2) simply examined the package or appearance of the foaming hand soap before completing the product survey for the soap. In the control group (Condition 3), a pen was used as the product which was unrelated to cleaning and participants answered a product survey for the pen. After completing the survey, participants were told to rate how wrong each action of six moral dilemmas was on a scale from zero (perfectly acceptable) to nine (extremely wrong). To ensure that the pictures induced comparable feelings of disgust among the three conditions, participants were instructed to recall their feelings when they saw the pictures and complete an emotion rating questionnaire. Participants indicated how they felt about the pictures in general in terms of feeling relaxed, angry, happy, sad, afraid, depressed, disgusted, upset, and confused. Some general personal information, such as gender, age, religion etc. was collected from participants to match personal background across conditions. Participants were debriefed before they left.

Since there was a risk of making the cleansing manipulation salient to the study, there was only one emotion rating in which participants were asked to recall their feelings after seeing the photos and no additional emotion rating was used after the hand-washing procedure. Although participants' emotion ratings before and after the hand-washing procedure could not be compared, it was assumed that the effect across conditions would enable this comparison. Thus, it was presumed that the hand-washing manipulation could reduce the feeling of disgust, and in turn reduce the severity of moral judgment.

Statistical Analysis

One-way ANOVA and post-hoc LSD tests were employed to analyse the relationship between cleanliness manipulations and severity of moral judgment. Repeated-measures ANOVA and one-way ANOVA were applied to ensure the feeling of disgust induced was similar among the three conditions.

Results

Emotion Ratings

A repeated-measures ANOVA was used to test whether participants in all conditions experienced the same level of disgust after seeing the pictures. The independent variable was condition and the dependent variables were the nine emotion ratings. There was no main effect for condition, $F(2, 72) = 0.61, p = 0.55$. There was no statistically significant difference in emotion between the three conditions. There was a significant main effect of emotion, $F(8, 576) = 55.51, p = 0.000$. Post-hoc Scheffé tests ($p < 0.05$) showed that the disgust ratings were significantly higher than each of the other mood ratings, suggesting that the pictures successfully induced the feeling of disgust among the participants. Table 1 summarises the means and standard deviations of the nine emotion ratings.

Table 1

Means and Standard Deviations for Emotion Ratings

Emotion rating	<i>M</i> (<i>n</i> = 75)	<i>SD</i> (<i>n</i> = 75)
Relaxed	4.49	4.69
Angry	4.23	4.83
Happy	3.27	4.32
Sad	9.79	5.76
Afraid	12.13	6.09
Depressed	8.85	5.68
Disgusted	16.57	5.56
Upset	9.13	5.88
Confused	8.84	5.93

Note. Response scales ranged from zero (*don't feel at all*) to 21 (*feel very strongly*).

Means indicated that participants felt disgust more strongly ($M = 16.57, SD = 5.56$) than any other emotions, especially for some negative emotions such as, angry ($M = 4.23, SD = 4.83$), sad ($M = 9.79, SD = 5.76$), depressed ($M = 8.85, SD = 5.68$), and upset ($M = 9.13, SD = 5.88$). There was no interaction effect for condition and emotion, $F(16, 576) = 1.28, p = 0.20$. Looking specifically at disgust, a one-way ANOVA was conducted to show whether participants in all conditions felt equally disgusted after seeing the pictures. The independent variable was condition and the dependent variable was disgust rating. There was a non-significant difference between condition on the disgust rating, $F(2, 74) = 1.45, p = 0.24$. Thus, it was successful to induce similar disgusting feelings on all participants in each of the three conditions before the hand-washing or cognitive priming manipulations.

Moral Judgments

The mean score of all six moral dilemmas for each participant was computed. A one-way

ANOVA was conducted to explore the impact of manipulations of cleanliness on the severity of moral judgments. The independent variable was condition and the dependent variable was the mean score of moral ratings. Figure 3 shows the mean ratings for moral dilemmas for the three conditions. As predicted, there was a statistically significant difference in the composite moral rating for the three conditions, $F(2, 74) = 5.31, p < 0.01$. The post-hoc LSD test ($p < 0.005$) indicated that the moral rating mean score of Condition 1 ($M = 5.99, SD = 1.55$) was significantly different from that of Condition 3 ($M = 7.23, SD = 0.07$), supporting the first hypothesis that washing hands reduces the severity of moral judgment. The moral rating mean score of Condition 2 ($M = 6.29, SD = 1.59$) had a significant difference ($p < 0.05$) from Condition 3, confirming the third hypothesis that cognitive priming with cleanliness reduces the severity of moral judgment. There was no significant difference between the moral rating mean scores of Condition 1 and Condition 2 ($p = 0.461$), so the second hypothesis that physical cleanliness alone reduces the severity of moral judgment was rejected.

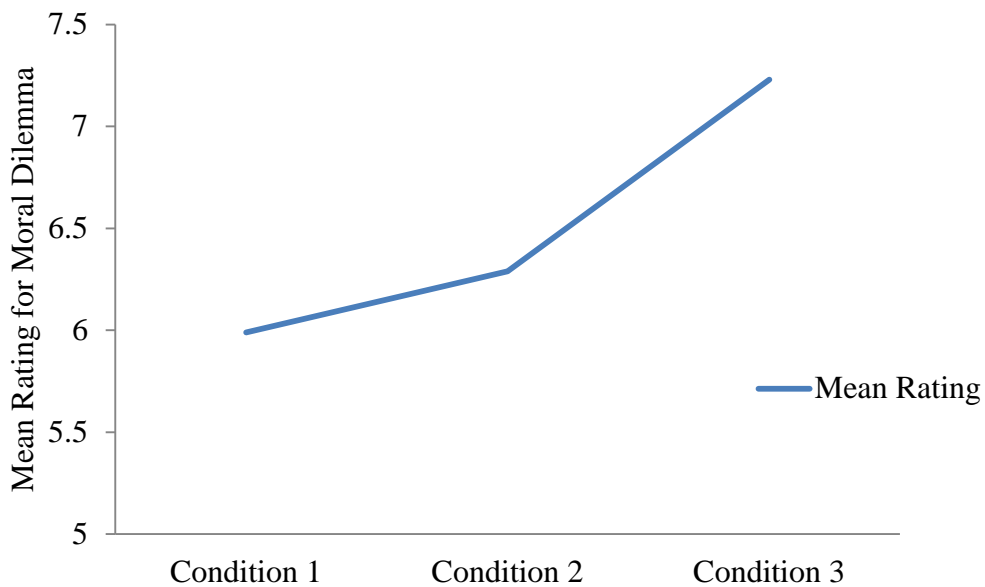


Figure 3. Mean scores of the three experimental conditions

Note. $n = 25$ in each experimental condition.

Discussion

The main purpose of this study was to investigate the individual effects of physical cleanliness and cognitive cleanliness on moral judgment. An experiment was conducted to reveal these effects. In line with prior findings, physical cleanliness and cognitive cleanliness together reduced the severity of moral judgment. As regards the experimentally induced feeling of disgust, cognitive cleanliness alone showed a significant effect in terms of reducing the severity of moral judgment, but this effect

could not be applied when only physical cleanliness was considered. This finding was not consistent with that of prior studies on the effectiveness of physical cleanliness.

It is interesting that the present finding did not fit with earlier ones on the effect of physical cleanliness on decision-making. It may indicate that the single effect of physical cleanliness can only be adopted in human decisions which are less related to moral judgments. Although the present study had similar manipulations of hand-washing conditions (one group of participants examined the soap by washing their hands with it and another group of participants examined the soap by simply looking at the package), the ratings for decisions measured later were different. Decisions were based on confidence about choosing a pen which would function well in Reyes et al. (2012). In the present study, they constituted rating the levels of moral transgression, and suggested that the sole effect of physical cleanliness may only apply to human judgments in limited ways, and the effect is not significant in areas such as making moral decisions.

When focusing on moral decision, few studies work on the relationships between the individual effects of physical cleanliness and cognitive cleanliness on moral judgments. This study found that, when the mixed effect of physical cleanliness and cognitive cleanliness was dissected, only cognitive cleanliness and not physical cleanliness was effective in reducing the severity of moral judgment. The cognitive process of cleanliness played an important role in moral judgments. According to the Idealized Cognitive Model (Lakoff, 1987), cleanliness and dirt are a dichotomy in which cleanliness relates to an ordered arrangement whereas dirt is related to lack of order. Lizardo (2012) concluded that people use the dirt-clean dichotomy to categorise objects and actions in the moral domain. In the present study, three of the moral dilemma cases (i.e. Dog, Plane Crash and Kitten) consisted of disgusting elements which might contribute to the severity of moral judgments. Moreover, with the cognitive cleanliness manipulation, participants removed the experimentally induced feeling of disgust. Thus, participants activated the 'clean' concept in their minds which help to reduce the severity of moral judgments.

Apart from the cleansing manipulations, the experimentally induced feeling of disgust was successful in altering the moral judgment process, which is in line with prior findings. Emotional reaction is automatic in humans, but it also serves as information when they make judgments. The results in the present experiment were consistent with the affect-as-information hypothesis. The hypothesis was that our own feelings serve as important information which is used for judgment and decision-making (Clore et al., 2001; Schwarz & Clore, 1983). In short, affective feelings influence our judgments. In this study, the experimentally induced feeling of disgust influenced participants' moral judgments. Once the disgusting feeling was eliminated by cleansing manipulation, participants made less severe moral judgments than those who did not receive the cleansing manipulation.

One might ask whether the specific feeling of disgust or the general negative feeling contributed to more severe moral judgment. A study showed that experimentally induced disgust contributed to more severe moral judgment than other negative emotions such as sadness (Study 4; Schnall et al., 2008b). This suggests that the effect of disgust on moral judgment is not merely an illustration of how generally negative emotions can alter moral decisions. In addition, a study showed that the functions of negative emotions are different from each other in that the feelings of disgust, anger, and contempt serve as the primary motivators for moral condemnation of others (Rozin, Lowery, Imada, & Haidt, 1999). Looking specifically at disgust, a study demonstrated that experimentally induced feelings of disgust contributed to the strength of the resulting moral judgment (Wheatley & Haidt, 2005). In the present study, the feeling of disgust, but no other feeling, was related to the severity of moral judgment. It signified the unique relationship between the feeling of disgust and human moral decision-making.

Limitations and Further Studies

First, the design of this study was not perfectly suited to the aim of separating physical cleanliness and cognitive cleanliness. Since both physical cleanliness and cognitive cleanliness have two levels, a 2 x 2 design should be used to address all combinations. Thus, there should be four conditions; Condition 1: hand-washing with cognitive cleanliness priming; Condition 2: hand-washing without cognitive cleanliness priming; Condition 3: non-hand-washing with cognitive cleanliness priming; Condition 4: non-hand-washing without cognitive cleanliness priming. In the present study, Condition 2 was missing. Since it was unreasonable to ask the participants to wash their hands without looking at the soap, there was no condition which addressed the single effect of physical cleanliness. Further studies should pay attention to this and carefully distinguish the effect of cognitive cleanliness from that of physical cleanliness.

Second, pictures instead of a film clip were used to induce feelings of disgust in the participants. Film clips have proved to be effective in eliciting strong disgust (Lerner, Small, & Loewenstein, 2004; Schnall et al., 2008a; Schnall et al., 2008b). In this study, although the pictures were also shown to be effective in triggering feelings of disgust in the participants, it is recommended that a pre-test on the effectiveness of pictures in terms of inducing disgust should be carried out or tools which were effective in other studies should be used.

Third, the sample consisted of more females than males. Although the gender ratio was roughly the same across the three conditions, the overall gender ratio (M: F = 1: 1.27) meant that more female participants than male participants took part in general. A study revealed that females made superior moral judgments to males (Tiwari & Tiwari, 1977). The high proportion of female participants may have inflated the moral judgment ratings. Also, the mismatched gender ratio between the present study and the population in Hong Kong (M: F = 1: 1.15) (Census & Statistics Department, 2013) limits the

generalisibility of the sample. Future researches should aim for a more balanced male and female ratio.

In addition, further studies could work on the underlying mechanism governing how and to what extent emotions can affect the moral judgment process, and whether there are any specific psychological or behavioural consequences if ethical decisions are driven by physical and cognitive cleanliness. Research which aims to clarify the relationship between cleanliness and moral decisions would be valuable and insightful.

Conclusion

In conclusion, the rituals or traditions which use bodily cleansing to symbolise moral purity are not myths. Moral judgment, which used to be considered as a rational and deliberate process, was found to be rather intuitive and can be affected by emotions and bodily cleanliness. The mixed effect of cognitive cleanliness and physical cleanliness contributed to the moral decision process. The importance of cognitive cleanliness in altering moral judgment was confirmed.

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Biographic Note

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