Breaking Bad:

Existential Threat Decreases Pro-Environmental Behavior

Benjamin Buttlar, Marc Latz, & Eva Walther

University of Trier

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Author Note

Benjamin Buttlar, Department of Psychology, University of Trier; Marc Latz, Department of Psychology, University of Trier; Eva Walther, Department of Psychology, University of Trier.

Correspondence concerning this article should be addressed to Eva Walther, Department of Psychology, University of Trier, Universitätsring 15, 54296 Trier, Germany. Email: walther@uni-trier.de; Phone: +49 (0)651 201-2864; Fax: +49 (0)651 201-3804.

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Abstract

Why is it that people do not change their behavior in the face of global threats? We hypothesized that when people who have been encouraged to engage in pro-environmental behavior are threatened, they fall back into their (bad) habits instead of exhibiting behavioral change; existential threat may thereby counteract pro-environmental norms. We tested this hypothesis in two field studies in which participants were encouraged to reduce paper use. Although the requests initially resulted in decreased paper use, this pro-environmental behavior ceased when an existential threat was induced. We discuss theoretical and practical implications for social psychology theorizing and behavioral change.

Key Words: climate change, habits, existential threat, stress, pro-environmental behavior

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In ancient Greece, the word “catastrophe” was used to refer to a situation of radical change. It seems logical, therefore, to assume that catastrophic events, like the destruction of the Fukushima nuclear power plant following the March 2011 earthquake in Japan, should cause people to make radical changes to their behavior. However, the opposite has occurred: Worldwide, only two of 444 nuclear reactors are in long-term shutdown, whereas 65 reactors are under construction (IAEA, 2016). While all Japanese nuclear power plants were initially shut down after the Fukushima catastrophe, Japan returned to nuclear power production only four years later (McCurry, 2015). Similar observations could be made in other areas, such as deep-water drilling: Less than three years after the sinking of the drilling rig Deepwater Horizon in the Gulf of Mexico, which led to the largest accidental oil spill in history (Robertson & Krauss, 2010), the Icelandic president Ólafur Ragnar Grímsson planned to open his country's shorelines to oil explorers despite serious environmental concerns (Kavanagh, 2012). In the face of these governmental reactions to catastrophes, the question remains: Why do such man-made existential threats not promote pro-environmental change in us? Why is it that people do not decrease their adverse impacts on the environment, for example by conserving resources (Kollmuss & Agyeman, 2002)?

One answer to the question of how people respond to existential catastrophes can be given by terror management theory (TMT). TMT states that individuals cope with existential threat by defending their cultural worldview (Greenberg, Solomon, & Pyszczynski, 1997). Based on the work of anthropologist Ernest Becker (1973), TMT postulates that humans, like all living creatures, have an instinctive desire for self-preservation. However, unlike every other species,

humans are assumed to be aware of the inevitability of their death. This awareness can result in the potential of paralyzing anxiety (i.e., terror). According to TMT, people are able to buffer this anxiety by executing behaviors that conform to their cultural norms and values. The protective function of investing in one's own culture is achieved through self-enhancement and a sense of symbolic immortality, which constitute an anxiety buffer. Therefore, behaving in consistence with one's cultural beliefs and values is a core element of the human terror defense system (Greenberg et al., 1997).

The influence of existential threat on environmental attitudes and behavior has been investigated in many studies. For example, Kasser and Sheldon (2000) found that participants who took the role of a rainforest lumberjack in a simulation were willing to destroy a larger amount of forest after being reminded of their own mortality compared to a no-threat control group. Other research, however, showed that these negative effects of the contemplation of one's death can be attenuated or even reversed when pro-environmental values are made salient (Fritsche, Jonas, Kayser, & Koranyi, 2010). In a similar vein, Selimbegović, Chatard, Er-Rafiy, and Pyszczynski (2016) demonstrated that man-made existential threats (i.e. nuclear threats) increase anti-nuclear attitudes in people holding strong pro-environmental attitudes; however, the opposite occurs for people with less pro-environmental attitudes. In order to reconcile these apparently inconsistent findings, TMT literature suggests that existential threat may reduce or enhance pro-environmental attitudes and behavior depending on the saliency of certain social norms (Fritsche et al., 2010; Jonas et al., 2008). Jonas et al. (2008) argued that this norm saliency may either emerge due to an existing disposition which conforms to a norm (e.g. Selimbegović et al. 2016) or may be established by increasing the salience of a norm in a certain context (e.g. Fritsche et al., 2010).

However, norms do not always lead to the expected pro-environmental behavior under threat. For instance, in a survey among German power customers, 44% of the respondents stated that their attitude towards nuclear energy was influenced negatively or very negatively by the events in Fukushima (Donath, 2011). In sharp contrast to these anti-nuclear values, four years later more than 88 % of them still drew conventional electrical power (coal, gas, nuclear energy) instead of changing their electricity suppliers to companies endorsing only renewable energy sources (Arbeitsgemeinschaft Verbrauchs- und Medienanalyse, 2015). Facing these considerations, the question remains why existential threats in real life, such as oil spills or accidents at nuclear power plants, do not promote pro-environmental behavioral change, at the least in a society that upholds strong pro-environmental norms.

Habits in the face of threat

We argue that in changing societies, social norms may indeed promote pro-environmental behavior under existential threat (Fritsche et al., 2010). However, we further reason that social norms may only be effective under threat as long as the behavior in question does not conflict with a counteracting habit. In fact, "Kick the habit", a book edited by the United Nations, identifies habitual behavior as a central inhibitory factor hindering appropriate environmental behavior. In the preface of the book, Secretary-General of the United Nations Ban Ki-Moon states that modern society almost seems to be addicted to conventional energy sources and that "our society is in the grip of a dangerous greenhouse gas habit" (Kirby, 2008, p. 6).

In contrast to norms, which are based on abstract rules or group standards (see Cialdini, Reno, & Kallgren, 1990; Smith et al., 2012), habits are based on behavior patterns of which people might not be consciously aware (e.g., leaving the engine running during stops, littering). As a result, an evolutionary advantage of habits is that they can be executed under conditions of

limited resources and time pressure, which often occur in stressful or threatening situations (Keinan-Boker, Kohn, Billig, & Levav, 2010; Schwabe, Dickinson, & Wolf, 2011; Schwabe & Wolf, 2009). Furthermore, research indicates that the execution of habits in these situations can induce feelings of control and reassurance (Wood, Quinn, & Kashy, 2002). Consequently, habits may mitigate the negative experience of stress or threat. It therefore seems plausible to assume that the execution of habits may not be reduced, but rather enhanced under threat.

Evidence for the increased probability of habit execution under stress can be found in neuro-psychological literature. Unlike goal-directed processes, which include the acquisition of action-outcome associations, habit acquisition involves a subsequent stimulus-response learning stage (Dickinson, 1985; Schwabe & Wolf, 2009). Schwabe et al. (2011) specified that at first, instrumental actions are goal-directed and motivated by the connection between an action and a rewarding outcome. However, the behavior becomes increasingly habitual through repetition, so that the actions can be elicited directly by triggering cues, regardless of the initial incentive of the outcome. Although goal-directed and habitual processes work in parallel in the execution of instrumental behavior, they are controlled by distinct brain structures. These brain structures respond differently under stress, favoring the habit system at the expense of the goal-directed system. On a behavioral level, this means that people tend to give up newly acquired goal-directed action and fall back into old habits under stress (Schwabe & Wolf, 2009).

We propose that existential threat influences habits in a similar way to stressful events. In fact, existential threat and stress appear to have a considerable conceptual and theoretical overlap. For example, Lazarus and Folkman (1984) defined challenges, losses and threats as stressors. From this perspective, existential threat is one (extreme) stressor among others which individuals have to cope with. A coping behavior which relates to both existential threats and stress is, for

instance, smoking. In particular, participants smoked more intensively (deeper inhalation) and found cigarettes more rewarding after the induction of threat or stress compared to control groups (Arndt et al., 2013; McKee et al., 2011). Goal-directed processes might initially explain this behavior, but in the long run these findings must be interpreted in the light of habitual stimulus-response reactions. That is, under acute stress, participants with prospects of a monetary incentive are worse at resisting the urge to smoke (McKee et al., 2011). Moreover, stress is a main reason for relapse among people who have the explicit goal to quit smoking (McKee, Maciejewski, Falba, & Mazure, 2003).

This conceptual relation is also apparent in studies that investigated the boundary conditions of stress and existential threat. For example, Fritsche, Jonas, and Fankhänel (2008) showed that the effect of existential threat on ethnocentric behavior can be mitigated if threats seem to be (at least partially) controllable. Participants who were asked to write about their own death, caused by an incurable illness, displayed a heightened ingroup bias. However, this was not the case when participants were told to jot down their thoughts about a self-determined and therefore more controllable death, which was also supposed to be motivated by the suffering of an incurable illness. Similarly, the uncontrollability of a situation is one of the two most important determinants for the success of laboratory stress manipulations. These manipulations produce the largest effects on bio-psychological markers of stress (e.g. cortisol) when participants believe that their responses cannot influence the outcome of the situation (Dickerson & Kemeny, 2004). Thus, the effectiveness of the induction of stress and existential threat is dependent on the participants' sense of control in a given situation.

The present research

We assume that threat experiences like news of global warming or accidents in nuclear power plants foster old habits and hinder the execution of goal-directed behavior. Because many habits correspond to environmentally harmful behavior, information about existential threat would therefore paradoxically widen the discrepancy between environmental awareness and pro-environmental behavior. This effect may contribute to mankind's inability to overcome environmentally harmful behaviors (Kirby, 2008).

In order to investigate these assumptions, we conducted two field studies on different types of habitual behavior: Paper towel and paper napkin use. Excessive paper towel and paper napkin use constitute environmentally harmful habits (Kirby, 2008), because paper production is a major reason for global deforestation, water and air pollution (Abramovitz, Mattoon, & Peterson, 1999). While some paper use is not habitual (e.g. packaging), we argued that in other areas (e.g., paper use for sanitary purposes) plenty of resources could be saved on a daily basis. For example, just one non-recycled paper towel (3-5g) needs 8-40 watt hours of energy and 0.24 – 1 liter of water to be produced. Additionally, emissions for the production, transport and waste disposal must be considered (Butzkamm, 1993). Therefore, lowering the habitual use of sanitary paper products is an important goal in order to save the environment. Since habits are acquired via repeated experience in a certain environment (Wood & Neal, 2007) and are triggered by cues present in those environments, we examined these habits in natural settings. This allowed us to rule out problems of reliability and validity of self-reported measures and heighten the explanatory power and practical usability of our results (Steg & Vlek, 2009).

Based on previous research (Goldstein, Griskevicius, & Cialdini, 2008; Goldstein, Griskevicius, & Cialdini, 2012; Smith et al., 2012), we expected that the presence of a request to decrease paper use would increase the salience of a social norm and further goal-directed pro-

environmental behavior. For example, Cialdini et al. (1990) showed that participants confronted with anti-littering norms on handbills littered less compared to a control group which was not aware of this norm. However, in contrast to TMT, we expected this positive effect of a social norm to be overridden by the experience of existential threat. To be more precise, fostering the execution of habitual behavior, we predicted existential threats to result in a fallback into old habits irrespective of the salience of social norms.

Study 1

In the first study, we tested this hypothesis by assessing paper towel use in two public university bathrooms (a women's and a men's bathroom). In order to increase participants' pro-environmental behavior, they were prompted to take less paper towels. Subsequently, we induced existential threat by confronting students with the danger and the possibly deadly consequences of living in close proximity to a nuclear power plant.

Method

Participants and design. Study 1 was conducted in a one-factor design, including a baseline condition, a request condition and a request-threat condition. This particular design was chosen because it reflects the real life process of behavior shaping. That is, an existing habit can be influenced by a request. We hypothesized that this influence would be eliminated in the presence of an existential threat. We considered inserting an existential threat-only condition or counterbalancing the different conditions, but dismissed this in order to avoid familiarization with the threat before the theoretically relevant condition (request-threat) was conducted. Because the study took place in a public bathroom on a university campus, there was no possibility to control or assess the exact sample size. All attempts to gather information on the use of the facilities were not approved by the ethics committee, which considered the use of sanitary facilities to be

absolutely private and raised concerns about the anonymity of the data; even if assessed data were coded anonymously, the observers themselves would still obtain personal information on individuals and their routines. However, since the bathrooms were located in a section of the building where they would be used almost exclusively by staff and a small number of students using the library entrance, it was possible to assume that the sample would remain relatively stable during the time of the study.

Materials and procedure. The study was conducted for four weeks in a men's and women's bathroom at a large German university. The bathrooms were located in the German Literature department. There was also a side entrance to the library nearby on the same floor. The bathrooms were equipped with automatic paper towel dispensers, which give out a single paper towel when users hold their hands in front of a sensor.

In the first two weeks of the study, the baseline was assessed. The quantity of towels usually taken in each of the two weeks was measured without any manipulation. Subsequently to the baseline phase, a request to reduce towel paper use was introduced by posting a sign in the bathrooms. As in the research conducted by Cialdini et al. (1990), requests were made by attaching a sign between two mirrors above the sink and another on the paper towel machine itself. The requests were written in German and read: "Please use one paper towel only!". Based on our observations, we presumed that for most people the use of more than one paper towel was a well-established habit, so we assumed that the request would incite people to change a previously acquired habit. The prompts were attached from week three until the end of the experiment.

Researchers have developed a variety of effective manipulations in order to induce existential threat, including questions about death, subliminal death priming or handing over

threatening fliers (for an overview see Burke, Martens, & Faucher, 2010). Due to the fact that the present research was concerned with man-made catastrophes that pose existential threats, a nuclear power threat was induced (see also Selimbegović et al., 2016). We assumed that this threat would be highly accessible for the participants, because the Fukushima catastrophe had taken place shortly before Study 1. In order to make the threat particularly relevant to the participants, we referred to the nuclear power plant *Cattenom*, which is located only 50 km from the university in which the study took place. The threat of living in close proximity to Cattenom is exemplified by the 800 incidents that have taken place since the power plant was commissioned in 1986 (BÜNDNIS 90 DIE GRÜNEN, 2016). For the purpose of our study, a poster showing the severely damaged Fukushima nuclear power plant, as well as several smaller images of collateral damage (see Appendix A), was designed and placed on a bathroom door for the last week of the study. The text on the poster invited participants to a fictitious discussion about the "Life threatening effects of the Cattenom nuclear power plant". Since we were interested in the way the introduction of the threat would change newly acquired pro-environmental behavior (the use of fewer paper towels) the request remained present during the threat manipulation.

Measures. The weight of the used paper served as our dependent variable and was assessed by subtracting the weight in grams of the paper left on the reels from the weight in grams of a new reel. In this way, paper towel use was measured at the end of each week. Furthermore, since we knew which reel came from which bathroom, we were able to assess differential effects of sexes.

Results

Since the amount of paper dispensed after activating the sensor is not standardized across bathrooms, we analyzed the data separately for each bathroom (see Figure 1). In both bathrooms, after implementing the request, we observed a decrease on paper towel use (men's bathroom: baseline = 1075, request = 907; women's bathroom: baseline = 1333, request = 864). More importantly, and confirming our hypothesis, the goal-directed behavior caused by the request ceased when existential threat was induced and participants fell back into their old habits (men's bathroom: request = 907, request-threat = 1086; women's bathroom: request = 864, request-threat = 1460). A comparison between the baseline condition and the request-threat condition (baseline = 1333, request-threat = 1460), indicated that women used even more paper towels after the threat was induced than during the baseline phase.

Discussion

Consistent with previous research (e.g., Cialdini et al., 1990), we found that a request to save towels did indeed decrease paper towel use. This means that a relatively simple request was effective in temporarily instigating goal-directed pro-environmental behavior. In confirmation of our hypothesis, however, this newly acquired behavior ceased when people were threatened by a reminder of the Fukushima disaster. Although we did not expect to find a moderation by sex, it was observed that women used more paper towels in the request-threat condition than during the baseline measurement. However, and most importantly, despite this difference, men and women exhibited the same pattern of results. In sum, Study 1 provided first evidence that existential threat can make people fall back into their environmentally harmful habits. Despite this confirming evidence, Study 1 has some limitations: It was not possible to assess how many people used the bathrooms during the time of the study.

Study 2

In order to replicate the main findings and to address this major limitation of Study 1, a second study was conducted in which we assessed data on an individual level. This second study was carried out in the cafeteria of a large German university, where paper napkin use was measured during lunch.

Method

Participants and design. 150 students (48 women and 102 men) participated in the study, which was conducted in the same quasi-experimental one-factor between-participants design (baseline vs. request vs. request-threat) as Study 1. Of the 150 participants, one had to be excluded due to the unusually high amount of paper napkins (15) taken, which deviated vastly from the mean of the remaining participants (M = 2.09, SD = .81).

Procedures and materials. The cafeteria's hallway can be entered via a revolving door located on the second floor. From the hallway, three staircases lead down to three different counters where food is served. Two counters are located on the first floor, and the third is located in the building's basement. We measured how many paper napkins were used at the basement counter because it can only be reached via one staircase, and because there is just one spot where paper napkins and cutlery are provided. Students have to pass this spot on their way to picking up their meals. Paper napkins must be extracted manually using one of three paper napkin dispensers positioned next to each other (see Figure 2).

We measured the paper napkin use of 50 cafeteria customers on three consecutive Mondays at 11.30 a.m.. On the first Monday, the baseline was assessed, representing the amount of paper napkins used habitually. Immediately after the assessment of the baseline, a sign in German, measuring 21 by 29.7 cm, which read: "Please use one napkin only! Thanks" was placed on top of the paper napkin dispensers. We measured paper napkin use on the following

Monday with the request still in place. Finally, on the third Monday, paper napkin use was measured under conditions of existential threat. To enhance comparability between Study 1 and 2, a nuclear threat was once again used as a reminder of one's own mortality. Accordingly, and in addition to the sign prompting customers to take only one paper napkin, the threat was induced by distributing flyers (14.8 by 21 cm) among students attending the cafeteria. The threat referred to a technical disturbance in the power plant Cattenom which had occurred shortly before the start of the investigation. The flyer contained several cells with phrases in German: "Only 50 km away from Trier", "Cattenom - The nuclear power plant in France", "The new Fukushima?" and "A non-acceptable risk. On the 28th of May 2015, we narrowly avoided the worst case scenario – but for how long will it be safe?". In order to increase the credibility of the manipulation, a link was given (www.cattenom-non-merci.de) providing "more information". A picture of the power plant was also included on the flyer (see Appendix A). Flyers were handed out on the top floor of the cafeteria, and only those students who took a flyer were included into the existential threat condition. No bogus information was presented on the flyer.

Measures. The amount of paper napkins taken per person was assessed by two independent observers who pretended to be customers sitting at a table located at a distance of three meters from the paper napkin dispensers. The table was positioned on the left side of the dispensers and offered an unobstructed view of the situation. In order to keep the dependent variable similar and comparable to Study 1, we calculated the weight of paper used by multiplying the amount of paper napkins taken with their weight (1.1 gram per paper napkin). Additionally, students' sex was coded.

Results

In order to assess the interrater reliability of the observational data, an intraclass correlation coefficient (ICC) was computed. The resulting ICC indicated sufficient interrater reliability, *ICC* = .79 (Cicchetti, 1994). Hence, the following analysis was conducted using the mean weight of paper calculated from both researchers' observations.

Figure 3 shows the mean paper use in gram, depicting the conditions and sexes (for detailed descriptive statistics see Appendix B). Consistent with our hypothesis, paper use in the request condition decreased compared to the baseline condition (Overall: d = -0.42; Men: d = -0.48; Women: d = -0.25). However, in contrast to the request condition, and despite the persistent prompt to use less paper, paper use rebounded after inducing existential threat (Overall: d = 0.77; Men: d = 1.03; Women: d = 0.24). Overall, paper use even seemed to increase compared to the baseline condition (d = 0.35), although this increase appeared to be driven by male (d = 0.55) rather than female participants (d = -0.03).

Discussion

In Study 2, we sought to eliminate methodological issues of the previous study and replicate the findings with a different habitual behavior. By choosing paper napkin use instead of paper towel use as the dependent variable, we confirmed our main hypothesis in a different setting. Following the assessment of the habitual baseline level, a request was introduced which lowered the amount of paper napkins that were taken. As predicted, the induction of existential threat eliminated this effect.

General Discussion

We started this investigation by asking the question why people may not change their behavior in the face of global threats, such as climate change or nuclear catastrophes. Integrating research on stress and threat, we hypothesized that threat, instead of increasing pro-

environmental norm-consistent behavior, can make people fall back into their habits of unsustainable behavior, even if those habits contradict existing norms. We investigated this hypothesis by means of two field studies, in which we first observed people's habitual behavior, then administered a request to save paper towels or paper napkins and subsequently observed how this request was undermined by existential threat.

In Study 1, we assessed paper towel use in two public university bathrooms. We found that a request to save paper towels did indeed lead to a decrease in the amount that were used. We attributed this reduction in towel use to the activation of pro-environmental norms and goals within participants. Most importantly, and in accordance with our hypothesis, this newly acquired pro-environmental behavior ceased completely when people were threatened by means of a poster reminding them of the disaster of Fukushima. Despite the fact that the request was still present in the bathrooms, goal-directed behavior no longer occurred when existential threat was present. Instead, people returned to their high level of paper use (men's bathroom) or even exceeded their baseline levels (women's bathroom).

Notwithstanding these straightforward results and the interesting implications for many areas of psychology, Study 1 has some limitations: It was not possible to gather information on how many paper towels were used by an individual participant. There was also no way to randomly assign participants to conditions. Furthermore, the possibility of events causing an individual person to take unusually large amounts of paper towels (e.g., spilled coffee or heavy rain) in a specific condition and bathroom, although very unlikely, could not completely be ruled out. The bathrooms used, however, were chosen because their location inside the building led us to assume that they would be used only by a medium-sized and consistent group of people. This renders outlier events unlikely in the relatively short amount of time in which the study was

conducted. Finally, the fact that a similar pattern of paper towel use can be observed for both sexes may serve as evidence that there were no major systematic influences on selective conditions or bathrooms.

By changing the location and the habitual behavior in Study 2, we addressed these issues and assessed individual paper use. We replicated the behavioral pattern of Study 1 and, due to the improved methodology, it was possible to compute effect sizes in this second study. In particular, participants first altered their habitual behavior due to the request and then fell back into their habit when they were threatened. We consider this replication of our main results across different contexts an indicator for the construct validity of our findings.

Although they were mainly inspired by applied considerations, our findings have important theoretical implications. In fact, our results challenge TMT (Greenberg et al., 1997; Jonas et al., 2008) which would predict that threat increases rather than decreases the norm-consistent reduction of paper use. Based on the fact that most German students hold pro-environmental attitudes and norms on a dispositional level (Swim & Becker, 2012) and that these norms were situationally activated by means of the request, our results are incompatible with a fundamental assumption of TMT. We argue that the explanations for our findings and the underlying processes can be found in neuro-physiological stress research, indicating that arousing situations increase habitual behavior more than goal-directed behavior (Schwabe & Wolf, 2009). The performance of these bad habits may be rewarded by a soothing function of habits (Wood et al., 2002), making the elicitation of habits likely, even when they are normatively inconsistent. Although most of this evidence was obtained from stress research (e.g. Schwabe, Dickinson, & Wolf, 2011) it seems natural to assume that similar mechanisms are at work in the area of threat.

This challenge is essential for TMT theorizing, because TMT assumes that existential threat and the accompanied potential for anxiety is buffered only by a confirmation of norm-consistent values and reactions to threat should therefore be limited mainly to this domain of culturally consistent behavior (Holbrook, 2016; Pyszczynski, Greenberg, & Solomon, 1997). This assumption, however, is not in line with our findings because we found that threat fosters habits - even those that contradict norms and values. Similarly, Holbrook, Sousa, and Hahn-Holbrook (2011) showed that threat may enhance any kind of predisposed behavioral tendencies. The authors demonstrated that, following an induction of existential threat, arbitrary world-view independent stimuli were rated more positively if they were positive and more negatively if they were negative. As the stimuli were not attached to any cultural values, a TMT explanation could not account for these findings. Even stronger evidence, however, comes from our work, showing that existential threats may actually work in the opposite direction of norm-consistent behavior. Thus, these findings contribute to an emerging body of literature criticizing TMT on a theoretical and empirical level (e.g. Hart, 2014; Holbrook et al., 2011; Martin & van den Bos, 2014; Trafimow & Hughes, 2012).

Moreover, referring to our findings, we assume that the recurrence of habits under threat is not restricted to the domain of pro-environmental habits. This means that, although we were interested in (bad) environmental habits, and our independent and dependent variable were chosen from this domain, similar effects could be expected in other areas such as driving, drinking or eating habits. For instance, Hirschberger and Ein-Dor (2005) showed that food consumption buffers the impact of an existential threat on the severity of a punishment for a social transgression, which is a typical dependent variable for worldview defense within TMT research. Interestingly, the authors observed that this soothing effect was stronger for pleasant

than for unpleasant food. Therefore, they speculated that the effect may either be caused by an immediate distraction from death thoughts or may exist because food is an ingredient of the cultural worldview. Contrary to these claims and outside of the TMT framework, our findings suggest that it may be the (soothing) function of habit execution (consuming pleasant food), rather than the taste of the food itself that causes the effect. This means that it can be assumed that eating represents a habit and that pleasant food is consumed even more habitually than less pleasant food (Tuorila & Pangborn, 1988). We therefore assume that after behaving habitually, participants do not need to engage in worldview defense anymore. In this way, our account may not only provide a challenge to TMT but also a parsimonious alternative explanation for habitual overeating (Spence et al., 2013). This approach may therefore contribute to explanations of societal problems such as obesity (Lehnert, Sonntag, Konnopka, Riedel-Heller, & König, 2013).

Although the study of Hirschberger and Ein-Dor (2005) indicates that cultural values and norms may be in accordance with habits in many TMT studies, a lot of this research is conducted in situations in which the opportunities for the exhibition of habits are sparse, such as lab contexts (e.g. Kasser & Sheldon, 2000). Thus, TMT research might overlook a central component of humans' daily behaviors, namely the execution of habits and routines. We suggest that habits, as highly accessible behavioral tendencies, may prevail over competing norm-consistent world-view defenses, particularly in situations of stress and threat. Given the prevalence of stressful or threatening situations in everyday life (Cohen & Janicki-Deverts, 2012; Gibson, 2007), the general notion of worldview defense in TMT theorizing may therefore be questioned - at least in natural settings. Furthermore, it is important to note that the theoretical differences between TMT and the habit account may often be overlooked, because habits overlap with norm-consistent behavior on many occasions (e.g. Arndt et al., 2013; Ben-Ari, Florian, & Mikulincer, 1999).

Facing this criticism, it becomes apparent that a more integrative understanding of psychological defenses and their underlying mechanisms is needed (Hart, 2014; Holbrook, 2016). By relating threat research with a similar but hitherto unrelated domain, in this case stress, and by underlining the importance of boundary conditions, we hope that the present investigation will spurn efforts to use new innovative methods for the investigation of existential threat in a much broader sense (Hart, 2014). This is important in order to scrutinize the external and construct validity of TMT and in order to generally advance the field of existential social psychology.

Apart from existential social psychology, our findings might also contribute to automaticity research, specifically to the automaticity of cognitive processes. This topic has recently received increased attention due to unconscious thought theory (UTT; Dijksterhuis & Nordgren, 2006), which suggests that environmental influences can directly affect and control different cognitive processes (Bargh, 2011). Specifically, UTT states that information may be elaborated unconsciously and influence judgments and decision making, even if people do not have resources to consciously contemplate them. Testing these hypotheses, studies have shown that deliberation without attention might even lead to improved judgment and decisions compared to conscious elaboration (Dijksterhuis, 2004; Handley & Runnion, 2011). Because UTT assumes that arguments may directly influence judgments and decisions without the involvement of conscious processes, it challenges classic models of judgment and decision making, which "might be considered as the last bastion of conscious processing" (Bargh, 2011, pp. 632-633). Therefore, the emergence of UTT has become a highly controversial topic in psychological science, and several reviews as well as meta-analyses have investigated the validity of its claims, generating evidence for and against UTT (Bargh, 2011; Newell & Shanks, 2014; Nieuwenstein et al., 2015; Strick et al., 2011).

Our research contributes to this controversy by questioning the idea of an unconscious deliberation. According to UTT, the pro-environmental information that was provided by means of our flyers and posters in the request-threat condition should motivate people to behave in accordance with a pro-environmental norm. This motivation should increase corresponding behavior, even if the threat would lower the resources to consciously contemplate the information. However, in our studies, the threatening information actually deactivated pro-environmental norms, suggesting that the information was not automatically processed. Instead, we assume that the threat and the accompanying lowered resources trigger a change from a goal-directed to a habitual system (Schwabe & Wolf, 2009). Our results therefore convey evidence for the arguments of Newell and Shanks (2014) and Nieuwenstein et al. (2015), who doubt the general notion of a deliberation without attention.

Limitations

A critical reader might suggest that threat simply distracts people from our request and thus results in an increased use of paper. We, however, believe that it is highly unlikely that students were simply distracted by the existential threat manipulation. In Study 1, the threatening information was only present on the bathroom door, inducing a time delay between the threat and the encounter with the request sign. Moreover, the request sign was placed directly on the paper towel dispenser, making it almost impossible not to recognize it. It is much more likely that people did recognize the request sign, but were not able to adapt, and fell back into their old habits. The same is true for Study 2, in which flyers were distributed on the top floor of the cafeteria, i.e., a few minutes before encountering the request sign, which was placed directly onto the paper napkin dispensers.

Related to the issue of attention, there may be concerns about the passage of time. It cannot be ruled out that people who have encountered the sign several times do not recognize the prompt anymore, because it has already become familiar. Subsequently, this familiarization might be responsible for the decreasing effectiveness of the social norm and cause participants to fall back into their habits during the request-threat condition. However, even if participants do not recognize the sign anymore, it is not likely that the normative behavior would completely cease or that participants would use more paper than in the baseline conditions. In fact, quite contrarily a meta-analysis (Manning, 2009) showed that the impact of descriptive norms (what you think others do) increases if time passes between the cognition and the actual behavior. Similarly, the effects of injunctive norms (what you think others want you to do) on behavior do not drop completely, even if the effectiveness decreases slightly over time. Regarding the present investigation, we introduced an injunctive norm by prompting participants to take less paper. However, we would argue that we also established a descriptive norm, because the participants were able to observe others. However, in any case, it is not very plausible that the heightened paper consumption in the request-threat condition is merely caused by the passage of time.

Another limitation might be that data was collected on a university campus and the sample consisted mostly of students. Thus, this investigation might not fully represent the whole society. Indeed, Burke et al. (2010) showed that existential threat manipulations work particularly well with student samples. However, they also reported that effects of threat can be observed in non-student samples, albeit to a slightly smaller degree. Therefore, we would argue that this effect of falling back into habit is generally observable and obtainable in other samples.

Finally, we would like to address the moderation by sex, which seems to occur in both studies. While females seem to take more towel paper in the request-threat compared to the

baseline condition in Study 1, a similar pattern occurs for paper napkin use by men in Study 2. However, as our research design does not allow us to infer the reasons for this moderation, any of the assumed explanations would remain speculative. Therefore, we refrain from speculating and encourage investigation of the underlying processes and possible moderations of the shown effect in future research. Sparked by our results, these upcoming studies should consider the examination of different types of habits, especially concerning potential effects of participants' sex.

Future Research

Now, considering our results and the increasing feelings of stress and threat in Western societies (e.g. Cohen & Janicki-Deverts, 2012), it is evident that "kicking the habit" (Kirby, 2008) should be one of our primary concerns in order to promote sustainable behavior. However, existential threat might not necessarily be a hindrance for pro-environmental behavior and it is important to note that the effect of falling back into habit may promote advantageous habits as well. If norm consistent pro-environmental behavior is already habitual, people should be able to execute habits even when they are confronted with aversive events that render the performance of more resource-dependent behavior (i.e., goal-directed behavior) less likely. For example, people may have acquired the habit of riding a bicycle to work for environmental and health reasons. Nevertheless, this habit may occasionally be overridden by other goals, e.g. a long shift at work might render it more desirable to take the car. However, we propose that people would still engage in their pro-environmental habit, and decide to cycle to work despite such conflicting goals, if they were reminded of an existential threat. Therefore, counteracting old habits in favor of new more pro-environmental habits is crucial to putting our findings into practical use.

Because these new actions have to compete with behavior that is cued and executed automatically, this raises the question: How can new habits can be implemented?

One well-known technique to challenge habits is the implementation intention technique (Gollwitzer, 1999) that leads to an association between a situational cue and a certain behavior. If the situational cues are present, the behavioral intention is triggered and the probability for the execution of the corresponding behavior increases. This way, and with a certain number of repetitions of the implemented behavior over a longer period of time, existing habits can be overwritten and replaced with new pro-environmental habits (Holland, Aarts, & Langendam, 2006).

Holland et al. (2006) showed the effectiveness of the implementation intention technique in a field study on recycling behavior which was in congruence with the existing social norms. However, in order to demonstrate how implementation intentions may work in congruence with the fall back into habit effect, it is required to turn a behavior into a habit that does not only correspond to a pro-environmental norm, but also to a conflicting social norm. An example for this could be the habitual use of disposable paper coffee cups which poses a serious threat to our environment (Cocozza et al., 2016). Especially the use of disposable plastic lids, which come with most of these cups, is often unnecessary and decreasing their use would save resources and reduce waste. As was already indicated, the use of lids does not only concern the environment, but also has implications for one's safety. Thus, pro-environmental norms (do not pollute the environment) may conflict with safety norms (do not spill hot coffee).

For further research we would therefore propose to change participants' habitual use of disposable coffee cup lids with the implementation intention technique ("Every morning, when I buy a coffee in a disposable cup on my way to work in the coffee bar Nervosa, I will not take a

lid."). By using this technique, and with enough repetition of the behavior, participants should acquire a new pro-environmental habit. Then, if a safety norm is made salient (e.g. by a prompt stating "Do not hurt yourself. Take a lid."), we hypothesize that participants will engage in goal-directed behavior and take a lid to fulfill this norm. Now, research on TMT (Jonas et al., 2008) would suggest that if participants are threatened, they would still engage in norm-consistent behavior. Quite contrarily, considering the results of the present investigation, we would hypothesize that the opposite will happen if a conflicting habitual behavior exists. Participants would fall back into their habits and engage in pro-environmental behavior. Although these types of long-term studies are above the scope of this investigation, further research should use implementation intention techniques to create pro-environmental habits and test these propositions. This way, more practical instructions could be developed in order to promote pro-environmental change.

In accordance with previous research (e.g. Cialdini et al., 1990; Goldstein et al., 2008), our results also indicate that social norms seem to be a catalyst for pro-environmental behavior (Quimby & Angelique, 2011) and that participants engage in norm congruent behavior if they do not feel threatened. However, the question remains whether this goal-directed behavior might overcome habitual behavior in diverging situations of threat. Thus, in order to identify the driving forces behind the fall back into habit effect, it would be beneficial to examine the relation between existential threat and stress more closely. This would allow the identification of certain variables, like the perceived controllability of a situation (e.g. Fritsche et al., 2008), which might change the impact of threats. Taking the example of our study, it can be speculated that rendering the nuclear threat more controllable (e.g. removing subjective obstacles to take action) or giving people a chance to restore their sense of control (e.g. signing a petition against Cattenom) might

buffer the effects of threats on habitual behavior (Fritsche, Jonas, & Kessler, 2011). This idea, regarding the lack of efficacy or empowerment as a barrier for pro-environmental behavior, has already been discussed in environmental psychology (Quimby & Angelique, 2011) and, in this example, it is apparent that uncovering boundary conditions of pro-environmental behavior is a major challenge for environmental psychology (Steg & Vlek, 2009). Therefore, future studies should focus on the conditions which affect the success of intervention strategies. Knowledge on this will hopefully aid community psychologists by providing means to promote pro-environmental behavior.

A future avenue of research could also concern the interplay between attitudes and habits. This would add to the literature on the value-action gap, which describes pro-environmental behavior as relatively scarce despite the prevalence of pro-environmental attitudes in many western societies. As Flynn, Bellaby, and Ricci (2010) have pointed out: "People express strong support for environmentally sustainable policies, but display little commitment to alter their own behavior" (p. 162). To be more precise, Kollmuss and Agyeman (2002) argue that knowledge, attitudes and values regarding one's environment are able to promote emotional involvement and corresponding feelings of fear. At the same time, it is hypothesized that emotional involvement furthers pro-environmental attitudes and the gathering of environmental knowledge. This is thought to lead to the emergence of environmental awareness, and to increase pro-environmental behavior. Now, based on our findings, we would suggest that the relation between emotional awareness and pro-environmental behavior is more complex than postulated by Kollmuss and Agyeman (2002). Heightened emotional involvement might be detrimental for behavioral change, albeit helping to increase pro-environmental attitudes and knowledge. Specifically, a high emotional involvement and the resulting feelings of fear may increase habitual behavior.

Additionally, the stronger pro-environmental attitudes get, the more emotional involvement is created, which again results in increased habitual behavior. Although Kollmuss and Agyeman (2002) briefly discuss habits as a barrier for pro-environmental behavior, further research on habitual behavior in the context of the value-action gap is needed. Hence, in future studies, measures for attitudes and emotional involvement should be used in order to shed light on their conceptual relations with habits.

Conclusion

Psychologists have developed a variety of approaches in order to foster sustainable environmental behavior (see Griskevicius, Cantu, & Van Vugt, 2012; Van Vugt, 2009; for an overview). Although these approaches have offered important insights, we argue that critical components for the promotion of pro-environmental behavior have received only limited attention. Particularly, as the present studies show, normative and purely goal-directed behavior in favor of the environment may not be maintained if people are threatened or stressed. Thus, communication about environmental issues may have unintended negative psychological side effects. Describing environmental issues in the context of threatening prospects about the future is likely to give rise to feelings of insecurity and deep-seated existential fears. In order to protect themselves against these negative emotions, people often employ psychological defenses, such as denial or distraction from the threatening information. We suggest that threat may reinstate bad environmental harmful habits, because habits can be executed even under limited resources. Furthermore, the soothing function of habits helps people to deal with threat on an emotional level. As defensive reactions may undermine the effectiveness of interventions aimed at promoting sustainable behavior, overcoming bad habits and implementing new, more sustainable pro-environmental habits should be a major priority of those interventions. By unfolding these

mechanisms, we also contribute to a great body of social psychology theorizing. Most importantly, the findings of the present investigation challenge TMT, the most prominent theory on existential threat. In addition, we see our findings as contributing to other influential areas of social psychology, like persuasion or judgement and decision making literature. To conclude, we view our theoretical contribution as having integrated disparate literatures to arrive at a novel explanation for the persistence of bad habits and hope to thereby inspire new lines of research. From an applied perspective, and as demonstrated for pro-environmental behavior, this research may contribute to several important domains of human life.

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Appendix A

Figure A1. Manipulation of existential threat. Left Panel: Study 1; Right Panel: Study 2.

Appendix B

Table B1

Napkin use (gram) in Study 2 by Sex and Condition

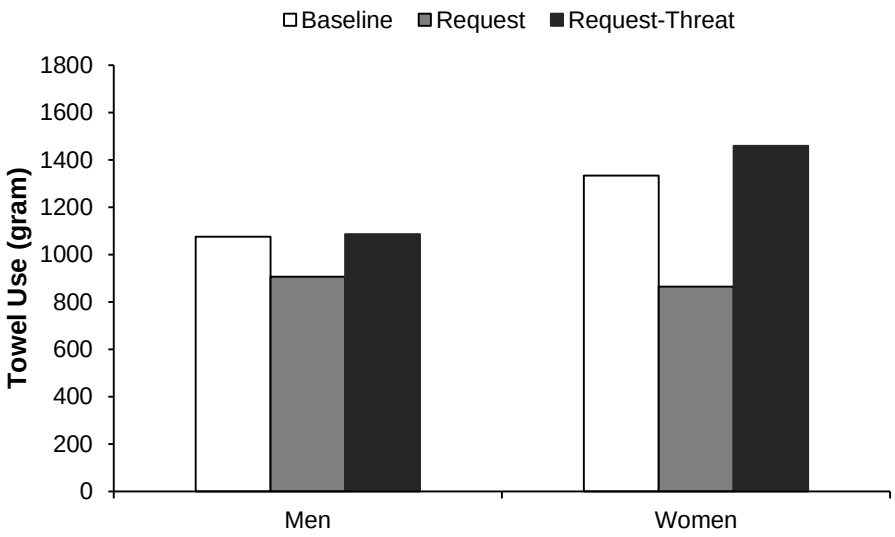
	Men		Women		Overall	
Condition	*n*	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*
Baseline	34	1.94 (.84)	16	2.10 (.97)	50	1.99 (.87)
Request	35	1.54 (.81)	15	1.87 (.83)	50	1.64 (.82)
Request-Threat	32	2.42 (.92)	17	2.07 (.84)	49	2.30 (.90)

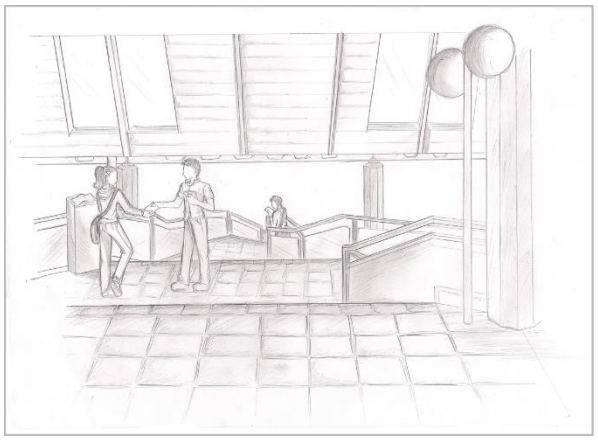
Figure Caption

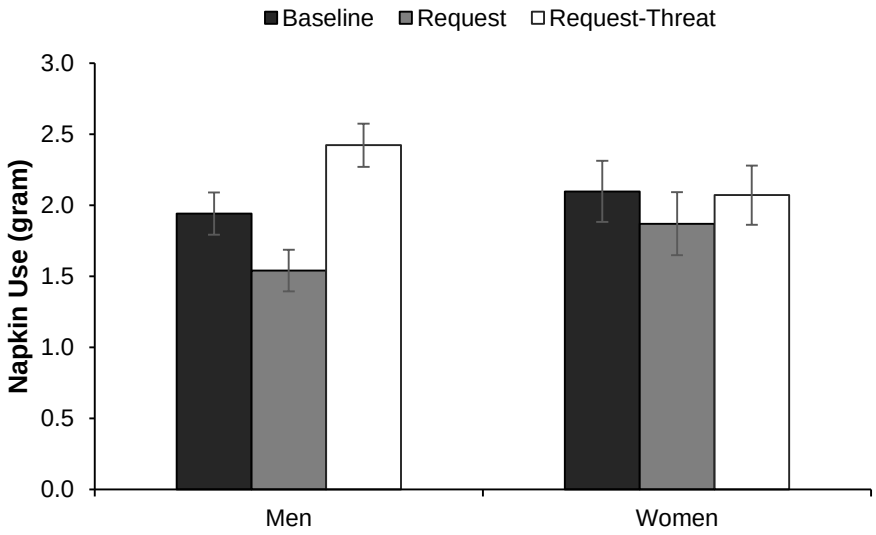
Figure 1. Paper towel use in gram depicted for men's and women's bathrooms and each condition.

Figure 2. Design of Study 2: The left panel shows the Cafeteria entrance including students and the researcher handing over flyers. The right panel shows the basement area including students and paper napkin dispensers with the request sign on it.

Figure 3. Paper napkin use in gram depicted for men and women and each condition. Error bars represent standard errors.


Baseline
Request
Request-Threat
Towel Use (gram)
1800
1600
1400
1200
1000
800
600
400
200
0
Men
Women




Baseline
Request
Request-Threat
Napkin Use (gram)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Men
Women