

RESEARCH ARTICLE

If They Are All Green, I Take Responsibility for My Eco-Unfriendly Behaviors: Effects of Injunctive Norm on Sense of Responsibility Following Cognitive Dissonance

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Individuals may knowingly engage in eco-unfriendly behaviors even though they endorse the injunctive norm that people should protect the environment. Although they presumably experience cognitive dissonance, they often fail to change either their environment-related behavior or their support for the injunctive norm. In the first of two experiments, we compared a low-choice condition (low dissonance arousal) with a standard high-choice condition and a high-choice condition with injunctive norm (high dissonance arousal). Results showed that acting freely in an eco-unfriendly and counterattitudinal manner resulted in less acceptance of responsibility, but responsibility was not denied if the injunctive norm was made salient. We hypothesized that this was driven by a desire to maintain self-integrity. In the second experiment (preregistered study), we sought to test this hypothesis by manipulating self-affirmation and the salience of the injunctive norm in a high-choice situation. Results confirmed that participants protected their self-integrity by denying responsibility or relying on the injunctive norm. Moreover, attitude toward waste recycling was more positive when the injunctive norm was salient, regardless of self-affirmation.

Keywords: cognitive dissonance; injunctive norm; denial of responsibility; self-affirmation; environment

Why is there so little action in favor of environmental protection, even though most people are convinced of its necessity? People habitually behave in a counterattitudinal manner in their daily lives in the domain of environmental protection. Despite being interested in the mitigation of the greenhouse effect, many of them still drive to work each day, even if other, less polluting alternatives are available (e.g., cycling or using public transport). By definition, acting in a counterattitudinal manner arouses cognitive dissonance (Cooper, 2019; Festinger, 1957; Fointiat, Girandola, & Gosling, 2013; Harmon-Jones & Mills, 1999), and people are then motivated to restore consistency by changing either their attitudes (e.g., being less in favor of mitigating the greenhouse effect) or their behaviors (e.g., using their car less often). Nevertheless, some habits persist. Regarding environmental issues, individuals change neither their attitudes (e.g., still being in favor of environmental protection) nor their behaviors (e.g., continuing to use their car). Although the necessary conditions seem to be met, people appear not to experience cognitive dissonance, or else make no effort to reduce it.

Based on this observation, we examined the processes of cognitive dissonance arousal and reduction following a counterattitudinal and eco-unfriendly act. First, we predicted that the discrepancy between a pro-environmental attitude and eco-unfriendly behaviors would influence the way in which cognitive dissonance was reduced. Participants might, for instance, seek to change their perception of their counterattitudinal behavior by denying responsibility (Gosling, Denizeau, & Oberlé, 2006). Denial of responsibility as a reduction mode has seldom been explored up to now. In line with the self-affirmation approach (Steele, 1988), we suggested that denial of responsibility protects individuals' self-integrity when it is threatened by a state of cognitive dissonance, by uncoupling the counterattitudinal act from the self-concept. Second, we predicted that knowing that most people approve of environmental protection (i.e., injunctive norm; Cialdini, Reno, & Kallgren, 1990) would decrease dissonance arousal. Conforming with others may enhance an individual's self-image (Cialdini & Trost, 1998) which, in turn, may make cognitive discrepancy bearable (i.e., without arousing cognitive dissonance). According to the self-affirmation approach (Aronson, Cohen, & Nail, 1999; Sherman & Cohen, 2006; Steele, 1988), cognitive dissonance is aroused when self-integrity is threatened. We can surmise that if the positive self-image associated with normative conformity protects self-integrity, cognitive dissonance arousal can be avoided.

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Protecting Self-Integrity by Denying Responsibility

From the self-affirmation perspective (Aronson et al., 1999; Steele, 1988), a discrepancy between an attitude and a behavior arouses cognitive dissonance because of a perceived threat to self-integrity. Individuals are deeply motivated to maintain their self-integrity. They need to perceive themselves as generally efficient and morally adapted, by controlling important outcomes in their social lives (Steele, 1988). Performing a counterattitudinal act makes individuals acutely aware that they are not systematically capable of moral and adaptive behaviors. Providing the necessary conditions are met, counterattitudinal behaviors arouse cognitive dissonance precisely because they threaten self-integrity. Among the necessary conditions listed by the *new look* model (Cooper & Fazio, 1984), sense of responsibility plays a major role in the arousal of cognitive dissonance. According to Cooper and Fazio (1984), individuals attribute responsibility to themselves when they engage in a counterattitudinal behavior of their own free will. Following a state of cognitive dissonance, one possible avenue for reducing dissonance arousal is to deny responsibility for the counterattitudinal act. Gosling, Denizeau, and Oberlé (2006) observed that participants reported less responsibility for a counterattitudinal behavior in a dissonance-arousing situation (high-choice) than in a control situation (low-choice). Denial of responsibility therefore allows individuals to continue acting in a counterattitudinal manner without experiencing cognitive dissonance, as the self-concept is uncoupled from the counterattitudinal behavior (Gosling et al., 2006). Importantly, according to Gosling and colleagues (2006), denial of responsibility differs from other reduction modes (e.g., attitude change or trivialization), insofar as it does not reduce the individual's motivation to restore cognitive consistency. We suggest that the use of denial of responsibility reveals (at least in part) the motivation to protect self-integrity.

Protecting Self-Integrity by Announcing a Social Norm

One way of positively managing the self-concept is to conform to social norms (Cialdini & Trost, 1998). Cialdini, Reno, and Kallgren (1990) identified two types of social norms: descriptive and injunctive. A *descriptive norm* refers to what the majority of people *do* (i.e., behaviors considered typical or normal in a given situation). An *injunctive norm* refers to what the majority of people *approve* (i.e., what they *should do*). Conforming to social norms affects the self-concept (Cialdini & Trost, 1998). Hence, awareness of how people think or behave may mitigate dissonance arousal. In their study, McKimmie et al. (2003) made participants aware of generosity as a favorable personality trait by asking them to complete a number of different scales. Participants then filled out a questionnaire about their generosity-related behaviors. This adaptation of the induced hypocrisy paradigm (Aronson, Fried, & Stone, 1991) presumably led to cognitive dissonance, in that participants were aware that they rarely behaved generously, even though they claimed generosity was a favorable trait.

The researchers then informed participants that according to a poll, a low percentage of their peers behaved generously (e.g., only 17% donated money to charities). This congruence of the descriptive norm with the hypocritical nature of the act reduced dissonance and meant that participants did not change their attitudes. However, in the condition in which they were told about an incongruent (with the hypocritical nature of the act) descriptive norm (e.g., 87% of their peers donated money to charities), they experienced dissonance and later changed their attitudes regarding the importance of generosity. According to the authors, the (*selfish*) descriptive norm was perceived by participants as providing social support for their failure to behave generously. In other words, participants who learned that few people behaved generously knew that their past behaviors were socially supported and were therefore no longer deviant.

This study shows that the way in which a social norm is presented can alleviate cognitive dissonance. Moreover, McKimmie, Terry, and Hogg (2009) argued that individuals can live with the attitude-behavior discrepancy without experiencing cognitive dissonance if their behavior conforms with how other people behave. If individuals find out that everyone else behaves at odds with an attitude, they then feel that their own behavior is appropriate and therefore not deviant. These initial studies focused on descriptive norms. However, Voisin and Fointiat (2013) extended their findings to injunctive norms. Participants were asked to think about the type of person they should be from the perspective of others and to describe themselves accordingly (see Stone, 2003 for more details). Results confirmed that the activation of injunctive norms made a dissonance-arousing situation bearable. Compared with a control group who did not have to perform this task, these participants did not need to use a reduction mode after freely writing a counterattitudinal essay. Making injunctive norms salient appeared to enable them to realize or believe that their actions were in line with socially approved or disapproved expectations (Cialdini & Trost, 1998; Jacobson, Mortensen, & Cialdini, 2011). Normative information allows individuals to appraise whether they have behaved morally and in line with their social environment. As individuals are deeply motivated to maintain a positive image of themselves (Steele, 1988), behaving normatively allows them to protect and maintain a positive self-concept (Cialdini & Goldstein, 2004; Cialdini & Trost, 1998). In other words, announcing a social norm that is consistent with their attitudes should provide a buffer for their self-integrity.

Experiment 1

Aim and Hypotheses

The first aim of this experiment was to test whether denial of responsibility is a possible means of reducing cognitive dissonance following a counterattitudinal and eco-unfriendly behavior. Freely choosing to perform a counterattitudinal eco-unfriendly behavior poses a threat to self-integrity, and as a result, individuals may then deny their responsibility (Gosling et al., 2006). As such, our first hypothesis was that committing a counterattitudinal

behavior in a free-choice context arouses cognitive dissonance and reduces individuals' feelings of responsibility in comparison with a low-choice condition. We also wanted to find out whether the salience of an injunctive pro-environmental norm protects individuals' self-integrity in a cognitive dissonance situation (Cialdini & Goldstein, 2004; Cialdini & Trost, 1998), such that they no longer need to deny their responsibility. Thus, our second hypothesis was that making a pro-environmental norm salient increases individuals' feelings of responsibility in a dissonance-arousing situation.

Participants and Experimental Design

A total of 56 undergraduate students (mostly women, 18–21 years) from the University of Bordeaux came into the psychology laboratory as part of a course requirement. Participants were randomly assigned to one of three experimental conditions. We compared one low-choice (LC) condition with two high-choice ones: standard high choice (HC), and high choice with normative information (NI) (see data availability).

Procedure

A male experimenter explained that he was conducting research on waste recycling by individuals. Participants were each asked to perform a counterattitudinal behavior by spending 10 minutes writing down as many arguments as possible against waste recycling by individuals (Voisin & Fointiat, 2013). In a previous mass survey, 132 undergraduates from the same university had expressed their disagreement with the statement that people must not recycle their waste ($M = 1.84$, $SD = 1.31$) on a Likert-type scale ranging from 1 (*I totally disagree*) to 9 (*I totally agree*). Thus, this topic was clearly counterattitudinal.

Low-choice condition

In this condition, participants agreed to perform the counterattitudinal writing task, but the experimenter did not mention that they were free to refuse. Moreover, they were not informed about the injunctive norm regarding waste recycling. In other words, this condition matched the standard LC condition in dissonance experiments.

High-choice condition

In this condition, the experimenter mentioned that participants were free to agree or refuse to write down arguments against waste recycling: 'Of course, you are free to agree or refuse to participate in this research. I do not want to force you! It is up to you!' This condition matched the standard HC condition in dissonance experiments. The wording of the instruction aroused cognitive dissonance, because freely deciding to undertake a counterattitudinal behavior leads individuals to assume responsibility for it (Cooper & Fazio, 1984). As in the LC condition, participants were not given any information about the injunctive norm.

High-choice with normative information condition

As in the HC condition, participants freely agreed to participate in the counterattitudinal writing task. However,

in this condition, immediately after explaining that he studied waste recycling by individuals, the experimenter informed participants of the injunctive social norm regarding recycling. He told participants that a recent survey had found that '95% of psychology students *approve* of recycling waste and *believe* that people should recycle their waste.'

After the counterattitudinal writing task, we assessed participants' sense of responsibility for what they had just written with Gosling, Denizeau, and Oberlé (2006)'s scale. Participants had to rate two statements ('Do you personally feel responsible for what you have just done?' and 'Do you personally feel responsible for what you have written?') on a 9-point scale ranging from 1 (*Not at all responsible*) to 9 (*Extremely responsible*). The two items showed satisfactory correlation (Spearman's $\rho = .40$, $p = .002$).

Finally, participants rated two statements ('How much freedom did you feel in performing the task that was requested?' and 'To what extent did you feel forced to write arguments?' [reverse scored]) about their perceived freedom (Spearman's $\rho = -0.23$, $p = 0.088$). Both items were analyzed separately, owing to their weak intercorrelation and because there was only a trend toward statistical significance. Prior research had suggested that participants need to feel that they were free (or at least not forced) to perform the task or not, in order for dissonance to be aroused (Linder, Cooper, & Jones, 1967).

Results

Manipulation checks

Feeling of being forced

A one-way analysis of variance (ANOVA) yielded a significant effect of experimental condition on the feeling of being forced to find arguments, $F(2, 53) = 14.51$, $p < 0.001$, $\eta_p^2 = .35$. We broke this effect down by conducting pairwise comparisons with Holm adjustments (*emmeans* package in R version 3.5.1). Participants in the LC condition felt more forced ($M = 6.71$, $SE = 0.39$) than those in either the HC ($M = 4.71$, $SE = 0.47$) or the NI ($M = 3.40$, $SE = 0.50$) condition, $t(53) = 3.28$, $p = 0.004$, Cohen's $d = 0.88$ and $t(53) = 5.22$, $p < 0.001$, Cohen's $d = 1.40$. Moreover, there was a borderline statistical difference between the HC and NI conditions, $t(53) = 1.92$, $p = 0.061$, Cohen's $d = 0.51$. Participants in the NI condition perceived themselves as less forced than those in the HC condition.

Feeling of perceived freedom

Analysis failed to reveal a statistical difference between the three experimental conditions on the perceived freedom item, $F(2, 53) = 0.87$, $p = 0.423$, $\eta_p^2 = 0.032$.

Number of arguments

The one-way ANOVA yielded a significant effect of experimental condition on the number of arguments, $F(2, 53) = 36.56$, $p < 0.001$, $\eta_p^2 = 0.58$. Two pairwise comparisons showed that participants in the HC condition ($M = 7.06$, $SE = 0.40$) wrote down more arguments than those in either the LC ($M = 3.46$, $SE = 0.34$) or the NI ($M = 2.47$, $SE = 0.42$) condition, $t(53) = 6.92$, $p < 0.001$,

Cohen's $d = 2.19$ and $t(53) = 7.90$, $p < 0.001$, Cohen's $d = 2.79$. Moreover, participants in the LC condition wrote down slightly more arguments than those in the NI condition did, although this difference failed to reach the significance threshold, $t(53) = 1.84$, $p = 0.072$, Cohen's $d = 0.61$.

Feeling of responsibility

The one-way ANOVA revealed a significant effect of experimental condition on participants' feelings of responsibility, $F(2, 53) = 3.36$, $p = 0.042$, $\eta_p^2 = 0.11$ (see **Figure 1**). To test our hypothesis, we ran three pairwise comparisons. First, participants in the HC condition ($M = 6.15$, $SE = 0.44$) felt less responsible than those in the LC condition ($M = 7.33$, $SE = 0.37$), $t(53) = -2.07$, $p = 0.044$, Cohen's $d = 0.55$. As expected, the second comparison revealed that participants in the HC condition felt less responsibility for their counterattitudinal behavior than those in the NI condition ($M = 7.70$, $SE = 0.47$), $t(53) = -2.42$, $p = 0.019$, Cohen's $d = 0.65$. Third, participants in the HC condition felt less responsible for their counterattitudinal behavior than those in either the LC or NI conditions. There was no statistical difference between the LC and NI conditions, $t(53) = -.37$, $p = .54$, Cohen's $d = .10$.

Dissonance magnitude can vary according to the number of written arguments (Beauvois, Ghiglione, & Joule, 1976). Given that the number of arguments differed statistically across the experimental conditions, we ran a one-way analysis of covariance (ANCOVA) with number of arguments as a covariate. The analysis still yielded a significant effect of experimental condition and covariate on the feeling of responsibility, $F(2, 52) = 15.97$, $p < 0.001$, $\eta_p^2 = 0.38$ and $F(1, 52) = 0.57$, $p = 0.45$, $\eta_p^2 = 0.07$. We conducted further pairwise comparisons. These comparisons again revealed that participants in the HC condition

($M_{adj} = 4.45$, $SE = 0.51$) felt a weaker sense of responsibility than those in either the LC condition ($M_{adj, LC} = 8.81$, $SE = 0.46$), $t(52) = -5.09$, $p < 0.001$, Cohen's $d = 1.36$, or the NI condition ($M_{adj, NI} = 8.81$, $SE = 0.46$), $t(52) = -5.48$, $p < 0.001$, Cohen's $d = 1.46$. Finally, there was a marginal difference between the LC and NI conditions, $t(52) = -1.88$, $p = 0.065$, Cohen's $d = 1.46$.

The sample size was small, and we did not perform an analysis to estimate the required sample size beforehand. For this reason, we ran a sensitivity power analysis with G*Power 3.1 software (Erdfeuler, Faul, & Buchner, 1996), to determine the smallest effect we could detect with a 56-participant sample for 80% statistical power ($\alpha = 0.05$). This revealed that the observed effect size (Cohen's f) had to be greater than 0.43 for a one-way ANOVA or ANCOVA. The one-way ANOVA revealed a smaller effect size ($\eta_p^2 = 0.11$ equivalent to Cohen's $f = 0.35$), whereas the effect size was greater than the expected value if the number of arguments was controlled (ANCOVA; $\eta_p^2 = 0.38$ equivalent to Cohen's $f = 0.78$).

Discussion

The results supported our hypotheses. We observed the use of denial of responsibility as a dissonance reduction mode following a dissonance-arousing eco-unfriendly and counterattitudinal act (Gosling et al., 2006). When participants were given the choice of agreeing (or refusing) to perform a counterattitudinal behavior (HC condition), cognitive dissonance was presumably aroused and participants denied their responsibility. From a self-affirmation perspective (Sherman & Cohen, 2006; Steele, 1988), decoupling the counterattitudinal behavior from the self-concept by denying responsibility could be an efficient way of protecting self-integrity. However, individuals

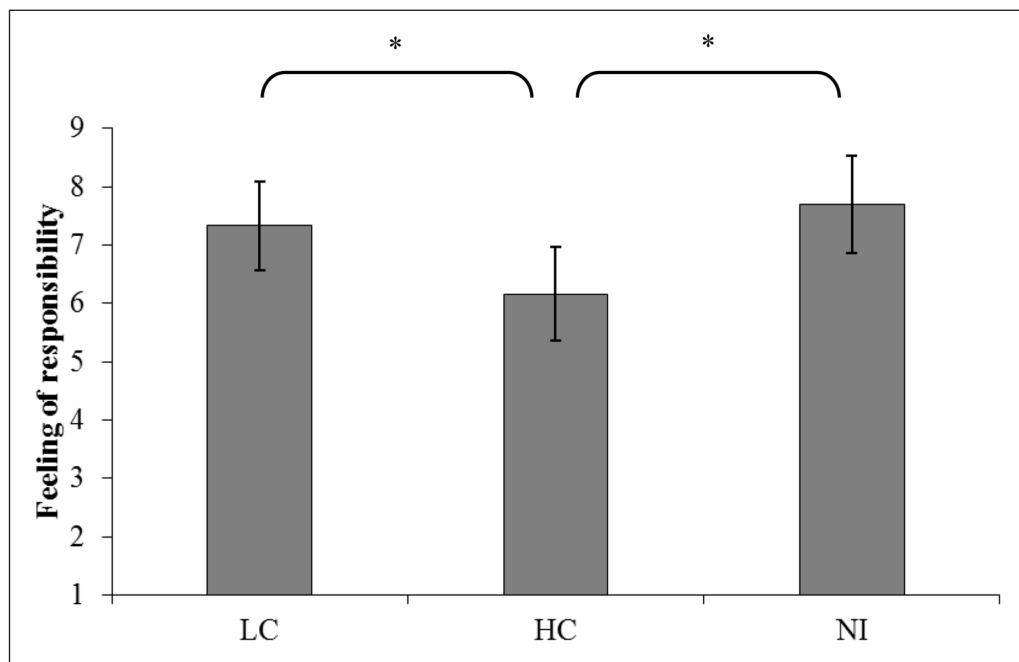


Figure 1: Feeling of responsibility as a function of experimental condition (Experiment 1). The lower the feeling of responsibility score, the greater the reduction of cognitive dissonance. Error bars represent the 95% confidence interval. * $p < 0.05$.

did not use denial of responsibility if they were informed beforehand about an injunctive norm that was congruent with their attitude (NI condition), as this information meant that their self-image could seem positive and in line with their social environment.

Our interpretation was based on the measure of only one reduction mode. We cannot, therefore, conclude about the nature of participants' psychological state in each experimental condition after being given an opportunity to deny responsibility. The fact that participants did not use the first mode of reduction they were offered does not imply an absence of dissonance arousal. By virtue of a *hydraulic* relation (Simon, Greenberg, & Brehm, 1995), individuals may not reduce their cognitive dissonance with the first mode that is presented to them, but with the second one. In other words, this first experiment did not provide enough evidence to establish the presence or absence of cognitive dissonance. The second experiment was designed to address this flaw. Finally, we observed a large effect size for the feeling of responsibility, which is somewhat unusual in social psychology. The first experiment may have overestimated this feeling, owing to the small sample size (Schäfer & Schwarz, 2019). As this meant we had to exercise caution when interpreting these results, we felt it was prudent and necessary to reproduce these effects with a larger sample. For all these reasons, we ran a second experiment with several methodological improvements to compensate for these limitations.

Experiment 2

We interpreted the results of Experiment 1 in terms of motivation to protect self-integrity. Individuals could attain this goal either by denying their responsibility or by learning that an injunctive norm was consistent with their valued attitude. The aim of this second experiment was both to pinpoint the preferred cognitive dissonance mode in each situation of interest and to test the hypothesis that denial of responsibility and salience of an injunctive norm both protect self-integrity, in terms of motivation to protect self-integrity. It should be noted that we pre-registered all the methods, hypotheses, and statistical models for Experiment 2 (see details on the Open Science Framework, https://osf.io/ej2fd/?view_only=adaa4b68edd240faad27dd6719d9d049).

Measuring Cognitive Dissonance

The first goal of the second experiment was to examine whether cognitive dissonance was aroused in each experimental condition. Dissonance arousal is associated with a negative emotional state (psychological discomfort or negative affect toward self), and can be measured in two different and complementary ways, either by using a *cognitive dissonance thermometer* (Elliot & Devine, 1994), or by comparing two different reduction modes. The argument underlying the first study was that *denial of responsibility* uncouples the counterattitudinal behavior from the self-concept. In other words, the function of denial of responsibility is to protect self-integrity, thus making dissonance arousal bearable. However, according to an alternative explanation, the desire for cognitive consistency

may subsist. Hence, in addition to measuring the feeling of responsibility, we decided to measure *trivialization*. When individuals choose this method to reduce their cognitive dissonance, they decrease the importance given to the counterattitudinal behavior. Importantly, according to Simon and colleagues (1995), trivialization restores cognitive consistency, but not self-integrity.

Testing the Hypothesis of Threat to Self-Integrity

The second goal of this study was to test our hypothesis that denial of responsibility and salience of an injunctive norm reduce the threat to self-integrity. In order to achieve this, we used a self-affirmation procedure. It is well established that self-affirmation protects self-integrity (McQueen & Klein, 2006; Sherman, 2013; Sherman & Cohen, 2006). Beyond research on cognitive dissonance, most studies examining the responses of individuals to a threat to their self-integrity have used a self-affirmation procedure (Sherman & Cohen, 2006). Self-affirmation is a way of bolstering the self by making a positive and important self-domain salient. Having a positive self-aspect thwarts the influx of self-related negative thoughts in the case of a threat (Critcher & Dunning, 2015). Self-affirmed individuals perceive threatening situations in an unbiased manner. They do not need to cope with a self-threat. More specifically, in the field of cognitive dissonance, experiments have shown that when they are placed in a dissonance-arousing situation, they do not change their attitude (Aronson, Blanton, & Cooper, 1995; Critcher, Dunning, & Armor, 2010; Steele & Liu, 1983). Simon and colleagues (1995) confirmed that self-affirmed individuals do not change their attitude—even if this reduction mode is presented first—and instead trivialize the importance of their attitude. By contrast, individuals who are not given an opportunity to self-affirm change their attitude, but do not trivialize it. In other words, self-affirmation influences the motivation to reduce cognitive dissonance. Individuals who no longer have concerns about their self-integrity manage their cognitive discrepancy.

Hypotheses

As in Experiment 1, we hypothesized that denial of responsibility and salience of an injunctive norm protect self-integrity. In addition, we expected participants in the no self-affirmation condition not to trivialize. 1) Without normative information, they would simply seize the first opportunity they were given to reduce cognitive dissonance (here, denial of responsibility). 2) In the NI condition, individuals would focus solely on the management of their self-integrity, without trying to reduce their cognitive dissonance (i.e., no motivation to decrease the dissonance ratio by trivializing).

To directly test our hypothesis on the motivation to protect self-integrity, we took advantage of the self-affirmation procedure, as this protects self-integrity while inducing attitude trivialization. Whether or not they were given the normative information, self-affirmed individuals would trivialize, but not deny their responsibility. Finally, we predicted that participants would experience a less

negative affective state when they had the opportunity to self-affirm and were told about the injunctive norm.

Participants and Design

We ran a priori power analysis to determine the sample size needed for 80% statistical power ($\alpha = .05$) to observe an interaction effect (for the procedure, see Perugini, Gallucci, & Costantini, 2018). This analysis was based on a calculation of the effect size of self-affirmation in a situation of cognitive dissonance, based on eight published experiments (Blanton, Cooper, Skurnik, & Aronson, 1997; Glasford, Dovidio, & Pratto, 2009; Heine & Lehman, 1997; Hoshino-Browne et al., 2005, Experiments 3 and 4; Simon et al., 1995, Experiments 3 and 4; Steele & Liu, 1983). The meta-analysis revealed a medium effect size (weighted Cohen's $d = 0.55$, see pre-registration for more details). From this effect size, we calculated an effect size for the interaction contrast ($C = \{3 -1 -1 -1\}$), testing the prediction that sense of responsibility would be weaker in the condition without affirmation and without salience of the injunctive norm than in the other three experimental conditions. We calculated the expected means from the estimate in the HC condition (i.e., without salience of the injunctive norm) in the first experiment ($M = 6.14$) and the standard deviation for the whole sample in the first experiment ($SD = 1.89$). We deduced the estimate in the self-affirmed condition without normative information ($M_{\text{Self-affirmed and without normative information}} = 6.14 + 0.55 \times 1.89 = 7.18$). We predicted that the estimates in the self-affirmed and no normative information condition would be identical to those in the two conditions with normative information (we also estimated that these means would be equal to 7.18). The calculated effect size of the interaction contrast turned out to be moderate ($f = 0.24$)². G*Power software 3.1 revealed that at least 139 participants had to be recruited. Finally, we recruited 145 students from the University of Reims Champagne-Ardenne (108 women; $M_{\text{age}} = 20.04$ years, $SD_{\text{age}} = 1.66$), 90.3% of whom were enrolled on a BA degree course (none studying psychology). Three other participants started the experiment but were excluded because they refused to write a counterattitudinal essay.

Participants were randomly assigned to one of the experimental conditions of a 2 (norm salience: no normative information vs. normative information) \times 2 (self-affirmation: no affirmation vs. self-affirmed) between-groups factorial design.

Procedure

Participants were contacted on the Reims University campus by one of the experimenters (there were two female and two male experimenters), who explained that they would take part in two independent studies. The same experimenter administered the self-affirmation procedure to participants. Participants were randomly assigned to the no affirmation or self-affirmed condition. When the relevant task had been completed, the first experimenter escorted the participant to a second experimenter (there were one male and two female experimenters). At this point, the procedure of induced compliance

began (identical to that in the first experiment). All the participants were told that they were free to agree or refuse to write the counterattitudinal essay (high choice). Participants in the normative information condition were orally informed by the second experimenter about the injunctive norm (see Experiment 1).

Material

Self-affirmation procedure

We used the value-affirmation procedure to affirm the participants' self-concept (Sherman, Nelson, & Steele, 2000). They began by ranking 11 values in order of importance (e.g., relationships with friends and/or family, spontaneity/living in the present moment, freedom, etc.). Next, they either wrote down why the most important value was meaningful and important to them (self-affirmed condition), or explained why the last value could possibly be significant or important for a typical student (no affirmation condition).

Measures

After the experimental procedure, participants completed a post-experiment questionnaire comprising three scales in the following order (see data availability).

Affect

Participants responded to the French adaptation of the cognitive dissonance thermometer (Elliot & Devine, 1994) by answering the following question for each of the 16 items: 'How do you feel right now?' They responded on a Likert-type scale ranging from 1 (*Does not apply at all*) to 7 (*Applies very much*). This scale is composed of three subscales: psychological discomfort (*uncomfortable, embarrassed, bothered, and uneasy*), self-directed negative affect (e.g., *disappointed with myself, shameful*), and positive affect (*good, happy, optimistic, friendly, and energetic*).

Feeling of responsibility

Participants reported their feeling of responsibility for the performance of the counterattitudinal act by rating both items (Spearman's $\rho = 0.68$, $p < 0.001$; see Experiment 1).

Trivialization

We adapted Martinie and Fointiat's (2006) trivialization items to our waste sorting topic. Participants rated four items on a Likert-type scale ranging from 1 (*Not at all important*) to 9 (*Extremely important*). These were: 'How important is it to you to defend a position you disagree with?'; 'How important is the issue of waste recycling to you?'; 'How important to you are the arguments you found against waste recycling?'; and 'If you had written some arguments in favor of waste recycling, how important would these arguments have been to you?'

Manipulation checks

First, we measured how far participants felt free to perform the counterattitudinal act with the same two items as in the first study (Spearman's $\rho = -.51$, $p < .001$). Second, we checked our manipulation of the injunctive

norm. Participants were asked to estimate the percentage of students who believe that people should recycle. Third, we measured participants' attitudes to ensure that they were strongly polarized (i.e., strongly in favor of waste recycling by individuals). We measured these attitudes by asking how far they agreed with five statements (e.g., 'I am in favor of waste recycling', 'It is not up to individuals to recycle their waste'; Cronbach's $\alpha = .80$). Participants rated each one on a Likert-type scale ranging from 1 (*Strongly disagree*) to 9 (*Strongly agree*).

Results

Preliminary analyses

Before analyzing the results, we decided to check whether participants had followed the instructions. Two judges decided if they had followed the self-affirmation instruction and discussed each case until they reached agreement. Three participants were excluded (two in the self-affirmed condition). Regarding the counterattitudinal test, the judges assessed each of the arguments and counted how many were for (pro-attitudinal) and how many against (counter-attitudinal) waste recycling by individuals. This verification led to the exclusion of participants who either did not produce at least two counterattitudinal arguments ($n = 6$), or who argued both for and against individuals recycling their waste ($n = 1$) from the analysis. In addition, one participant was excluded because he refused to write for 10 minutes (he stopped after 3 minutes). Two participants were also excluded because they failed to complete most (i.e., more than 50% of the items) of the post-experiment questionnaire. The final sample was thus reduced to 132 participants (98 women; $M_{age} = 20.06$ years, $SD_{age} = 1.63$).

Analyses

As the induced compliance task was administered by three different experimenters, precautions had to be taken in the statistical analyses, as these experimenters could potentially induce more or less cognitive dissonance (e.g., by being more or less welcoming to participants, thus interfering with the magnitude of cognitive dissonance). Accordingly, all subsequent analyses, verifications and hypothesis tests were performed with linear mixed-effects models² (lme4 and lmerTest packages for R version 3.5.1). More specifically, we tested random intercept models. We assumed that whatever the effects of norm salience and self-affirmation, they would be induced similarly by each experimenter. We nonetheless assigned them different intercepts. Moreover, when the measures involved several items, by-item variability was taken into account. We controlled for the baseline difference between items (random intercept). Finally, the interactions were broken down by planned pairwise comparisons (emmeans package for R version 3.5.1).

Manipulation checks

Perceived freedom

Overall, our sample responded that they had felt free to decide about performing the counterattitudinal act ($M_{adj} = 6.84$, $SE = 0.54$). We did not observe any effect of

norm salience, self-affirmation, or the interaction between the two, $F(1, 262) = 2.35$, $p = 0.13$, and $F_s < 1$.

Number of discrepant arguments

There were no main effects of either norm salience or self-affirmation on the number of written arguments, $F < 1$ and $F(1, 132) = 1.81$, $p = 0.18$, and no interaction effect, $F < 1$. All conditions taken together, the participants produced 3.88 discrepant arguments on average ($SE = .13$).

Perceived injunctive norm

Participants in the normative information condition estimated that a greater proportion of students believe that people should recycle ($M_{adj} = 87.0\%$, $SE = 2.29$), compared with those in the no normative information condition ($M_{adj} = 74.3\%$, $SE = 2.23$), $F(1, 261) = 39.08$, $p < 0.001$, $\eta^2_p = 0.128$. We unexpectedly observed a trend toward an effect of self-affirmation, $F(1, 261) = 3.55$, $p = 0.061$, $\eta^2_p = 0.012$. Self-affirmed individuals felt that a lower proportion of students supported the injunctive norm ($M_{adj} = 78.7\%$, $SE = 2.34$), compared with those who were not affirmed ($M_{adj} = 82.5\%$, $SE = 2.22$). There was no interaction effect, $F < 1$.

Attitude

To end with, we measured attitude, to verify that it was polarized. Overall, participants supported waste recycling ($M_{adj} = 7.99$, $SE = 0.16$). Unexpectedly, analysis revealed that participants in the no normative information condition had a less favorable attitude toward waste recycling ($M_{adj} = 7.83$, $SE = 0.17$) than those in the norm salience condition ($M_{adj} = 8.15$, $SE = 0.17$), $F(1, 656) = 5.76$, $p = 0.017$, $\eta^2_p = 0.009$. Analysis revealed neither a self-affirmation effect, $F(1, 654) = 1.38$, $p = 0.24$, nor an interaction effect, $F(1, 654) = 0.03$, $p = 0.87$.

Affect

Before testing our hypotheses, we performed an exploratory factor analysis using the maximum likelihood extraction with oblimin rotation to test the factor structure of the cognitive dissonance thermometer. An initial analysis revealed a three-factor solution (Kaiser-Meyer-Olkin, $KMO = 0.86$, Barlett's test: $\chi^2(120) = 1,223$, $p < 0.001$). However, four items (*guilty*, *disappointed*, *ashamed*, and *good*) simultaneously loaded on two factors, and a fifth item (*bothered*) that is supposed to measure discomfort loaded on the first factor measuring self-directed negative affect. We therefore conducted a second exploratory factor analysis without these five items ($KMO = 0.83$, Barlett's test: $\chi^2(55) = 610.3$, $p < 0.001$), which accounted for 57.3% of the variance. The exploratory factor analysis yielded a structure in line with expectations. The first factor (20.8% of explained variance) consisted of four self-directed negative affect items (*disgusted with myself*, *angry toward myself*, *dissatisfied with myself*, *self-critical*; all loadings > 0.50 , Cronbach's $\alpha = 0.88$). The second factor (18.9% of explained variance) involved three items associated with psychological discomfort (*embarrassed*, *uncomfortable*, *uneasy*; all loadings > 0.69 , Cronbach's $\alpha = 0.91$). The third

factor (17.6% of the explained variance) corresponded to the four positive affect items (*happy, optimistic, energetic, friendly*; all loadings > 0.60, Cronbach's $\alpha = 0.80$).

We then carried out a linear mixed-model analysis of the 2 (self-affirmation) \times 2 (normative information) \times 3 (type of affect: psychological discomfort vs. self-directed negative affect vs. positive affect) between-groups factorial design. Before running this analysis, we reversed the coding of the positive affect items so that the higher the score was, the more it reflected a negative affective state. Analysis revealed an affect-type effect, $F(2, 10.95) = 6.37$, $p = 0.015$, $\eta_p^2 = 0.009$ ($M_{adj}^{discomfort} = 2.05$, $SE = 0.36$; $M_{adj}^{negself} = 2.38$, $SE = 0.32$; $M_{adj}^{positive} = 3.38$, $SE = 0.32$). The main effect of self-affirmation failed to reach significance, $F(1, 123.98) = 3.26$, $p = 0.071$, $\eta_p^2 = 0.002$. Descriptively, self-affirmed participants felt less self-directed negative affect ($M_{adj} = 2.52$, $SE = 0.21$) than unaffirmed ones did ($M_{adj} = 2.68$, $SE = 0.21$). However, analysis revealed neither a significant effect of norm salience, $F(1, 1,424.14) = 2.45$, $p = 0.12$, nor an interaction effect between self-affirmation and norm salience, $F(1, 1,425.24) = 1.09$, $p = 0.30$. All other interactions with the affect-type variable were nonsignificant (all $ps > 0.20$).

Responsibility

Before analyzing the feeling of responsibility, we sought to detect whether our sample included outliers. We excluded three participants because they deviated from the median by more than three median absolute differences (Leys, Delacre, Mora, Lakens, & Ley, 2019). The linear mixed model revealed the expected interaction effect, $F(1, 255.05) = 6.00$, $p = 0.015$, $\eta_p^2 = 0.023$ (see **Figure 2**). We performed pairwise comparisons to break down the interaction effect. There was an effect of norm salience on the feeling of responsibility when partici-

pants were not self-affirmed, $t(256) = -2.02$, $p = 0.044$, Cohen's $d = 0.36$. Thus, in this condition, participants felt less responsible for their counterattitudinal act when they did not receive any normative information ($M_{adj} = 5.65$, $SE = 0.33$) than when they were told that '95% of students approve' of waste recycling ($M_{adj} = 6.52$, $SE = 0.34$). On the other hand, normative information did not affect the feeling of responsibility when participants were self-affirmed ($M_{adj}^{no\ normative\ information} = 7.09$, $SE = 0.35$, and $M_{adj}^{norm\ salience} = 6.46$, $SE = 0.33$), $t(255) = 1.42$, $p = 0.16$, Cohen's $d = 0.25$. Indeed, a contrast indicated that participants in both self-affirmation conditions acknowledged their responsibility more than those in the standard free-choice condition (i.e., no normative information and no self-affirmation), $t(254) = 3.04$, $p = 0.003$, Cohen's $d = 0.52$. Another pairwise comparison showed that self-affirmation influenced the feeling of responsibility if participants were not given any normative information, $t(258) = 3.25$, $p = 0.001$, Cohen's $d = 0.57$. Self-affirmed participants felt more responsibility than participants in the no affirmation condition. However, self-affirmation had no effect if the injunctive norm was salient, $t(255) = -0.14$, $p = 0.89$, Cohen's $d = 0.02$.

In addition, the linear mixed-model analysis revealed an effect of self-affirmation on the feeling of responsibility, $F(1, 253.99) = 5.08$, $p = 0.025$, $\eta_p^2 = 0.020$. Self-affirmed participants assumed more responsibility for their counterattitudinal act ($M_{adj} = 6.77$, $SE = 0.29$) than participants with no self-affirmation ($M_{adj} = 6.08$, $SE = 0.26$). Finally, there was no main effect of normative information, $F(1, 254.48) = 0.14$, $p = 0.71$.

Trivialization

We performed an exploratory factor analysis using the maximum likelihood method with an oblimin rotation

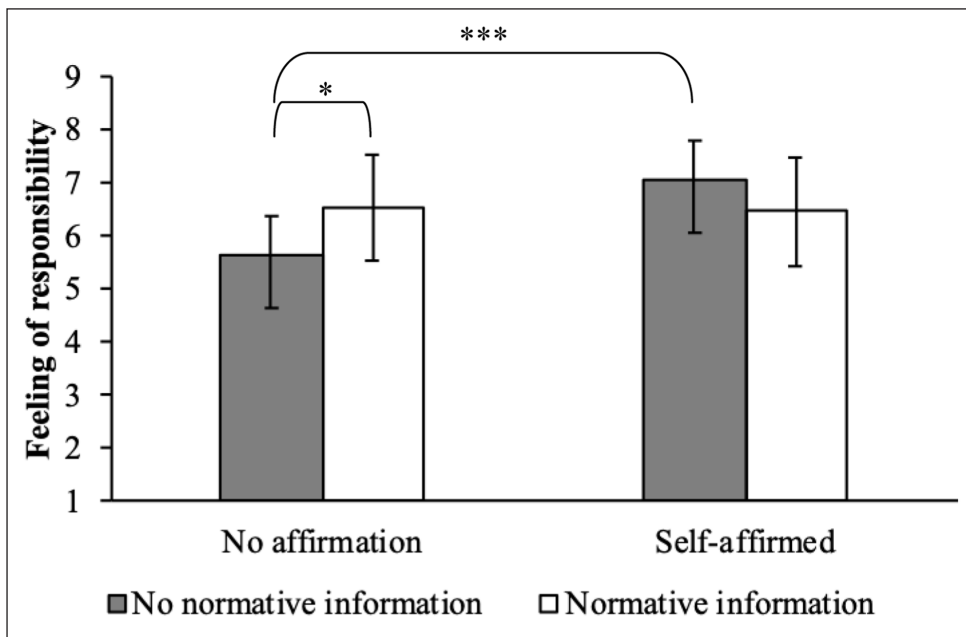


Figure 2: Feeling of responsibility as a function of affirmation (Experiment 2). The lower the feeling of responsibility score, the greater the reduction of cognitive dissonance. Error bars represent the 95% confidence interval. * $p < 0.05$. *** $p < 0.001$.

that yielded a two-factor structure ($KMO = 0.50$, Bartlett's test: $\chi^2 = 56.02$, $p < 0.001$). The first factor consisted of two items (loadings = 0.78 and 0.75; 'If you had written some arguments in favor of waste recycling, how important would these arguments have been to you?' and 'How important is the issue of waste recycling to you?'; Spearman's $\rho = 0.52$, $p < 0.001$) and the second factor consisted of the other two items (loadings = 0.43 and 0.37; 'How important is it to you to defend a position you disagree with?' and 'How important to you are the arguments you found against waste recycling?'; Spearman's $\rho = 0.21$, $p = 0.013$). Owing to the weak correlation of the second measure of importance, we only performed an analysis on the first one.

Consistent with our hypothesis, the linear mixed model revealed that self-affirmed participants reported less importance ($M_{adj} = 7.05$, $SE = 0.21$) than those in the no affirmation condition ($M_{adj} = 7.62$, $SE = 0.21$), $F(1, 259) = 7.79$, $p = 0.006$, $\eta^2_p = 0.029$. In addition, analysis failed to reveal either a main effect of norm salience, $F(1, 259) = 1.44$, $p = 0.23$, Cohen's $d = 0.25$, or an interaction effect, $F(1, 259) = 1.13$, $p = 0.29$, Cohen's $d = 0.19$.

Discussion

This second experiment supported our hypotheses in terms of self-integrity protection, and replicated the effects observed in Experiment 1. Following a counter-attitudinal act, individuals reduced their cognitive dissonance by denying their responsibility. Results also showed that if self-integrity was protected beforehand by a self-affirmation procedure, responsibility denial was unnecessary. The other way of blocking denial of responsibility was to make the injunctive norm (which was congruent with the participants' attitude) salient. Our results suggest that this normative information was sufficient to reduce dissonance arousal. Participants did not take advantage of the second potential reduction mode (here, trivialization). Knowledge of the injunctive norm made cognitive discrepancy bearable (McKimmie et al., 2003, 2009).

According to the radical view of cognitive dissonance (Beauvois & Joule, 1996), normative information is a discrepant cognition, compared with a counterattitudinal act. Therefore, the injunctive norm should have heightened cognitive dissonance. However, our results suggested the opposite effect. Cognitive dissonance seemed less uncomfortable in the normative information condition. This was supported by an unexpected result on attitude, whereby participants in the normative information condition had a more favorable attitude toward recycling than those in the no normative information condition. In other words, the individuals in the normative information condition had little or no recourse to denial of responsibility, trivialization, or attitude change. Our explanation is that normative information protects self-integrity because individuals realize that they are in line with their social environment. One surprising result was the absence of effect of norm salience on affective state. The measure of affective state is assumed to capture cognitive dissonance. Norm salience should have decreased self-directed

negative affect. Although this remains speculative, conforming with a social norm may not systematically reduce overall discomfort or self-directed negative affect. Social norms have an emotional impact on guilt and shame (for a review, see van Kleef, Wanders, Stankou, & Homan, 2015). Importantly, owing to the results of the exploratory factor analysis, the *guilty* and *shame* items were excluded from the statistical analysis. The self-directed negative affect subscale was therefore free of this affective dimension, which may explain the absence of effect.³

An important contribution of this experiment was to test the impact of a self-affirmation procedure on the feeling of responsibility and attitude importance. First, this experiment showed for the first time that self-affirmation blocks denial of responsibility, a reduction mode distinct from attitude change. Second, it was the first replication of the impact of self-affirmation on the importance of attitude in a dissonance-arousing situation (Simon et al., 1995). When a first reduction mode is blocked by self-affirmation, individuals experiencing cognitive dissonance seek to reduce their state of discomfort by trivializing. This suggests that self-affirmation protects self-integrity, but the desire for cognitive consistency may persist. Individuals may have different motivations for reducing cognitive dissonance, depending on the social context. However, the fact that participants trivialized after being self-affirmed shows that even if they needed to reduce cognitive dissonance, they did not resort to denial of responsibility. The latter is more convenient for protecting self-integrity. Nevertheless, this result needs to be further investigated. First, we should point out that the first experimenter was not blind to the self-affirmation condition. Thus, instead of affirming the personal self, the self-affirmation procedure may have affirmed the relational self (Sedikides, Gaertner, Luke, O'Mara, & Gebauer, 2013). Second, the results were at odds with other works (beyond the ambit of cognitive dissonance research), by showing that self-affirmation did not lead our participants either to trivialize (Critcher & Dunning, 2015; Koole, Smeets, Van Knippenberg, & Dijksterhuis, 1999) or to change attitude (e.g., Steele & Liu, 1983).

General Discussion

Informing people of an injunctive pro-environmental norm seems to be a possible avenue for increasing awareness of their responsibility in terms of environmental impact. This easy-to-implement procedure increased participants' feeling of responsibility in a situation of dissonance. The present study also supported our hypothesis that self-integrity can be protected by the announcement of an injunctive norm. Participants who realized that the injunctive norm was in line with their attitude did not deny their responsibility. Knowing that the majority of people espouse their views enabled participants to reinforce a positive aspect of themselves. For this reason, individuals who were made aware of the injunctive norm did not experience cognitive dissonance. They presumably had the impression that their initial attitude was consistent with the in-group injunctive norm. Feeling that they conformed with an ingroup injunctive norm seemed to

help them perceive themselves as adapted to their social environment. As Cooper reminds us (see in this special issue, Cooper, 2019), the most convincing theorization of why individuals experience cognitive dissonance is contained in the action-based model whereby cognitive dissonance interferes with effective and unconflicted action (Harmon-Jones, Amodio, & Harmon-Jones, 2009). Thus, the self-perception of conforming with a normative prescription makes for more effective action. Individuals know how to behave without creating any cognitive conflict.

Importantly, cognitive dissonance is often described as motivating individuals to restore cognitive consistency. Neither the denial of responsibility nor the announcement of an injunctive norm helps to decrease cognitive discrepancy. In line with self-affirmation theory (Aronson et al., 1999; Steele, 1988), the primary motivation in some cognitive dissonance situations is to protect self-integrity, and not to reduce cognitive discrepancy. Denial of responsibility and the injunctive norm make that cognitive discrepancy bearable.

Cognitive dissonance is what Gifford (2011) would call a *dragon of inaction*, in that it leads people to feel less responsible for their counter-environmental behaviors. The present research may have several implications for environmental protection. Feelings of responsibility have been identified as an important predictor of pro-environmental behaviors (Kollmuss & Agyeman, 2002). In environmental studies, they have been linked to many major predictors of pro-environmental behaviors, including self-efficacy (Ramsey & Hungerford, 1989), commitment (Leeming, Porter, & Dwyer, 1997), and self-determined motivation (Villacorta, Koestner, & Lekes, 2003). Moreover, Frantz, and Mayer (2009) suggested that people feel less responsible for environmental behaviors because they do not perceive the urgency of the climate threat. It is therefore worthwhile looking for ways of increasing individuals' sense of responsibility, in order to discourage them from performing counterattitudinal behaviors.

Data Accessibility Statements

In the spirit of open science, all the material and datasets, together with the pre-registration of Study 2 and the R script, are stored on the Open Science Framework and are freely available to download: (https://osf.io/ej2fd/?view_only=adaa4b68edd240faad27dd6719d9d049).

Notes

$$^1 \text{Cohen's } f = \frac{|\sum C_i \cdot \mu_i|}{\sqrt{k \cdot \sum C_i^2 \cdot \sigma^2}} = \frac{|(3 \times 6.14) + (-1 \times 7.18) + (-1 \times 7.18) + (-1 \times 7.18)|}{\sqrt{4 \times 12 \times 1.89^2}} = .24$$

Where k is the number of experimental conditions, σ is the standard deviation, C_i are the contrast values, and μ_i are the estimated means.

² We departed from the plan we had established in the pre-registration. We had initially planned to run ANOVAs but decided to run linear mixed-model analyses as well. The ANOVA is a specific case of the linear mixed-effects model. However, preliminary analyses of construct validity showed that there was between-item variability, and the items did not identically represent

the latent variable. Moreover, the experiment was conducted by three different experimenters, thus also inducing variability. In other words, the linear mixed-effects models were a way of dealing with the violated assumption of independent data. For example, we observed that the between-item random effect had a significant effect on affect and attitude. Overall, the ANOVAs and linear mixed-effects models yielded similar patterns of results, with only the p values being somewhat lower for the linear mixed-effects models. For example, we wanted to test the Norm salience \times Self-affirmation interaction effect on the feeling of responsibility. The ANOVA revealed borderline significance ($p = 0.058$), whereas the linear mixed-effects model was significant ($p = 0.015$).

³ We tested this a posteriori hypothesis on the *ashamed* and *guilty* items. Two linear mixed-model analyses revealed significant main effects of both norm salience and self-affirmation on shame, $F(1, 1,167.5) = 17.02$, $p < 0.001$, $\eta^2_p = 0.014$ and $F(1, 1,167.5) = 7.09$, $p = 0.008$, $\eta^2_p = 0.006$, and guilt, $F(1, 1,167.8) = 5.49$, $p = 0.019$, $\eta^2_p = 0.005$ and $F(1, 1,167.8) = 9.03$, $p = 0.002$, $\eta^2_p = 0.008$. Participants felt less shame and guilt when they had been made aware of the injunctive norm (*ashamed* item: $M_{adj \text{ no saliency}} = 1.66$, $SE = 0.12$ and $M_{adj \text{ saliency}} = 1.40$, $SE = .12$; *guilty* item: $M_{adj \text{ no saliency}} = 1.98$, $SE = 0.14$ and $M_{adj \text{ saliency}} = 1.98$, $SE = 0.14$) and when they had been self-affirmed (*ashamed* item: $M_{adj \text{ unaffirmed}} = 1.62$, $SE = 0.12$ and $M_{adj \text{ self-affirmed}} = 1.44$, $SE = 0.12$; *guilty* item: $M_{adj \text{ unaffirmed}} = 2.01$, $SE = .14$ and $M_{adj \text{ self-affirmed}} = 1.74$, $SE = 0.14$). Finally, we observed an interaction effect on shame but not on guilt, $F(1, 1,168.4) = 13.45$, $p < 0.001$, $\eta^2_p = 0.011$ and $F(1, 1,167.8) = 0.61$, $p = 0.43$. Thus, when individuals are self-affirmed and/or they learn that their attitude conforms with an injunctive norm, they feel less shame than they would in a high-choice dissonance-arousing condition.

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Competing Interests

The authors have no competing interests to declare.

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