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The Uncertain Universality of the Macbeth Effect with a Spanish Sample

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Recently a psychological mechanism has been proposed between bodily purity and moral purity: the "Macbeth effect". The act of washing their hands seems to free individuals of their guilt. However, the universality of this psychological mechanism is an empirical question that should be studied. In four studies we replicated the original Zhong & Liljenquist's experiments with Spanish samples. We were unsuccessful in replicating the Zhong & Liljenquist´s results that supported cleansing as a psychological mechanism for compensating guilty: results couldn't confirm an increased mental accessibility of cleansing-related concepts or even a greater desire for cleansing products, neither a greater likelihood of taking antiseptic wipes. In addition we didn't find that physical cleansing alleviates the upsetting consequences of unethical behaviour. Spanish samples showed sensibility to morality and helping behaviour but not with cleansing as a way to reduce their threatened morality. .
Keywords: morality, social cognition, interpersonal sensibility, guilt, Macbeth effect.

Recientemente se ha propuesto un proceso psicológico que vincularía la limpieza corporal y la limpieza moral: el efecto *Macbeth*. De acuerdo con él, lavarse las manos nos ayudaría a liberarnos del sentimiento de culpa. Sin embargo, la universalidad de este fenómeno no está suficientemente acreditada y debe ser sometida a escrutinio empírico. Con ese fin, se replicaron con sujetos españoles los cuatro experimentos de Zhong y Liljenquist (2006). Los resultados no van en la línea de los originales, de modo que no se ha podido confirmar el carácter liberador de la culpa que tendrían los actos de lavado. Así, no se observó un incremento en la accesibilidad de los conceptos relacionados con la limpieza. Tampoco un incremento en el atractivo de los productos propios de esta actividad, ni un cambio en la probabilidad de elegir una toallita antiséptica. Por último, no se pudo observar que el acto de lavarse las manos aliviara las emociones negativas asociadas a un acto moralmente inadecuado. Los sujetos españoles, que sí son sensibles a las necesidades del prójimo, no parecen relacionar la limpieza con el alivio de esas emociones negativas.
Palabras clave: moral, cognición social, sensibilidad interpersonal, culpa, efecto Macbeth.

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Is there a universal psychological mechanism of physical cleansing aimed to adaptively compensate for guilt? An overview of many religions in the world suggests that the answer is affirmative, and that water rituals could be such a mechanism. This is the point of the research carried out by Zhong and Liljenquist (2006), These authors claim that what they call the "Macbeth effect" is a basic coping mechanism that could be used when people want to deal with the consequences of unethical behavior. The mechanism is as simple as to cleanse oneself. In defense of their hypothesis they call for arguments that suggest the universality of the physical cleansing to compensate for moral impurity. Evidence come from: (a) The fact that physical cleansing is a ritual for purity in different religions; and (b) Physical and moral disgust lead to similar facial expressions and physiological activation, and recruit partially overlapping brain regions (Moll et al., 2005). An original contribution of their research is that physical cleansing may wash away moral sins through symbolic self-completion. Thus, when moral self-definition is at stake, such as when one has indulged in morally questionable activities, one should naturally be motivated to engage in activities that will restore moral integrity. The restoration of the moral self can be achieved through direct restitution, but it may also be achieved through substitutable symbols or activities as physical cleansing that are not directly related with morality (Tetlock, Kristel, & Elson, 2000).

These arguments implicitly suppose the universality of the psychological mechanism of physical cleansing for restoring moral integrity. However, this assumption could be unjustified. We think it needs to be demonstrated. Let's consider the case of jealousy. Most researches agree that jealousy stands as an exemplary candidate for a fundamental social emotion, its functions being to evoke somatic, cognitive and behavioral responses to address relationships threats. However, consensus regarding its underlying causes and mechanism has been much more difficult to find. Different finding clearly documents variability in jealously as a function of individual and cultural differences (Buss, Larsen, Western, & Semelroth, 1992; DeSteno, Valdesolo, & Bartlett, 2006; Hupka & Ryan, 1990).

In this paper we replicate the four experiments of Zhong and Liljenquist (2006), with Spanish participants, trying to examine the universality of physical cleansing as a way of restoring morality. In Experiments 1 to 3, these authors hypothesized that exposure to one's own and even to other's moral indiscretions pose a moral threat to the ego and as a consequence of it, participants either activate concepts of, or express a greater desirability or even show an overt preference for objects related with water and cleansing. In the fourth experiment the authors take a step forward, (given the demonstrated association between physical cleansing and moral purity) and claim that cleansing activities that improve physical cleanliness may also compensate for moral impurity.

Our aim is to replicate the Macbeth effect with Spanish participants. If the Macbeth effect is replicated, its universal nature would be supported. Therefore, its relevance as a psychological mechanism in the ambit of morality would be enhanced. In another case, the Macbeth effect should be considered a culturally influenced phenomenon.

Experiment 1: Mental Accessibility of Cleansing Related Words

The purpose of Experiment 1 was to replicate in a Spanish sample the finding of Zhong and Liljenquist (2006), according to which a threat to moral purity activates a need for physical cleansing, by increasing the mental accessibility of cleansing related words.

Method

Participants

As part of their course requirement, 47 undergraduate students (M_{age} = 19.2, SD_{age} = 1.60, 37 females and 10 males) at La Laguna University in Spain participated in this experiment. All of the participants were Spanish natives.

Design and Procedure

Participants were randomly assigned to the cells of a 2-level single factor (Recall: ethical vs. unethical), between-participants design. They were led to separate breakout rooms upon arrival and were told that the researcher was interested in studying the differences in memories associated with ethical or unethical behaviors. In the *ethical condition*, participants were asked to describe in detail an ethical thing that they had done in the past and to describe any feeling or emotions they experienced. In the unethical condition, they were asked to describe an unethical deed and any emotions they experienced. This manipulation was replicated from the previous research (Zhong & Liljenquist, 2006).

After the recall, participants engaged in a seemingly unrelated word completation task, in which filled in blank spaces within word fragments to convert them into meaningful words. In the previous research Zhong and Liljenquist (2006), there were only six word fragments, three of which could be completed as either cleansing-related (i.e.: wash, shower and soup) or unrelated words (e.g., wish, shaker and step). Here the task included eighteen words. There were six word fragments that could be completed as either cleansing-related (soap, gel, shower, bath, wash, clean) [jabón, gel, ducha, bañar, fregar, aseo] or unrelated words (ham, gen, moneybox, down, brake, atheist) [jamón, gen, hucha, bajar, frenar, ateo]. The six

words selected have a similar number of orthographic neighbors (between 5 and 8). There were also three words that could be completed as either water-related (river, sea, lake) [rio, mar, lago] or unrelated words (uncle, more, ribbon) [tio, mas, lazo]. Finally, there were nine fillers that could only be completed as unrelated words (mine, book, disc, net, card, oak, bottom, sum) [mina, libro, disco, red, ficha, roble, fondo, suma].

Results

We summed the number of cleansing-related word fragments participants completed to form a first composite measure of mental accessibility of cleansing-related concepts and submitted this measure to a one-way ANOVA. As a second measure of mental accessibility of cleansing-related content, we added the number or water-related word to the previous measure and submitted the total to a new one-way ANOVA.

Data analyses shows that, in contrast with previous research, participants who recalled an unethical deed didn't generate more cleansing-related words than those who recalled and ethical deed, $F(1,46) = .08$, $p > .5$, $\eta^2 = .002$, $1\text{-}\beta = .5$, see Table 1. The same results where found when the water-related words were considered $F(1,46) = .01$, $p > .5$, $\eta^2 = .000$, $1\text{-}\beta = .5$, ($M_{ethical} = 4.21$ and $M_{unethical} = 4.16$, respectively)[1] .

Experiment 2: Desirability of Cleansing Related Products

In Experiment 2 we replicated the experiment of Zhong and Liljenquist (2006), to examine whether an implicit threat for moral purity produces a psychological desire for cleansing (expressed thorough preferences for cleansing products). As in the original research, participants were told that the experiment was about the relationships between handwriting and personality, and were asked to hand-copy a short story written in first person. The story describes either an ethical, selfless deed (helping a co-student) or an unethical act (sabotaging a co-student). Participants then rated the desirability of various products. In the previous research the list included five cleansing products and five products related with food or stationery. We included ten cleansing products well known by participants because they were being advertised on TV at that moment, and ten non cleansings products, related also to food and stationery.

We also asked participants about their religious beliefs. This is a relevant piece of information because physical cleansing is a ritual for several religions (among them Catholicism). It was advisable to confirm the existence of well defined beliefs, acting as scripts that participants activate when submitted to a moral threat. Catholic beliefs turned out to be the most prevalent among our students[2]. This type of information was not furnished in the original Zhong and Liljenquist (2006) experiment.

Table 1
Summary results of Experiments 1 and 2

Experiment 1: Average number of cleansing related words completed. Standard error in brackets		Experiment 2: Average of desirability of cleansing products on a scale from1 (low) to 7 (high). Standard error in brackets	
Ethical recall ($n = 23$)	Unethical recall ($n = 24$)	Ethical story ($n = 18$)	Unethical story ($n = 18$)
2.52 (1.27)	2.63 (1.22)	4.30 (1.36)	4.27 (1.11)

[1] A posteriori, following a Review suggestion, the data from this experiment was checked regarding Anova's two most relevant assumptions: homoscedasticity and normality of the distribution of residuals. Homoscedasticity is present in the data, according to Levene's test, both for the first dependent variable, cleansing-related words, (.006, $p = 0.938$) and the second one, water-related words (.028; $p = 0.87$). But residuals do not follow a normal distribution (Kolmogorov-Smirnov test equals .25 and .17 for the first variable; .17 and .25 for the second; $p < .01$ in the four cases). So, we decided to run a set of two U Mann-Whitney tests (one for each dependent variable), parallel to the Anovas. Results are identical to those from the Anovas': there are not significant differences between the two groups of subjects, neither for the first dependent variable (cleansing-related words recall): $U = 271.0$, $p = .913$, nor for the second one (water-related words recall): $U = 266.0$, $p = .825$.

[2] We designed a brief questionnaire about religious beliefs. As a part of their course requirement 155 undergraduate students from the University of La Laguna participated (Mage = 19.6, SDage = 1.26, 130 females and 25 males). Results showed that 90% of the participants considered themselves as Catholic, or at least were educated in the catholic tradition. From this sample, 45 subjects participated in Experiment 2, 43 in Experiment 3 and 28 in Experiment 4.

Participants

As part of their course requirement, 36 undergraduate catholic students (M_{age} = 20.3, SD_{age} = 1.09, 30 females and 6 males) from La Laguna University participated in this experiment. All of the participants were Spanish natives. None had previously participated in experiment 1.

Design and Procedure

Participants were randomly assigned to the cells of a 2-level single factor (Recall: ethical vs. unethical), between-participants design. They were led to separate breakout rooms upon arrival and engaged sequentially in two seemingly unrelated tasks. First, participants hand-copied a short story written in first person. They were told that the research was designed to study the association between handwriting and personality. But in fact, an implicit manipulation for ethical vs. unethical priming adapted from Zhong & Liljenquist (2006), was been employed. Participants in the ethical prime condition hand-copied the following story about an honest student (the original was written in Spanish):

A short time ago I applied for a valuable university grant. There were two of us, myself and John and we both knew that only one of us would be successful. For some months, John had been studying and working for the town council which gave him and advantage in trying to get the grant. Unfortunately he had lost the document certifying this important work. One day, while I was in the Graduate Studies Office, I discover John's certificate in my document case. I handed the document to the secretary knowing that the next day John would be relieved.

Those in the unethical prime condition hand-copied the same story except that in this condition the student in the story decided to destroyed the critical document, and so sabotaged his competitor. The last sentence was replaced with, "*I tore the document up, threw it in the wastepaper basket, and was confident that now my grant was assured.*"

After completing the hand-copying task, participants engaged in a marketing-like task, rating the desirability of various products on a seven-point scale (1 = complete undesirable, 7 = completely desirable). In the previous research the list of the products included five cleansing products (i.e.: Dove shower soap, Crest toothpaste, Windex cleaner...) and five other products related with food or office (i.e.: Post-it, Snickers bars, Energizer batteries...). We included ten cleansing products well-knowing by participants because they are advertised on TV at that moment (Sanex shower soap, Wipp Express cleaner soap, Star bleach, Cologan tissues, Colgate toothpaste, Ake deodorant, Herbal Esence shampoo, Listerine mouthwash, Don Limpio cleaner, Deliplus baby wipe) [gel de baño Sanex, jabón para la ropa Wipp Express, lejía Estrella, clinex Cologan, pasta de dientes Colgate, desodorante Axe, champú Herbal Esence, enjuage bucal Listerine, limpia hogar Don Limpio, toallitas refrescantes Deliplus] and others no-cleansings products (Energizer batteries, Sony compact disc, Lyby's juices, Post-it notes, Mars chocolate bar, Scotex adhesive, Pilot pen, Sam notebook, Inoxcrom ballpoint, Xerox A4 paper) [pilas Energizer, CD Sony, jugos Liby's, notas Post-it, barritas de chocolate Mars, cinta adesiva Scotex, rotulador Pilot, cuadernos Sam, bolígrafos Inoxcrom y folio Xerox].

The desirability rating served as the dependent measure because participants who have a need for bodily cleansing should express greater desire towards cleansing related products. After completing the task we asked participants what they think the goal of the task was. None of them suspected the link between copying the text and the product rating task.

Results and Discussion

In contrast with Zhong and Liljenquist (2006) results, we did not find differences in desirability of cleansing products between participants who cope with the unethical and the ethical deed[3], $F(1,34) = .05$, $p > .5$, $\eta^2 = .000$, $1-\beta = .5$, see Table 1.

Taken together, studies 1 and 2 clearly cast some doubts on the effects of the activation of guilt-related episodes on the accessibility of cleansing-related concepts in subjects' memory. But it may be the case that the effects of that activation could better be detected with a different task, more related with overt behaviour. That is why we decided to keep on with the replication of Zhong and Liljenquist (2006) experiments. Their third experiment (and also, then, ourself) is about preferences.

Experiment 3: Preference for Antiseptic Wipes

In this experiment we examined the likelihood of taking an antiseptic cleansing wipe after recalling an ethical or an unethical deed. Participants engaged in the same recall task as in Experiment 1. Upon finishing, they were offered an antiseptic wipe or a pencil (verified in an auxiliary study to be two equally attractive objects).

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[3] As in the previous experiment, we checked for homoscedasticity and normality of the distribution of residuals. Both assumptions were satisfied: *Levene's* test of homoscedasticity equals .787; p = .381, and *Kolmogorov-Smirnov* test of normality equals .127 and .152, with associated p values of 0.200 in both cases.

Method

Participants

As part of their course requirement, 45 undergraduate catholic students (M_{age} = 18.9, SD_{age} = 1.43, 38 females and 7 males) at La Laguna University participated in this experiment. All of the participants were native Spanish. None had previously participated in Experiments 1 and 2.

Design and Procedure

Participants were randomly assigned to the cells of a 2-level single factor (Recall: ethical vs. unethical), between-participants design. They were led to separate rooms upon arrival and engaged in the same memory recall task (i.e., the ethical vs. unethical recall) as in Experiment 1.They were then approached individually by the experimenter during the break and asked whether they would like to have an antiseptic cleansing wipe or a felt tip pen as a free gift (both items were visible on a table in front of the participant). Their choice between the felt tip pen and the wipe served as the dependent variable.

The wipe and the felt tip pen were tested previously to make sure that they were equally desirable on another independent sample with forty-nine undergraduate students. These participant engaged in a marketing-like task and rated the desirability of fourteen products on a seven-point scale (1 = completely undesirable, 7 = completely desirable). Results confirm equal desirability between felt tip pen (M = 4.10) and wipe (M = 3.94) [$t(48)$ = .16, n.s.].

Results and Discussion

In contrast with Zhong and Liljenquist (2006) results, Spanish participants who recalled an unethical deed were not more likely to take the antiseptic wipe (30.4%) than were those who recalled an ethical deed (13.6%), χ^2 = .99[4], n.s.p and φ = .14, see Table 2.

One objection to this third experiment could be that our participants didn't activate any type of moral script because they didn't remember any emotional episode in the unethical condition. But a look to subjects' responses does not support such objection. Even more, it could be said that both sorts of stories are non-overlapping. In the ethical condition, participants referred mainly to facts in their past they are proud of, like collaborating with a non-governmental organization, or lending money to a friend in trouble. In the unethical condition their stories were related, in almost all the cases, with guilt or similar feelings. Subjects usually referred to situations in which they had lied, or experienced unfair behaviour (like infidelities) with their friends or mates, frequently one or two years before. The differences in themes between the facts recalled in the ethical and unethical condition support the efficacy of our manipulation. Therefore, we can conclude that among Spanish subjects physical cleansing is not an operant conduct in order to restore moral purity.

With their three studies, Zhong and Liljenquist (2006), provided support for the Macbeth effect, and claimed it to be universal. However, our experiments cast doubts about this universality of the effect, especially when considering the methodological improvements we included: In the first experiment we increase the numbers of words, to facilitate semantic activation. With the same goal, in the second one we increase the number of cleaning items. In this third experiment we increased the sample and checked the equal desirability of the two gifts (pen and antiseptic wipe). Finally, in Experiments 2 and 3 we include an important control that was absent in the Zhong and Liljenquist (2006), paper: the knowledge of the participant's religious beliefs. Hence, taken together, studies 1, 2 and 3 cast definite doubts on the universality of the Macbeth Effect.

Table 2
Summary of results of Experiment 3: Counting of participants that chose antiseptic wipes vs. tip pen as function of the experimental manipulation (Ethical vs. Unethical recall), (percentages in brackets).

Experimental condition	Chose Wipe	Chose Pen	Total
Ethical recall	3 *(6.7)*	19 *(42.2)*	22 *(48.9)*
Unethical recal	7 *(15.6)*	16 *(35.6)*	23 *(51.1)*
	10 *(22.2)*	35 *(77.8)*	45 *(100)*

[4] In this experiment and in the next one, we used *Yates' chi-square* test.This formula is chiefly used when at least one cell of the table has an expected frequency less than 5.

Experiment 4: Away your sins or interpersonal sensitivity?

The fourth experiment in Zhong and Liljenquist (2006), was designed to probe the efficacy of cleansing for moral restoration. They proposed that a threat to the moral self would motivate the restoration of moral purity through direct compensatory behaviour (e.g. volunteering to help). The hypothesis in this experiment was that participants in the unethical condition ("recall of questionable moral activities") who cleansed their hands with an antiseptic wipe should have less need to engage in helping behaviour than the other participants who didn't cleanse their hands.

As aforementioned, one criticism for Zhong and Liljenquist (2006), research is its lack of control of the characteristics of the sample. For example, we do not know if the American participants were protestant or catholic, if they are or are not practitioners and so on. In Zhong and Liljenquist (2006), Experiment 4, the dependent variable was a type of behaviour: volunteering to help.

In this experiment all participants described an unethical deed from their past. Subsequently, they either cleansed their hands with an antiseptic wipe or not. Then they completed a survey regarding their current emotional state. Finally, they were asked to volunteer without pay for another research to help out a desperate graduate student. According with Zhong and Liljenquist (2006), participants who had cleansed their hands before being solicited for help would be less motivated to volunteer because the cleansing wipes had already washed away their moral sins and restored a suitable moral self.

Method

Participants

As part of their course requirement, 28 undergraduate students (M_{age} = 19.3, SD_{age} = 1.27, 24 females and 4 males) from the University of La Laguna participated in this experiment. All of them were native and catholic Spanish. None has previously participated in Experiments 1, 2 or 3.

Design and Procedure

Participants were randomly assigned to the cell of 2-level single factor (Intervention: cleansed vs. not-cleansed) between-participants design. They were led to individual rooms and told that they were going to engage in a computer task and a paper task. Participants were first asked to describe an unethical deed from their past via a computer program. They were then randomly assigned to one of two conditions. In the cleansed condition, participants were told that the Research Protection Board had recommended that we provide participants with hand-wipes after using public computers, and they were given an antiseptic cleansing wipe to use at that point. Those in the not-cleansed condition, however, were simply told that they had finished the computer task and could move on to the paper-based task.

After the cleansing manipulation, participants in both conditions were given a paper-and-pencil task in which they assessed their current emotional state. The experimenter asked them to be as detailed as possible in the description of their emotions.

Finally, right before the end of the experiment, participants were solicited to volunteer to participate in a new research. An unfamiliar experimenter from Arts Faculty asked them to help with one of her dissertation studies. The participation would be unpaid because the student had no financial support. They put theirs names down in a list if they wanted to participate in the Art's research two days later. Following Zhong and Liljenquist, (2006) predictions, after participants recalled an unethical behaviour from their past, they would be motivated to offer help to compensate for their wrongdoing. In contrast, participants who had cleansed their hands before being solicited for help would be less motivated to volunteer because the sanitation wipes had already washed their moral stains and restored a suitable moral self.

Results and Discussion

In contrast with Zhong and Liljenquist (2006) results, data analysis shows that physical cleansing did not significantly reduce the number of volunteers: 85% of those in the non-cleansing condition and 60% of those who cleansed their hands offered help, (χ^2 = 1.04, n. s and φ = .2, see Table 3). It should also be noticed that participants in general showed a high tendency for volunteerism (71.4%). In adition, data analysis of the list of emotions shows that cleansing did not significantly reduce the number of negative emotions expressed by participants[5], ($t_{(26)}$= .71, n.s, $M_{cleansing}$ = 2.7 and $M_{no\text{-}cleansing}$ = 3.3).

General Discussion

We can conclude from our results that Spanish participants did not use physical cleansing as a psychological mechanism for restoring threatened morality. The Experiments 1 and 2 support that Spanish participants neither thought about nor desired cleansing products when submitted to the unethical condition. Experiment 3 showed that Spanish participants did not show a preference for choosing a cleansing product

[5] Negative emotions were anxiety, guilt, pain, disappointed, impotence, fear, anger, sadness and shame.

Table 3
Summary of results of Experiment 4: Counting of participant that volunteering to help as function of the experimental manipulation (Cleansed vs. Not cleansed), (Percentages in brackets)

Experimental condition	Volunteering to help		Total
	No	Yes	
Non Cleansed	2 *(7.1)*	11 *(39.3)*	13 *(46.4)*
Cleansed	6 *(21.4)*	9 *(32.1)*	15 *(53.6)*
Total	8 *(28.6)*	20 *(71.4)*	28 *(100)*

(an antiseptic wipe) when they were involved in morally questionable activities. Finally, in Experiment 4 Spanish participants did not show less motivation to volunteering after cleansing their hands in the unethical condition; that is, physical cleansing did not seem to restore their threatened morality. Therefore, the Macbeth effect is at the moment, an American, cultural and not universal effect.

As proposed by Haidt, Rozin, Mccauley & Imada (1997), the use of embodied schemata in social life may constitute a set of universal psychological and cultural processes, yet the particular constellation of bodily and social meanings must be arranged or filled in by each culture. Following these authors, Americans seem to hold a view of the body (found also in others parts of the world) according to which it is a temple, housing of the self or the soul within.

However, we are prone to a skeptical attitude about the Macbeth effect even among Americans subjects. The fact that participants in the Zhong and Liljenquist (2006), Experiments 1, 2 and 3 thought of, desired, or preferred cleansing products when involved in morally questionable activities does not directly demonstrate that they feel less disturbed after physical cleansing (i.e., that they are restoring their moral purity). Only Experiment 4 gave some support to this claim. We were aware of the limitations of experiment without significant effects, and took a set of experimental cautions to avoid them. In Experiments 1, 2 and 3 we increased the size of the sample or the experimental controls. In Experiment 1 American sample was slightly superior to ours (Spanish = 47, American = 60) but we increased numbers of items from 6 to 18; in Experiment 2 we increased the sample size (Spanish = 36, American = 27) and numbers of items, from 5 to 10; in Experiment 3 we increased the sample size (Spanish = 45, American = 32). Only our Experiment 4 has a sample size inferior to the original Zhong and Liljenquist (2006), experiment (Spanish = 28, American = 45). In this particular case, the percentage of participants motivated to voluntarism was higher in the cleansing condition than in non-cleansing one (85% vs. 60%). It could be argued that a greater sample could make this difference significant. However, even if this possibility occurred, this fact would not support the Zhong and Liljenquist (2006) hypothesis. Interpretation of Experiment 4 depends on the results of previous studies (1, 2 and 3), and those experiments clearly were not replicated with Spanish subjects.

Zhong and Liljenquist (2006), idea of bodily cleansing as a mechanism to restore moral integrity appears very attractive and simple for the general public, but we consider that the identification between morality and religion is a fundamental problem in the Zhong and Liljenquist (2006) research. We have serious suspicions of the existence of this type of effect in different cultures. We think that it is necessary to have more data and news studies improving methodological deficiencies showed in the Zhong and Liljenquist (2006) paper.

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