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# Framing Descriptive Norms as Self-Benefit Versus Environmental Benefit: Self-Construal's Moderating Impact in Promoting Smart Energy Devices

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**Abstract:** Recently, awareness has been raised concerning the importance of sustainable energy use. Nevertheless, many obstacles must be overcome to change individuals' energy consumption habits. This study examines how a message should be framed to convince individuals to purchase a smart energy device that provides feedback on household energy use. As such, this device can assist households in adjusting their energy-wasting habits. Through two experimental studies, this paper examines how a descriptive normative message, indicating that the majority of US households have already purchased a smart energy device, can increase individuals' intention to purchase the device. Both studies consider the moderating influence of the self-construal, which refers to individuals' consideration of themselves as either part of a group (interdependent self-construal) or independent from others (independent self-construal). The first study ( $n = 231$ ) reveals that a descriptive norm (versus no norm) leads to a higher purchase intention through an enhanced normative influence regardless of participants' self-construal. The second study ( $n = 128$ ) adds to the finding that combining a descriptive norm with a self-benefit (versus environmental) frame more strongly impacts the purchase intent of individuals with a dominant independence. No significant differences are identified between the two benefit frames' effectiveness among individuals with a dominant interdependence.

**Keywords:** sustainable energy use; smart energy devices; social norms; descriptive norms; self-construal; self-benefit; environmental-benefit

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## 1. Introduction

Global warming and associated climate change are some of the most urgent problems affecting the global population [1,2]. The impacts of climate change on our planet have become clearly visible in rising temperatures, extreme weather events, forest fires, heavy flooding and water shortages that cause natural disasters. These disasters are due to the accumulation of greenhouse gases in the atmosphere [1]. According to the UK Climate Change Risk Assessment [3], greenhouse gas emissions from human activities are likely to be the dominant cause of global warming [4]. Since energy consumption is a key factor in these global CO<sub>2</sub> emissions, targeting this sector necessary to mitigate human impacts on the environment [4,5]. The amount of household energy consumption accounts for a substantial proportion of the total worldwide energy consumption. For example, in the European Union, households are responsible for approximately 25% of the total energy consumption [6] due to their use of electricity and gas for space and water heating, cooking, and appliances [7]. This high consumption emphasizes the need for research that focuses on inducing behavioral change

related to household energy conservation [3,4], which can be achieved by practicing curtailment behavior and adopting energy-efficient technologies [5]. Curtailment behavior refers to households' daily and habitual practices to reduce energy use, such as turning off lights or reducing the temperature and amount of heat utilized [6]. Energy-efficient technologies require a single financial investment and can be classified under energy-efficient investment measures, which refer to structural improvements to a house (e.g., insulation, solar panels), household energy-efficient products (e.g., washing machines), and home energy monitoring systems (e.g., smart energy devices and meters) [7,8]. The current study aims to examine how individuals can be persuaded to adopt a smart energy device that monitors household energy use and offers households detailed feedback about their energy consumption [7]. In particular, we examine individuals' willingness to purchase an ambient light bulb that turns red in color when energy consumption is high and green when energy consumption is low.

Such a smart energy device allows individuals to reduce their energy use and eventually begin practicing more energy conservation behaviors (e.g., reducing the temperature and amount of heat consumed, using fewer household appliances). Indeed, previous literature has shown that providing households with a smart energy device can lead to a decrease in energy consumption [9,10]. Notably, some authors have suggested that using such devices merely result in short-term energy reductions [11,12]. For example, in a field trial of smart energy devices amongst UK households, Hargraeves et al. [11] qualitatively explored whether such devices were sustainable over time. Their results showed that whilst the devices had an immediate effect on reducing household energy use, over time these devices did not motivate households to reduce their energy consumption further. Simply making energy visible and managing to keep it visible (by using the smart energy device) is not enough to achieve long-term sustainable energy consumption. In this respect, Schultz et al. [9] argued that a smart energy device is a promising tool to encourage energy conservation, but careful consideration should be given to the way feedback is framed through such a device. Particularly, the results from their study showed that providing household with normative feedback (i.e., own kWh consumption compared to those of similar households) through smart energy devices led to a reduction in household energy use. However, providing households with real-time personal feedback (i.e., own kWh consumption) and personal feedback coupled with cost information did not lead to a decrease in energy consumption. Even more, a recent study by De Domenicis et al. [10] showed that providing households with normative feedback through a smart energy device was found to be effective in promoting both short and long-term (i.e., two years) energy reductions. Hence, smart energy devices can be an effective tool to promote sustained reductions in household energy use; however, the effectiveness of such devices depends on how feedback is framed [10]. Nevertheless, research on how individuals can be convinced to purchase such a device remains scarce [7]. This hiatus is addressed in our research through an examination of how persuasive messages should be framed to increase individuals' willingness to purchase a smart energy device.

Social scientists have emphasized the role that social norms play as a powerful strategy to promote energy conservation behavior [13–17]. Social norms are cues that help people make sense of social situations in terms of how they are expected to behave [14]. In the environmental domain, the use of normative information, which describes others' behaviors (i.e., descriptive norms) or the behaviors most people (dis)approve of (i.e., injunctive norms), has resulted in an effective means of directly reducing household energy consumption [17]. Farrows et al. [16] provided an overview that contained empirical findings about how perceived social norms affect energy use. Amongst eleven studies whereby perceived descriptive and injunctive norms were manipulated to influence energy conservation behavior, all findings related to descriptive norms were the most consistent. Descriptive normative information may influence a person to engage in the same behavior as others through simple imitation and without much cognitive effort [18].

Social norm interventions are built upon social identity theory [19], which asserts that people who strongly identify with a social group (in-group) may be more likely to act in accordance with the group's norms. As such, the use of normative information in communication messages is most influential when it refers to the appropriate in-group with which one identifies [10,20]. As we attempt

to achieve a large-scale uptake of the general population's adoption of smart energy devices, the current study employed a broader in-group norm to encourage the desired behavior—that is, households in the US (the study respondents were also US citizens). This in-group norm may avoid low identification with the reference group (i.e., households in the US), as the norm refers to what US households themselves do and approve of.

Nevertheless, the effectiveness of descriptive norms may differ according to how an individual views him/herself. Findings related to the influence of an individual's self-construal [21]—whereby an individual may differentiate oneself from others (i.e., independent self) or view oneself as part of a group (i.e., interdependent self)—and his/her conformity to social norms have been mixed. Therefore, it is necessary to conduct further research on whether a descriptive norm's effectiveness is moderated by an individual's self-construal. Both types of self-construal can coexist within an individual, although one dimension is likely to be more dominant than the other. The current study thus examines whether activated self-construal influences the effectiveness of descriptive norms.

Given the powerful influence of social norms, several authors have suggested that social norms should be combined with other persuasive appeals to optimally influence behavior [16,22]. A growing body of research has demonstrated that the framing of pro-environmental behaviors as beneficial to the self (e.g., monetary savings) or the environment (e.g., reduction in greenhouse gasses) has proven effective in encouraging people to perform the desired behavior [23–26]. Importantly, Hafner et al. [27] explored the effect of providing normative information (versus no norm) with different benefit frames (financial versus environmental) in the context of promoting an energy-efficient product that requires a significant financial investment (i.e., a heat pump). The authors found that when normative information (versus no norm) was provided, the benefit type was irrelevant because no significant difference was identified between the various benefit frames. Consistent with previous literature, which has suggested that an individual's self-construal can affect one's motivation to engage in pro-environmental behavior for one's self-interest or environmental concern [28–30], the present research was designed to explore whether the benefit frames' effectiveness may depend upon one's dominant self-construal.

The first experimental study aimed to examine whether the effectiveness of a descriptive normative message depends upon an individual's self-construal. The second experimental study further aimed to unravel whether the framing of a descriptive normative message with a self-benefit frame versus an environmental-benefit frame differentially affects the purchase intent of individuals with a dominant independent versus dominant interdependent self-construal.

Before discussing the results of two experimental studies that were conducted with US samples, we develop a theoretical framework and build our hypotheses. We then conclude by firstly discussing the study's practical and theoretical implications and secondly offering suggestions for future research.

### *1.1. Using Descriptive Norms to Promote Smart Energy Devices*

A social norm is an expectation regarding appropriate behavior that occurs in a group context [31]. Individuals tend to conform to social norms to gain social approval or avoid punishment [32]. Social norms are widely applied in social marketing campaigns to, for instance, reduce people's smoking or drinking behaviors or convince them to eat less meat. The objective of such social norm approaches is to influence individuals' behavior by informing them about others' behaviors, which typically involve those in which the majority of people engage [31]. According to the focus theory of normative conduct [13], shifting an individual's attention to social norms can lead to changes in one's behavior in ways that are consistent with those norms. Social norms refer to a set of beliefs about what behavior is done or (dis)approved of in a given situation. Perceptions of what others do (i.e., descriptive norms) and what others (dis)approve of (i.e., injunctive norms) are persuasive to behavior [13,32]. The distinction between these two norms is important since they pose different impacts upon decision making [16,33,34]. Previous research has particularly indicated that injunctive norms more strongly affect attitudes, while descriptive norms are stronger predictors of behavior [14,16]. Descriptive norms require less cognitive effort because they can initiate a heuristic shortcut that

facilitates decision making [34]. Descriptive norms can additionally serve as indicators of injunctive norms. In this respect, the mere describing of widespread behavior may serve as an indicator of what most people approve of, while the opposite cannot be proven [16].

Drawing on social identity theory, an appeal to descriptive norms in communication messages is most effective when employing an appropriate reference group (in-group versus out-group) for a particular target group [35,36]. Social identity theory [19] proposes that individuals classify themselves and others into social groups that can range from concrete groups (e.g., 'We, the people of our neighborhood') to broader categories (e.g., 'We, the people of our country') and that result in one's identification with a group [37]. One's membership to a group whose members possess the same group-defining attributes as oneself (in-group) may result in one's increased conformity to the in-group's perceived norms. On the contrary, one's identification to non-memberships (out-groups) results in behaviors of differentiating oneself from the in-group [22]. For example, Graffeo et al. [38] found that Israeli households who were provided with an in-group normative feedback message (from the same neighborhood) decreased their energy consumption more so than those who received an out-group normative feedback message (from another city). As we attempt to promote the large-scale uptake of a smart energy device, this study refers to a broader in-group norm (i.e., households in the US) as an effective referent group [10].

A substantial body of research has already established the power of social norms as part of information provision (i.e., normative information) to directly influence energy consumption [10,15,16,32,39]. For example, in the study of Nolan et al. [39], Californian households were provided with either descriptive normative information regarding their neighbors' energy conservation measures (e.g., '99% of the people in your community reported that they turned off their lights to save energy') or a non-normative message (e.g., benefit to society). Participants who received a social norm conserved more energy than participants under any other message condition. Similar results were reached in the study of Goldstein et al. [15], who determined that providing hotel guests with a descriptive normative message (e.g., '75% of other guests reused their towels') versus a standard message (e.g., 'help us save the environment') designed to promote towel reuse motivated environmental conservation behavior to a greater extent. These studies demonstrated that descriptive normative messages about the high prevalence of the desired behavior (e.g., '82% of the student sample engaged in energy conservation behavior') can be more effective to change behavior than those about low prevalence (e.g., '15% of the student sample engaged in energy conservation behavior') or the mere presentation of injunctive norms (e.g., 'others approve of engaging in energy conservation behavior') [17,32,40]. Though research has demonstrated how descriptive normative information affects direct energy consumption, the potential for such strategies to promote a smart energy device in order to reduce energy consumption has received scant attention. In consideration of previous findings, we believe a descriptive normative message can increase an individuals' intention to adopt a smart energy device. More specifically, we anticipate that the descriptive norms will evoke the perception that if the majority of households in the US have already adopted and approve of such a device (i.e., perceived social norms), individuals' intention to purchase the device will be higher. We hereby hypothesize: H1. Using a descriptive norm (versus no norm) will increase perceived social norms, thereby resulting in a greater intention to purchase a smart energy device.

#### Exploring Individuals' Self-Construal as a Moderator

Self-construal theory [41] proposes that the self comprises two dimensions in terms of one's relationships with others—that is, the interdependent self and the independent self. Nevertheless, people are flexible in their construal of themselves, and situational triggers can activate one's specific self-construal type [21,42].

People who possess a dominantly interdependent self-construal emphasize close relationships with others and society and therefore tend to be more oriented towards conforming to group norms [43]. People who possess a dominantly independent self-construal form few connections with others and society, perceive themselves as distinct from a group, and are less sensitive to external influences [21,44]. Previous research has indicated that differences in self-construals may also lead to diverging

pro-environmental behaviors [30,45,46]. For example, Chuang et al. [30] found that individuals who were dominantly interdependent (both chronically and due to priming) exhibited a greater intention to choose a pro-environmental product than those who were dominantly independent. The reasoning behind this finding is that people who possess a dominantly interdependent self-construal consider the needs of others and society rather than focus solely on their own needs. Hence, they act more pro-environmentally to conform to the societal norm of behaving as such and maintain relationships with others to avoid social exclusion [47]. Conversely, people who possess a dominantly independent self-construal outweigh their needs over societal needs, engage in behaviors that fulfil their own needs, and prioritize their self-benefits rather than comply with social norms [48].

Notably, White and Simpson's [49] study investigated the effectiveness of a descriptive versus injunctive in-group normative appeal on grass recycling behavior, depending upon respondents' activated level of self-construal. Self-construal was manipulated via collective (interdependent self) rather than individual pronouns (independent self) in an informative text on grass recycling that was combined with either a descriptive or an injunctive norm. The results revealed that both norms were effective when interdependent self-construal was activated. Contradictory to what theory might suggest, descriptive norms were also determined to be effective when an independent self-construal was activated. The authors argued that the effectiveness of the descriptive norms under independent self-activation conditions was driven by the self-benefit of informational value. Particularly, because grass recycling was perceived as an ambiguous activity, the descriptive norms provided relevant information regarding how one should behave as well as which behaviors were considered adaptive. In this case, the use of a descriptive norm was meant to satisfy one's own needs and self-interests rather than conform to societal norms. In this respect, De Domenicis et al. [29] suggested that messages that appeal to societal benefits (e.g., to gain others' social approval) can indicate self-interest benefits and thereby motivate pro-environmental behavior. As the manipulation of social norms induces feelings of others' social approval, the use of descriptive normative messages can therefore also be effective among individuals who possess a dominantly independent self-construal.

Given these contradictory findings, we formulated a research question to examine self-construal's role in the effectiveness of a descriptive normative message (See Appendix A, Figure A1 for a graphic visualization of the proposed research model): RQ: Is a descriptive norm's (versus no norm) effectiveness on an individual's intention to purchase a smart energy device through higher perceived social norms that are moderated by one's activated self-construal?

### *1.2. Descriptive Norms in a Self-Frame Versus an Environmental-Benefit Frame and Self-Construal's Moderating Role*

We further wish to explore how we may most effectively employ a descriptive norm to encourage an individuals' uptake of a smart energy device. A substantial body of research in environmental behavior has indicated that people are driven by egoistic (i.e., one considers the costs and benefits to oneself) and social-altruistic motivations (i.e., one considers the costs and benefits to others and the environment) [50,51]. Several authors have highlighted the fact that one can tap into these diverging motivations by framing messages in which behaviors or products offer individuals either a self-benefit (e.g., cost savings or a positive impact on one's health) or an environmental benefit (e.g., clean air, lower CO<sub>2</sub> emissions, or protection for future generations). In this respect, self-benefits appear to appeal to egoistic motivations, while environmental benefits appeal to altruistic motivations [25,27,29]. Importantly, past research has suggested that one's motivation to engage in pro-environmental behavior may be related to one's self-construal. As such, Davis and Stroink [52] indicated that the strength of one's dominantly independent self-construal influences one's egoistic or self-directed environmental concern. In their study, people who possessed dominantly interdependent self-construal were found to express greater levels of environmental concern and participate more in environmental conservation, particularly when such actions assisted in-group members [45]. The study suggested that people who possess a dominantly interdependent self-construal may react to the various benefit frames differently from those who possess an independent self-construal.

A growing body of research has been empirically exploring how such self-benefit (monetary savings) and environmental-benefit (reduced emissions) frames differently motivate energy conservation behavior. For example, in the study of Dogan et al. [24], respondents were presented with various eco-driving scenarios (e.g., speed limits of 100 versus 200 km/h) that offered either an environmental benefit (e.g., 'you will save 1.92 kg CO<sub>2</sub> emissions for this trip') or a financial benefit (e.g., 'you will save 2€ for this trip'). The authors found that environmental benefits were more effective than financial benefits in motivating respondents to adopt eco-driving behaviors. In the study of Hafner et al. [25], participants were given information that emphasized either financial (i.e., information about reducing costs) or environmental benefits (i.e., information about reducing CO<sub>2</sub>) regarding the installation of a heat pump (versus a standard boiler). Their results reported that those under the financial benefit condition expressed a higher intention to install a heat pump in real life. Consequently, both benefit frames have been demonstrated to change behaviors in the desired directions, although a person's motives can influence the impact of various benefit frames [29]. In a follow-up study, Hafner et al. [27] explored the interplay of providing participants with descriptive normative information (e.g., 'the vast majority of people in your neighborhood have installed the energy-efficient heat pump') combined with either a financial- or environmental-benefit frame to convince individuals to install a heat pump. They incorporated information on cost reduction (i.e., financial frame) and emission savings (i.e., environmental frame) produced whilst the heat pump was in use. The authors exclusively found a main effect whereby providing participants with a descriptive norm message (versus no norm) led to their higher intention to install a heat pump in real life, while no interaction was identified with benefit type. Particularly, for the participants under the normative condition, no difference was found between the different benefit types upon participants' intention to install a heat pump. When no normative information was provided, the financial benefit frame exclusively influenced participants' higher intention to install the heat pump. Accordingly, the authors suggested that normative information is more powerful than the benefit type because the latter solely affected their participants' intention to install a heat pump differently when normative information was not provided. Given normative information's powerful influence, further research on the optimal combination of various benefit types with a normative message is necessary [27,29]. We suggest that the effectiveness of normative information combined with either a (financial) self-benefit or an environmental-benefit frame may depend upon how individuals are oriented. In line with previous studies, we herein employ monetary savings resulting from one's purchase of a smart energy device as a (financial) self-benefit, while lower greenhouse gas emissions that result from purchasing a smart energy device are applied as an environmental benefit.

In consideration of previous findings, we believe that a descriptive norm combined with a self-benefit frame will lead people who possess dominantly independent self-construal to purchase a smart energy device. Particularly, as those people appear to prioritize self-benefits over environmental benefits [21], they are more oriented towards pursuing their self-interests and may be more motivated to adopt a smart energy device when the personal benefits are highlighted. In contrast, we expect that a descriptive norm combined with an environmental-benefit frame will lead people who possess a dominantly interdependent self-construal to purchase a smart energy device. As social approval appears to be crucial for such individuals, we anticipate that they will be more motivated to adopt a smart energy device when the environmental benefits are highlighted. Accordingly, we hypothesize the following moderated mediation model (See Appendix A, Figure A2 for a graphic visualization of the proposed research model):

H2a. When an individual's independent self-construal is activated, a descriptive norm in a self-benefit (versus an environmental-benefit) frame will increase the perceived benefits for the self, thereby resulting in one's higher intention to purchase a smart energy device.

H2b. When an individual's interdependent self-construal is activated, a descriptive norm in an environmental-benefit (versus self-benefit) frame will increase the perceived benefits to the environment, thereby resulting in one's higher intention to purchase a smart energy device.

## 2. Materials and Methods

To test our hypotheses and research question, two experiments were conducted. In both studies, the same experimental procedure was used. First, respondents were exposed to a priming procedure to prime either the independent or interdependent self-construal. Next, participants were exposed to an advertisement in which the Ambient Energy Orb (i.e., a smart energy device) was promoted. In this advertisement, the independent variables were manipulated by using different headlines and keeping all other textual and visual information constant (see Appendix B). More specifically, the descriptive normative message was manipulated in Study 1 by adding the following headline: 'Be among the more than 70 million of households to try the Ambient Energy Orb in the USA.' In the control condition, this headline was removed. The self- versus environmental-benefit frames in Study 2 was manipulated by adding either of the following sentences 'Save money and contribute to your better future by lowering your energy use' (self-benefit) or 'Contribute to a better environment and reduce GHG emissions by lowering energy use' (environmental-benefit). After being exposed to the stimuli, respondents were asked to complete a questionnaire in which the manipulation checks, mediating variables, and dependent variables were measured. The stimuli were designed with the drawing program Adobe InDesign®. Study 1 was conducted in January 2017, and Study 2 was conducted in February 2018.

### 2.1. Study 1—The Effectiveness of Descriptive Norms and Self-Construal's Moderating Role

#### 2.1.1. Participants

This study's sample involved 231 respondents who were drawn from the general US citizen population, and data were collected through Amazon's Mechanical Turk panel. The participants' average age was 33.95 years (SD = 10.57), among whom 57% were females. Each respondent received 0.30 USD for their participation.

#### 2.1.2. Experimental Design and Procedure

A 2 (descriptive norm: yes versus no) × 2 (self-construal: interdependent versus independent) between-subjects experimental design examined how a descriptive norm affects an individual's preference for a product that may help monitor his/her energy use. A persuasive message was designed to promote a smart energy device; under the normative condition, a descriptive norm was included (e.g., 'Be among the other 70 million US households to try the Ambient Energy Orb'), although this norm was absent from the control condition. The look and feel of the persuasive message was identical under both conditions, and a participant's self-construal was manipulated via a priming technique. Many studies have indicated that self-construals can both vary across individuals (trait variable) as well as be situationally induced (state variable) [21,43,47]. People can include features of both self-construal aspects, although the dominant type is determined by situational cues and influences their behavior [45]. For example, anecdotes that are focused on oneself or focused on families while using individual or collective pronouns in anecdotes have all been demonstrated to prime either independent or interdependent self-construals [53,54]. Our respondents were randomly exposed to one of the conditions by the computer software Qualtrics.

After reading a short introductory text that explained how much time the study would take to complete, the respondents were asked to read and highlight all the pronouns used throughout a short story that manipulated either independent or interdependent self-construals. After their exposure to the priming condition, respondents were asked to carefully view an advertisement for the smart energy device that contained either the descriptive norm or no norm. After being exposed to the advertisement, manipulation checks were measured followed by measures of the dependent and mediating variables ('perceived social norms').

### 2.1.3. Stimulus Material

To measure how willing the respondents were to purchase a smart energy device, we selected the Ambient Energy Orb (AEO), which is a product that helps consumers monitor their energy use. The AEO is a small light bulb that changes color when energy is used excessively. This product was invented in 2007 to make energy use visible.

To manipulate the descriptive norm, two different advertisements were designed that contained either a descriptive normative message or no message (see Appendix B, Figure A3), while all other aspects were kept constant (i.e., graphics, layout, and information). The normative condition contained the message: 'Be among the other 70 million US households and try the Ambient Energy Orb.' This message served as a descriptive norm in that it emphasized other US households' uptake of the smart energy device. Alongside the normative message, a short informational text was displayed next to the product: 'Control your energy consumption. The light pulses green when your energy consumption and costs are low, and it pulses red when they are high.' The control condition solely contained the short informational text next to the product, and no normative message was displayed.

An individual's self-construal was primed by using Hamilton and Biehal's [53] priming procedure, while one's level of self-construal (interdependent versus independent) was manipulated by assigning a short story about a trip to the city. The participants were tasked with identifying the pronouns used throughout the story (see Appendix C), all of which were self-oriented (i.e., I, me, and myself) to prime the independent self [43,49]. The interdependent self-construal condition presented the same short story, only all pronouns were other-oriented (i.e., we, us, and our) to prime the interdependent self [43,49].

### 2.1.4. Measures

The self-construal was entered as a dichotomous variable into SPSS. An interdependent self-construal was coded as 0 and an independent self-construal was coded as 1. Manipulation checks were measured to ensure that the descriptive norm signaled the perceived popularity of the smart energy device by other people [13]. A three-item scale ( $\alpha = 0.89$ ) was applied (e.g., 'This energy light bulb is positively rated by many other people') as adapted from a study by Sundar et al. [55], while the manipulation check for measuring the primed self-construal level was adapted from a study by Hamilton and Biehal [53]. The participants answered two items that measured the extent to which they focused on and thought about themselves ( $r = 0.73$ ) and two items that measured the extent to which they focused on others ( $\alpha = 0.64$ ) [53]. To measure our mediating variable of perceived social norms, a scale adjusted from that of White and Simpson [49] was used (e.g., based on the advertisement, how many people are currently using the AEO?). To measure participants' intent to purchase the smart energy device, a five-item ( $\alpha = 0.95$ ) scale was implemented (e.g., 'It is likely that I will buy this AEO') [54]. See Appendix D for an overview of all scales and means.

## 2.2. Results—Study 1

### 2.2.1. Manipulation Checks

An independent-samples t-test revealed that the respondents under the normative condition perceived the smart energy device as to be preferred more by the majority of people ( $M = 5.05$  and  $SD = 1.11$ ) than by those under the control condition ( $M = 4.62$ ,  $SD = 0.17$ ;  $t [231] = -2.62$ , and  $p < 0.009$ ). Next, the respondents under the interdependent prime condition focused less on themselves ( $M = 2.85$  and  $SD = 1.53$ ) compared to the respondents under the independent prime condition ( $M = 3.87$ ,  $SD = 1.76$ ;  $t [229] = -3.87$ , and  $p < 0.001$ ). A univariate ANOVA reported that the manipulation of the self-construal prime condition did not differ under the normative or control conditions ( $F = [1, 227] = 5.88$  and  $p = 0.97$ ). The descriptive norm's manipulation also did not differ under both self-construal prime conditions ( $F = [1, 227] = 2.86$  and  $p = 0.29$ ).



### 2.2.2. Main Analyses

The results from the independent-samples t-test revealed no main effect of the descriptive normative message (vs. control message) on purchase intention ( $M = 4.89$ ,  $SD = 1.57$ ;  $M = 4.77$ ,  $SD = 1.62$ ;  $t [229] = 0.56$  and  $p = 0.57$ ). Next, a mediation analysis was conducted to test whether a descriptive norm affects individuals' intention to purchase the smart energy device through perceived social norms (Hayes, [56]; version 3.0, model 4, 5000 bootstraps; 95% bias-corrected confidence intervals [CIs]). The results revealed the descriptive norm's significant indirect effect on purchase intention through perceived social norms ( $\beta = 0.34$ ,  $SE = 0.11$ , and 95% CI [0.1438, 0.5666]). These results suggest that the use of a descriptive normative message (versus no normative message) evokes the perception that the majority of people are using and approve of the product ( $a = 0.46$ ,  $SE = 0.12$ , and  $p < 0.001$ ) and that these perceived social norms in turn lead to a higher purchase intention ( $b = 0.73$ ,  $SE = 0.10$ , and  $p < 0.001$ ). The data therefore support H1.

To examine the research question, the moderating effect of a person's activated self-construal was investigated. More specifically, whether the use of a descriptive normative message on purchase intention is effective for interdependent and/or independent self-construals was examined by conducting a moderated mediation analysis (Hayes, [56]; version 3.0, model 7, 5000 bootstrap samples, and 95% bias-corrected CIs). The moderated mediation index was not significant ( $\beta = 0.09$ ,  $SE = 0.18$ , and 95% CI [-0.2571, 0.4569]). In particular, for both interdependent ( $\beta = 0.30$ ,  $SE = 0.14$ , and 95% CI [0.0430, 0.5931]) and independent self-construal ( $\beta = 0.39$ ,  $SE = 0.14$ , and 95% CI [0.1380, 0.6952]), the results revealed that a descriptive normative message (versus no norm) significantly and indirectly affected purchase intention through perceived social norms. Accordingly, this result answers our research question, whereby the activated self-construal does not moderate the effectiveness of descriptive norms.

### 2.2.3. Study 1 Discussion

The data from Study 1 provide strong support for a descriptive norm's effectiveness in promoting an individuals' intention to purchase a smart energy device. More specifically, by including a descriptive norm in advertisements, the perception that the majority of households in the US had already adopted the product was evoked and reflected in what is socially approved. Accordingly, people want to conform to these societal norms that lead to a stronger intention to purchase the smart energy device. The results did not report self-construal's moderating impact on the effectiveness of a normative message, as a normative message led to a higher purchase intention among both self-construal orientations. This finding answers our research question and contributes to previous literature concerning the self-construal's role and the effectiveness of social norms [49]. A possible explanation for descriptive norms' effectiveness on a dominantly independent self-construal may be that an innovative cue was integrated into the normative message. In the message 'Be among the other 70 million US households and try the Ambient Energy Orb,' the 'and try' indicator might have emphasized the product's innovativeness and novelty, thereby attracting those with the independent self-construal. Additionally, when looking at our designed advertisement, the information about the product's features may have contained a form of self-benefit appeal. The messages 'control your energy consumption,' 'the light pulses green when your energy consumption and costs are low,' and 'it pulses red when they are high' refer to the ability to save money and therefore highlight self-benefits, and they might explain why the advertisement was also effective among those whose independent self-construal was activated. A second study will be conducted to examine whether emphasizing self- versus environmental-benefits are more effective depending on an individual's level of self-construal.

### 2.3. Study 2—The Effectiveness of a Descriptive Norm in a Self-Benefit Versus an Environmental-Benefit Frame and Self-Construal's Moderating Role

Study 2 aimed to examine the influence of a descriptive normative message combined with a (financial) self-benefit frame versus an environmental-benefit frame. The self-construal's moderating role (i.e., interdependent versus independent) is additionally assessed herein.

#### 2.3.1. Participants

This study's sample comprised 128 respondents drawn from the general US citizen population, and data were collected through Amazon's Mechanical Turk panel. The participants' average age was 34.32 years ( $SD = 8.60$ ), among whom 64% were females. For their participation, each respondent received 0.30 USD.

#### 2.3.2. Experimental Design and Procedure

Study 2 adopted the same approach as Study 1. A 2 (descriptive norm in a [financial] self-benefit frame versus a descriptive norm in an environmental-benefit frame)  $\times$  2 (self-construal: independent versus interdependent) between-subjects experimental design was implemented to examine the effects of a normative message in a (financial) self-benefit frame versus an environmental-benefit frame on an individual's intention to purchase a smart energy device. The self-construal was manipulated with the same priming technique that was used in Study 1, and the respondents were randomly exposed to one of the conditions via Qualtrics.

#### 2.3.3. Stimulus Material

The same product that was employed to monitor energy use in Study 1 was also used for Study 2's experiment (i.e., the AEO). Since we did not want to emphasize the AEO's innovative aspect to rule out appeals other than normative messages, small adjustments were made to the descriptive normative message; rather than 'Be among the other 70 million US households to try the Ambient Energy Orb,' we included the message 'Follow the other 80% of US households and use the Ambient Energy Orb' [15,18].

To manipulate the (financial) self-benefit and environmental-benefit frames, different messages were designed. The self-benefit frame focused on saving money, while the environmental-benefit frame focused on the product's environmental impact. In particular, the self-benefit condition stated: 'Save money and contribute to your better future by lowering your energy use.' The information regarding the product's features that was displayed in the advertisement was also slightly adjusted: 'Control your energy consumption and save money. The light pulses green when your energy consumption and costs are low. It pulses red when they are high.' Thus, the self-benefit appeal focused on self-benefits by promoting individuals' ability to save money and lower their costs, both of which can be considered egoistic concerns related to pro-environmental behavior [27,30,57]. The environmental-benefit condition stated: 'Contribute to a better environment and reduce GHG emissions by lowering energy use.' The product feature information was slightly adjusted to: 'Control energy consumption and contribute to a better environment. The light pulses green when energy consumption is low and pulses red when it is high.' We left out all personal pronouns (e.g., 'your') to avoid any egoism appeals. We also did not mention any costs or savings potential to rule out self-benefit appeals, and we focused on benefitting the environment by promoting the product's positive contribution [27,28,45]. The advertisements were identical in their visual feature layouts (see Appendix B, Figure A4).

#### 2.3.4. Measures

The self-construal priming method was the same as the one applied in Study 1. The self-construal was entered as a dichotomous variable in SPSS, where interdependent was coded as 0 and independent was coded as 1. The same constructs and scales were used as those in Study 1. An additional manipulation check was measured with one item to determine whether the self-benefit

frame focused more on benefits to the individual rather than benefits to the environment and vice versa [58]. To measure our mediating variable of ‘perceived benefits to the self’ ( $r = 0.86$ ), we applied a two-item scale (e.g., ‘The advertisement makes me consider the benefits to myself when using the AEO’) adapted from a study by White and Pelozo [59]. Our second mediating variable, ‘perceived benefits for the environment’ ( $r = 0.74$ ), was measured with the same scale (e.g., ‘The advertisement makes me consider the benefits to the environment when using the AEO’). See Appendix D for an overview of all scales and means.

## 2.4. Results—Study 2

### 2.4.1. Manipulation Checks

An independent-samples t-test reported that the advertisement with the self-benefit frame was perceived to focus more on contributing to individual benefits ( $M = 4.03$  and  $SD = 1.78$ ) than environmental benefits ( $M = 3.11$  and  $SD = 1.49$ ;  $t [126] = 3.14$  and  $p = 0.002$ ). The respondents under the interdependent prime condition focused more on others ( $M = 4.14$  and  $SD = 1.40$ ) compared to the respondents under the independent prime condition ( $M = 3.37$  and  $SD = 1.79$ ;  $t [126] = 3.90$  and  $p < 0.001$ ). Additionally, an univariate ANOVA revealed that the manipulation of the self-construal prime condition did not differ under either condition (normative self-benefit versus normative environmental benefit;  $F = [1, 124] = 3.10$  and  $p = 0.081$ ). The manipulation of the self-benefit and environmental-benefit frames also did not differ under either self-construal prime condition ( $F = [1, 124] = 2.80$  and  $p = 0.10$ ).

### 2.4.2. Main Analyses

The results from the independent-samples t-test revealed no main effect of normative message across the two benefit frames regarding purchase intention ( $M = 4.55$  and  $SD = 1.17$ ;  $M = 4.48$  and  $SD = 1.42$ ;  $t [119] = 0.30$  and  $p = 0.77$ ). Next, a moderated mediation analysis (Hayes, [56]; version 3.0, model 7, 5000 bootstraps; 95% bias-corrected CIs) revealed a significantly moderated mediation index with perceived self-benefit as a mediator ( $\beta = -0.74$ ,  $SE = 0.22$ , and 95% CI  $[-1.2002, -0.3582]$ ). More specifically, this revealed that the indirect effect through perceived self-benefit significantly differed across self-construals. The results for the conditionally indirect effects revealed that, for the independent self-construal, there was a significant indirect positive effect of normative message in the self-benefit frame on purchase intention through perceived benefits for the self ( $\beta = -0.71$ ,  $SE = 0.20$ , and 95% CI  $[-1.1537, -0.3444]$ ). This indirect effect was not significant for the interdependent self-construal ( $\beta = 0.03$ ,  $SE = 0.10$ , and 95% CI  $[-0.1679, 0.2093]$ ); this result confirms H2a. The moderated mediation analyses of perceived environmental benefits was not significant ( $\beta = 0.16$ ,  $SE = 0.14$ , and 95% CI  $[-0.0519, 0.5079]$ ). The results of the conditionally indirect effects reported that the use of a normative message in an environmental benefit frame had no significantly indirect effect on purchase intention through perceived benefits to the environment for either interdependent self-construal ( $\beta = -0.12$ ,  $SE = 0.10$ , and 95% CI  $[-0.3864, 0.0271]$ ) or independent self-construal ( $\beta = 0.07$ ,  $SE = 0.15$ , and 95% CI  $[-0.1262, 0.2225]$ ). Therefore, H2b is not confirmed. See Appendix B, Figure A5 and A6 for a graphic visualization of these results.

### 2.4.3. Study 2 Discussion

The results of our second study partially support our assumption. Particularly, the provided data support the claim that when the respondents’ independent self-construal was activated, a normative message in a self-benefit frame conveyed higher perceived benefits to the self while the participants considered purchasing the smart energy device, which increased their intention to purchase it. When respondents’ interdependent self-construal was activated, we found no significant indirect effect for either benefit frame. Particularly, when respondents’ interdependent self-construal was activated, no significant difference was identified between a normative message’s effectiveness in a (financial) self-benefit frame ( $M = 4.85$ ) or an environmental-benefit frame ( $M = 4.44$ ) regarding

their intention to purchase the smart energy device. Thus, for interdependent self-construal, both frames worked equally (relatively) well.

### 3. Discussion

The results of the current study generally align with previous research (e.g., [9,17,32]) and demonstrate social norms' considerably persuasive influence in promoting a smart energy device that monitors household energy use and may result in energy conservation behavior. The first experimental study provided evidence for descriptive norms' influence on individuals' intention to purchase a smart energy device through perceived social norms, irrespective of their activated level of self-construal. By merely indicating the behavior of many other households in the US, the belief that this behavior is appropriate is supported, thereby resulting in individuals' greater preference to purchase a smart energy device. We did not find a significant interaction with a descriptive norm's effectiveness and the participants' activated level of self-construal. Particularly, among both activated interdependent and independent self-construals, the manipulation of a descriptive norm resulted in participants' higher preference to purchase a smart energy device through perceived social norms. These results answer our research question and align with previous studies [29,49]. One may assert that, for a dominantly independent self-construal, when promoting a (new) smart energy device, a descriptive norm delivers a source of information to the self regarding what type of behavior is most effective and appropriate, whereby conforming to the norm reaps self-benefitting goals. The results for dominantly interdependent self-construal also align with previous studies that have claimed that a dominantly interdependent self conforms to social norms because the individual considers the needs of others and wants to maintain social relationships [28]. Whether one's conformity to social norms is pursued to benefit oneself or to connect with others, social norms' persuasive influence to motivate the desired behavior remains constant regardless of how an individual views him/herself. This study is one of few to appeal to a broader in-group norm. Given the fact that the effectiveness of social norm messages depends on the degree to which an individual identifies with the reference group, describing the behavior of a larger in-group population may rule out both one's low identification with this reference group and the possibility that some people do not want to align with these in-group norms [10,22]. The current study demonstrates that describing the high prevalence of the desired behavior by other households in the US to encourage the widespread adoption of a smart energy device may prove effective. Future studies might explore why individuals who possess dominantly independent self-construal comply with normative information, such as whether social norms are used for extrinsic motivation (e.g., 'I comply because others do') or intrinsic motivations (e.g., 'I want to do the right thing') [60]. An alternative explanation for this finding can be that using descriptive norms could evoke other meaningful motivations that influence individuals to purchase a smart energy device. For example, the message could have evoked a bandwagon effect. A bandwagon effect refers to the tendency for people to follow the behavior of others because when many people are doing it, it must be good [55,61]. As such, messages that stress the popularity of a behavior may reduce the perceived risk of purchasing such device as the adoption by others may function as a quality signal. Additionally, promoting a product by emphasizing its actual adoption by the majority of people may improve the credibility of the message [34]. Thus, there could be other possible explanations besides wanting to conform to social norms that motivate individuals with an independent self to purchase a smart energy device. Future studies could explore whether enhanced quality perceptions can explain the effectiveness of a social norm message for people with a dominant independent self.

Next, the results partially support the link between normative information in different benefit frames, state self-construals, and individual's intentions to adopt a smart energy device. The findings suggest that the provision of normative information in a (financial) self-benefit frame (versus an environmental-benefit frame) resulted in individuals' higher intent to purchase the smart energy device, although only among participants whose independent self-construal was activated. The results are consistent with those of previous literature that recognized the importance of financial benefit frames in influencing energy conservation behavior [25,27,29]. However, we contribute to the

existing literature by providing evidence that the effectiveness of normative information in a self-benefit frame depends upon a person's self-construal. As a dominantly independent self is motivated to engage in behavior for one's own self-interest, emphasizing the associated financial benefits will be more effective in encouraging the desired behavior from that individual. Thus, for the dominantly independent self, providing normative information alone (Study 1) or combining that information with a self-benefit frame results in a higher intention to adopt a smart energy device, which is driven by self-benefitting motives (in the case of Study 2). In contrast with previous research, no significant results were identified among the participants whose interdependent self-construal was activated whilst they received normative information in an environmental-benefit frame. A possible explanation for this finding may be that, for the dominantly interdependent self, the mere provision of normative information is most effective in encouraging one's adoption of a smart energy device. Particularly, as a dominantly interdependent self values social relationships, providing normative information may activate a social-altruistic value whereby individuals conform to the norm because they want to be perceived as morally conscious by others with whom they wish to harmonize [27,50]. Because the dominantly interdependent self is pro-socially oriented, the influence of normative information may exceed the influence of both benefit frames. Another possible explanation might be that, as a dominant interdependent self expresses concerns for the environment [30,45], it is possible that these individuals already engage in energy conservation behaviors and thus perceive a smart energy device as unnecessary. Thus, when an individual's interdependent self-construal is activated, a normative message combined with environmental benefits does not lead to one's higher purchase intention through perceived benefits to the environment. Future studies may explore how environmental benefits might be more effectively framed—particularly, whether the framing of benefits to the environment via concrete measures (e.g., reducing 1 kw/hours = emission from 1 car) that result from reduced energy use is more likely to achieve individuals' uptake of a smart energy device.

Notably, a downside of appealing to financial benefits resulting from sustainable energy use is that doing so may crowd out people's intrinsic motivation. When appealing to financial benefits (e.g., monetary incentives), such benefits may induce doubts about an individual's true motives of behaving pro-environmentally and therefore hinder his/her energy conservation behavior. Further research may investigate when financial benefits discourage consumers from engaging in energy conservation behaviors and whether combining financial and environmental benefits proves beneficial in eradicating this crowding-out effect [62].

Interestingly, Schultz et al. [9] found that installing energy-smart meters that provide households with normative information about their neighbours' energy use—coupled with feedback information about their own energy use rather than information about their own consumption (Kw usage) or costs (\$/hour) alone—has led to a decrease in energy consumption. Similarly, De Dominicis et al. [10] provided their participants with energy smart meters to investigate the long-term effect of normative feedback, whereby residents' electricity use was compared to that of similar households. Households that received this normative feedback (versus households who exclusively received their own energy use) resulted in long-term reductions (two years) in their total energy consumption. Thus, as normative feedback has been determined to impact direct energy consumption, our study contributes to the literature by providing evidence that descriptive normative messages can incite individuals' uptake of a smart energy device that provides households with such normative feedback.

Though social norms strongly influence human behavior, using social norms as a nudge tool may evoke ethical concerns [63]. Nudging refers to making small, unnoticeable changes to the choice architecture that influences consumers' behavior by making changes in the environment that guides them to make (usually) automatic choices [64]. Nudging is often used to stimulate pro-environmental, pro-social, or more healthy behaviors. As such, nudges are used amongst others to stimulate people to take the stairs instead of the elevator, to recycle, to eat healthier, and to donate blood. In the field of green nudging (i.e., nudging aimed at stimulating pro-environmental behavior), ethics play an important role, as green nudging often requires a financial investment. It is frequently

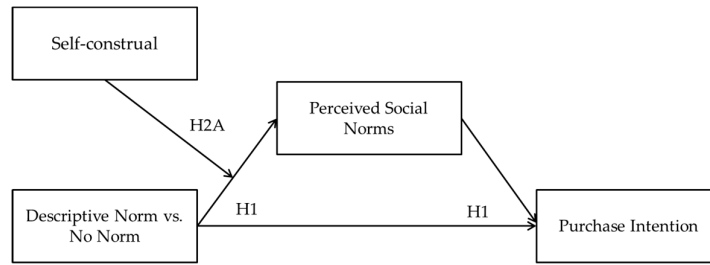
claimed that nudges can be perceived as manipulative [65–67], because they influence automatic and intuitive processes of decision-making through mechanisms that people are not aware of [45]. Nudging has the potential to be harmful, especially when it is used with the implicit tendency to manipulate people and convince them to purchase products or spend money [68]. As such, nudges are currently used in supermarkets to convince people to purchase vegetarian or vegan products which are quite expensive. As people believe it is their free will to choose these products, it can be an unethical tactic to use in commercial marketing. Therefore, transparency is a key prerequisite for ethical (green) nudging [65,66]. A transparent nudge means that nudged consumers know the types of interventions that are being used and that they are capable of identifying such interventions [65,66]. Otherwise, transparency can also reduce (but not eliminate) the behavioral impact of nudges [67]. Consequently, organizing (green) nudges in a transparent way, coupled with the condition that the nudge generates behavioral change, will remain a challenge for effective and ethical (green) nudging [65]. The current research poses some limitations. Firstly, we did not measure actual purchase behavior; rather, we asked respondents to report their intention to purchase a smart energy device. Hence, this variable might be considered an attitudinal measure that would prove more effective for an injunctive norm. However, as this study has proven that descriptive norms induce the belief that others approve of engaging in the desired behavior, the mere manipulation of descriptive norms can induce injunctive norms and therefore be effective in influencing attitudinal measures. Related to this, the respondents' behavioral intentions were measured through an experiment that did not explore individuals' behavior in real-life situations. Therefore, a field study may be an interesting follow-up avenue to validate the findings of the present research. Thirdly, our mediating variable 'perceived social norms' was measured with only two items, which is a rather limited scale. Consequently, this could have influenced our results as a multi-item scale (more than two items) would be more accurate to measure perceived social norms. Further methodological research should therefore be conducted to develop and test adequate scales that accurately and measure perceived social norms, the study offers evidence that normative descriptive information about the behavior of a larger in-group (i.e., US households) leads to individuals' higher intention to purchase a smart energy device, thereby allowing them to monitor their energy use. Combining this normative message with a (financial) self-benefit frame depending upon one's dominant level of self-construal was determined to be effective in promoting the adoption of the smart energy device due to the perceived benefit to the self. This finding poses important implications for policymakers as they design behavior change campaigns to maximize individuals' uptake of a smart energy device to achieve generally sustainable energy use.

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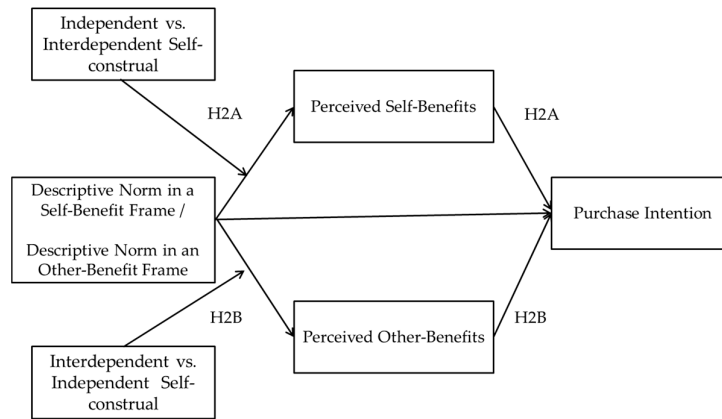
**Funding:** This research was funded by [Ghent University, Belgium BOF24]2016000402 and Research Foundation-Flanders, Belgium FWO.3E0.2015.0035.01]. It should be noted that the second author has the title of postdoctoral fellow fundamental research of FWO (grant number FWO.3E0.2015.0035.01).

**Conflicts of Interest:** The authors declare no conflict of interest.

**Appendix A. Graphic Visualization Research Model**



**Figure A1.** Research model of Study 1.



**Figure A2.** Research model of Study 2.

**Appendix B. Stimulus Material**



**(a) Descriptive Normative Message**

## AMBIENT ENERGY ORB

USE LESS ENERGY IN A GLANCE

Control your energy consumption. The light pulses green when your energy consumption and cost is low, it pulses red when it is high.

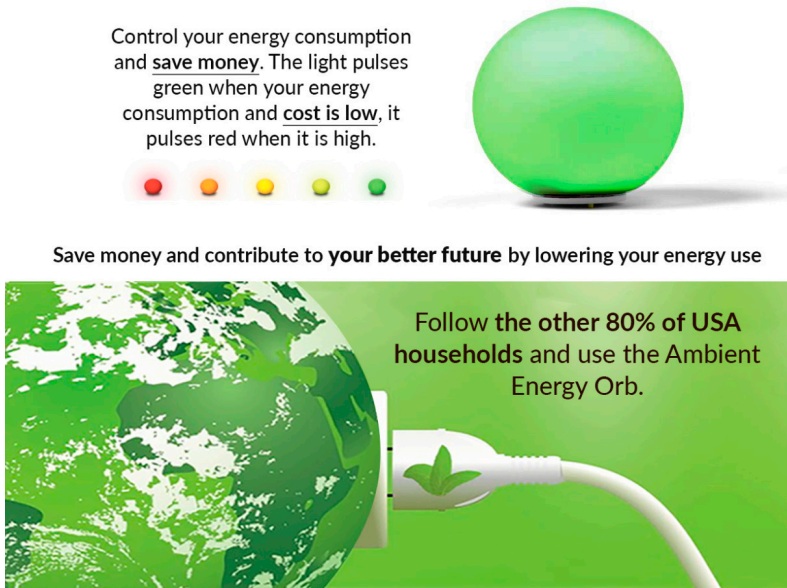


(b) No Normative Message

Figure A3. Normative versus control conditions.

## AMBIENT ENERGY ORB

Control your energy consumption and **save money**. The light pulses green when your energy consumption and **cost is low**, it pulses red when it is high.



(a) Descriptive Normative Message in a Self-Benefit Frame



## AMBIENT ENERGY ORB

Control energy consumption and contribute to a better environment. The light pulses green when energy consumption is low, it pulses red when it is high.



Contribute to a better environment and reduce GHG emissions by lowering energy use



(b) Descriptive Normative Message in an Environmental-Benefit Frame

Figure A4. Normative self-benefit condition versus normative environmental-benefit condition.

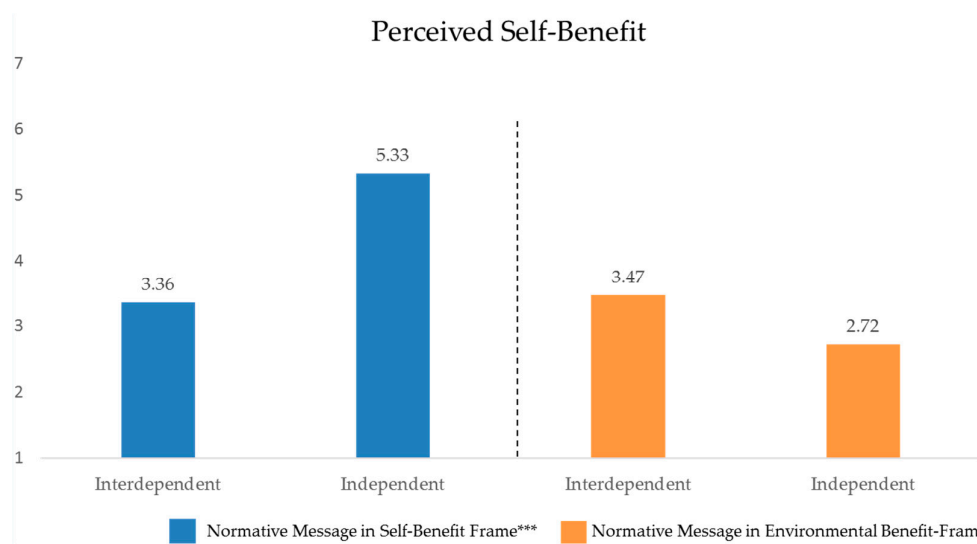
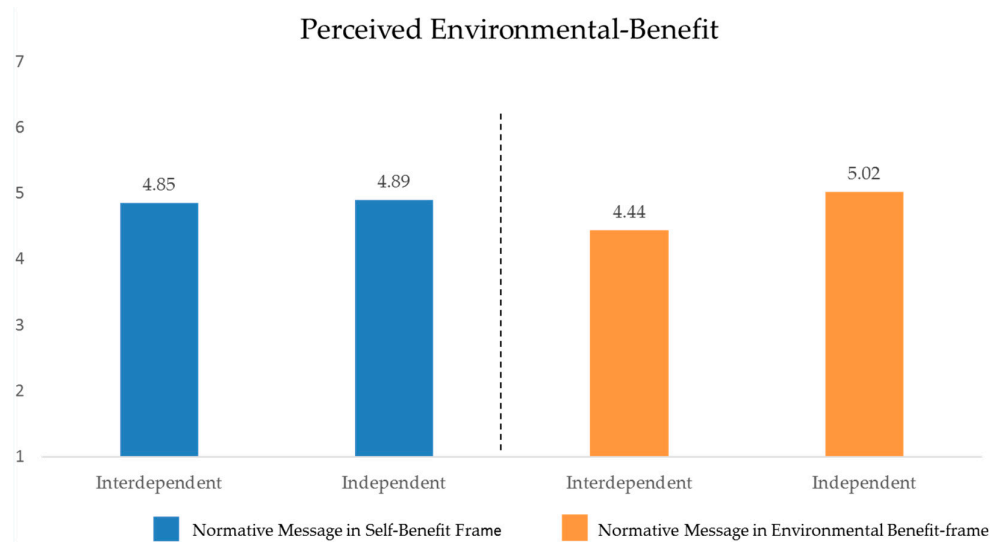


Figure A5. Graphic Visual: Moderation Effect of Self-Construal on Perceived Self-Benefit: Moderating impact of self-construal on perceived self-benefit in a normative message in a self-benefit frame vs. an environmental-benefit frame. Note: \*\*\* =  $p < 0.001$ .



**Figure A6.** Graphic Visual: Moderation Effect of Self-Construal on Perceived Other-Benefit: Moderating impact of self-construal on perceived environmental-benefit in a normative message in a self-benefit frame vs. an environmental-benefit frame.

### Appendix C. Priming Task Self-Construal

#### (a) The Interdependent Self-Construal Condition [53].

Yesterday, we went to the city because we needed a new dress for our birthday party that we are throwing next week. We had just received our salary, so we could afford to get us a dress that was a bit more expensive than we usually buy. After trying on 10 dresses, we finally found our dress that we were going to wear at our party. After our trip to the city, we came home and poured us a glass of wine to celebrate our purchase. Approximately ten minutes later, our parents came home, and we showed our new dresses.

#### (b) The independent self-construal condition [53].

Yesterday, I went to the city because I needed a new dress for my birthday party that I am throwing next week. I had just received my salary, so I could afford to get me a dress that was a bit more expensive than I usually buy. After trying on 10 dresses, I finally found my dress that I was going to wear at my party. After my trip to the city, I came home and poured me a glass of wine to celebrate my purchase. Approximately ten minutes later, my parents came home, and I showed my new dress.

### Appendix D

**Table A1.** Measurements of variables of interest—Studies 1 and 2.

Variables	Item Statement	Item Measurement Mean
<b>Study 1</b>		
Manipulation Check; Descriptive Norms [55]	▪ This energy bulb is bought by a lot of people.	7-point Likert scale Definitely false– Definitely true (M = 5.05; SD = 1.11)
	▪ This energy light bulb is a popular product.	
	▪ This energy bulb is positively rated by a lot of people.	

<p>Manipulation Check; Priming Interdependent Self-Construal [53] Manipulation Check; Priming Independent Self- Construal [53]</p>	<ul style="list-style-type: none"> <li>▪ At this moment I am focused on others I care about.</li> <li>▪ Right now, a sense of 'WE' is at the top of my mind.</li> <li>▪ At this moment I am focused on myself.</li> <li>▪ Right now, a sense of 'I' is at the top of my mind.</li> </ul>	<p>7-point Likert scale Strongly disagree—Strongly agree (M = 3.51; SD = 1.73) (M = 3.42; SD = 1.71)</p>
<p>Perceived Social Norms [49]</p>	<ul style="list-style-type: none"> <li>▪ Based on the advertisement, how many people are currently using the Ambient Energy orb?</li> <li>▪ Based on the advertisement, how much do you think the other people would approve of you when buying the Ambient Energy orb?</li> </ul>	<p>7-point Likert scale Nobody—Everybody (M = 5.30; SD = 0.98) Strongly disapprove—Strongly Approve</p>
<p>Purchase Intention [54]</p>	<p>Indicate to what extent you are willing to buy the Ambient Energy Orb:</p> <ul style="list-style-type: none"> <li>▪ Unlike/Likely</li> <li>▪ Non-existent/Existent</li> <li>▪ Improbable/Probable</li> <li>▪ Impossible/Possible</li> <li>▪ Uncertain/Certain</li> </ul>	<p>7-point semantic differential (M = 4.83; SD = 1.59)</p>
<b>Study 2</b>		
<p>Manipulation Check; Self- vs. Environmental-benefit appeal [58]</p>	<ul style="list-style-type: none"> <li>▪ The advertisement focuses more on benefits for one's personal self than on contributing to the environment when buying the Ambient Energy Orb.</li> </ul>	<p>7-point Likert scale Strongly disagree—Strongly agree (M = 3.59; SD = 1.71)</p>
<p>Manipulation Check; Priming Interdependent Self-Construal [53] Manipulation Check; Priming Independent Self- Construal [53]</p>	<ul style="list-style-type: none"> <li>▪ At this moment I am focused on others I care about.</li> <li>▪ Right now, a sense of 'WE' is at the top of my mind.</li> <li>▪ At this moment I am focused on myself.</li> <li>▪ Right now, a sense of 'I' is at the top of my mind.</li> </ul>	<p>7-point Likert scale Strongly disagree—Strongly agree (M = 3.73; SD = 1.56) (M = 3.54; SD = 1.74)</p>
<p>Perceived Self-Benefits [59]</p>	<ul style="list-style-type: none"> <li>▪ The advertisement I just saw makes me consider the benefits for myself when using the Ambient Energy Orb.</li> <li>▪ The advertisement I just saw is focused on helping oneself.</li> </ul>	<p>7-point Likert scale Strongly disagree—Strongly agree (M = 3.63; SD = 1.80)</p>
<p>Perceived Environmental Benefits [59]</p>	<ul style="list-style-type: none"> <li>▪ The advertisement I just saw makes me consider the benefits for the environment when buying the Ambient Energy Orb.</li> <li>▪ The advertisement I just saw is focused on helping the environment.</li> </ul>	<p>7-point Likert scale Strongly disagree—Strongly agree (M = 4.78; SD = 1.11)</p>

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	Indicate to what extent you are willing to buy the Ambient Energy Orb:	
Purchase Intention [54]	<ul style="list-style-type: none"> <li>▪ Unlike/Likely</li> <li>▪ Non-existent/Existent</li> <li>▪ Improbable/Probable</li> <li>▪ Impossible/Possible</li> <li>▪ Uncertain/Certain</li> </ul>	7-point semantic differential (M = 4.51; SD = 1.29)

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