



# How Injunctive Norm Promote Pro-Environmental Behavior Effectively: The Role of Descriptive Norm and Punishment

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**Abstract.** This study aims to explore how injunctive norms can effectively promote individual pro-environmental behaviors through punishment and descriptive norms. We used a behavioral experiment method, and 60 participants were recruited to perform decision-making tasks to analyze the effects of different intensities of injunctive norms and punishment probabilities on PEB participation. The experimental data indicate that the strength of injunctive norms significantly influence participants' environmental decisions. Results also show that stronger injunctive norms and higher punishment probabilities both significantly increase individuals' willingness to engage in PEBs. Additionally, descriptive norms play a moderating role in the effect of injunctive norms. Negative descriptive norms can weaken the function of injunctive norms and punishment. The contributions of this research provide effective strategies for policymakers, emphasizing the promotion of public pro-environmental behaviors through reasonable punishment measures, thereby supporting the achievement of sustainable development goals.

**Keywords:** Injunctive norms, Pro-environmental behavior, Punishment.

## 1 Introduction

Emissions of greenhouse gases resulting from individual factors have become one of the significant contributors to global climate change [1,2]. Therefore, countries worldwide are making relentless efforts to encourage public engagement in pro-environmental behaviors, and some progress has been made. However, there still remains a significant gap between the achievements and the expected outcomes[3]. For instance, regarding recycling behaviors, despite the widespread promotion of recycling campaigns and incentive programs, the level of public participation remains low. Human behaviors or activities that are aimed at protecting the environment or preventing environmental degradation are defined as pro-environmental behaviors (PEBs) [4], including various behaviors, such as energy conservation, recycling, green consumption, plastic bag use. According to data from the "China Statistical Yearbook 2022" published by the National Bureau of Statistics of China, the urban municipal solid waste collection in China

reached 248.692 million tons in 2021. Therefore, the impact and guidance of pro-environmental behaviors remain indispensable and crucial in addressing these challenges [5]. Survey results revealed that as high as 40% of individuals consider government agencies to be the most critical factor in promoting pro-environmental behaviors [6]. Therefore, social norms, as an effective way of influencing individual behavior [7], play a crucial role in the policy-making process undertaken by the government to promote individual PEBs.

Despite the extensive study of social norms [8], the punishment embedded within social norms has been overlooked. Additionally, there is insufficient attention given to injunctive norms compared to descriptive norms. In climate change mitigation research, punishment has been identified as an effective method to encourage people to engage in environmental behaviors. Given the sanctioning nature of injunctive norms, it is indeed crucial for government strategies aimed at promoting individual PEB to incorporate injunctive norms with punitive measures.

Therefore, this paper focuses on the impact of injunctive norms on PEB and further investigates the role of punishment and descriptive norms in the decision-making process. We hypothesize that in the process of promoting PEB, the government's targeted development of punitive strategies can influence the effectiveness of injunctive norms in promoting PEBs. At the same time, descriptive norms will moderate the effect mentioned above.

To test our hypothesis, we conducted a behavioral experiment and used logistic regression analysis to analyze the data. Through empirical research and theoretical analysis, we aimed to deeply investigate the interaction between injunctive norms, punishment, and descriptive norms in the decision-making process of individual PEBs. The objective was to propose more effective strategies for guiding and enhancing individual PEBs. We hoped to provide more accurate and effective strategic guidance for environmental conservation practices through this study, encouraging active participation from the public in environmental protection actions, and ultimately contributing to the sustainable development of the environment.

## **2 Literature Review**

### **2.1 The Relationship Between Pro-Environmental Behaviors and Social Norms**

Among the factors influencing individual PEBs, attitudes, belief, values, motivations and norms have garnered significant attention. Some famous theoretical frameworks have been developed to analyze PEB, such as the Theory of Planned Behavior (TPB). The TPB proposes that human behavior is consciously planned and determined. An individual's behavioral intentions are influenced by their attitudes, subjective norms, and perceived behavior control. When an individual holds a positive attitude, perceives social norms supporting the behavior, and believes they have control over their actions, they are more likely to form positive behavioral intentions and are more likely to engage in the behavior itself [9]. The TPB provides a comprehensive understanding of

individual behavior decision-making processes. It is suitable for predict PEBs and has been widely applied in interventions targeting PEB, and various other domains.

The main influencing factors of PEB can be categorized into two major classes: individual internal variables such as demographic and psychological variables, and external variables such as social norms and costs [10]. In general, the early studies indicated that women, younger individuals with higher education and good income levels, married individuals, and residents of urban areas demonstrate a greater inclination towards pro-environmental behavioral intentions [11]. However, demographic differences and supportive norms may not always be effective for encouraging sufficient PEBs. Then, the focus of PEB research shifted towards psychological factors such as attitudes, beliefs, personal norms, and perceived behavioral control. Extensions of the TPB by Singh et al. (2018) demonstrated that attitudes towards recycling and readiness for a circular economy are key factors influencing recycling intentions, technological innovations [12], and sustainable waste management. Lizin et al. (2017) found that perceived behavioral control and moral norms have the greatest impact on battery recycling intentions [13].

There are also many external variables that influence PEBs, among which social norms have received significant attention [10]. Cialdini et al. (1990) propose that social norms refer to the rules and standards understood by group members that guide or restrict their behaviors, aiming to ensure the achievement of group goals and consistency in group activities. Based on different pathways through which social norms influence individual behavior, they introduce the concept of the normative focus theory, which categorizes social norms into descriptive norms and injunctive norms. Descriptive norms are behavioral standards formed based on the behaviors displayed by a majority of group members, exerting an influence on individual behavior similar to conformity. Individuals tend to align their behavior with what the majority does, representing an informational social influence through social interactions. Injunctive norms are behavioral standards formed based on the majority of group members' favorable or unfavorable attitudes toward a specific behavior. Research has shown that social norms, compared to education and marketing tools, social norms are more convenient, practical, and cost-effective in promoting behavior change [4]. Therefore, social norms have been utilized in various domains to improve social behaviors, including individual health behaviors, drunk driving and more. In the context of PEB, our research primarily focuses on individual PEBs, including energy-saving behaviors, recycling behaviors, as well as other behaviors such as green consumption, sustainable transportation, hotel towel reuse, and waste sorting.

Social norms which are distinct from personal norms have been confirmed as important factors influencing PEBs. Social norms can influence personal norms. When social norms are internalized as personal norms, external punishment is gradually replaced by internal sanctions [15]. But social norms can also change individual behavior without changing individual norms. In terms of monetary factors, such as costs or the use of financial incentives, they also have an impact on PEBs. Research on the influence of behaviors in the context of municipal recycling in the United States has confirmed that recycling refunds or rebates are determining factors for certain item recycling behaviors [16].

Based on the development of social norms and PEBs, as well as the interplay between variables, this study primarily focuses on the discussion of external variables. Specifically, we examine the impact of injunctive norms on individual PEBs, including the role of punishment and descriptive norms.

## 2.2 Injunctive Norms and the Punishment

Injunctive norms refer to behaviors that people expect others to follow in specific social contexts, even if doing so goes against their own self-interest. According to the normative focus theory [14], descriptive norms provide information about the current behavioral patterns, while injunctive norms provide norms regarding expected behavior. Injunctive norms promote or maintain the internalization of norms through social disapproval or punishment for people with norm violations [17]. Numerous studies have shown that descriptive norms have a stronger influence on guiding individual behavior compared to injunctive norms [4,18]. These studies generally focus on the individual intrinsic variables in the process of norm influence on behaviors, such as personal norms, and perceived behavioral control. In this context, the sanction of injunctive norm refers to the fear of not gaining group acceptance, negative perceptions from others, or internal guilt when individuals do not adhere to the injunctive norm. However, Punishment or sanctions also imply that individuals incur monetary costs for violating norms.

As mentioned above, injunctive norms can maintain individual behaviors by punishing those who violate the norms. Therefore, punishment is an important factor in the process of intervening individual behaviors. We suppose that imposing fines on individuals who do not engage in relevant PEBs can potentially improve their PEBs. Firstly, it changes the cost of decision-making. In addition, when individuals who choose to engage in PEB witness the punishment of those who do not, they perceive it as fair and are more likely to continue maintaining their own PEB. In exploring social norms, it has been found that there are some elements in common with public goods games (PGGs). When those who violate norms are punished, those who comply with the norms are more willing to adhere to them because they perceive it as fair, while those who do not comply may start to follow the norms in order to avoid punishment. Currently, most research on interventions based on social norms focuses on intrinsic factors of individuals, weakening the punitive aspect of injunctive norms. This may also be one of the reasons why most studies suggest that descriptive norms have a stronger impact on behavior change. In fact, understanding human decision-making in social contexts requires consideration not only of beliefs, internalized values and expectations of (dis)approval for norm violations but also the material costs, benefits, or fines involved. Injunctive norms, serve as effective tools for governments to implement policies related to PEB, as they can enforce compliance through the possibility of punishment. Therefore, whether individuals are subject to punishment becomes a probabilistic outcome. Therefore, based on the current research status of injunctive norms, this paper focuses on the variable of punishment and further verifies its function in the influence of injunctive norms on PEBs through behavioral experiments. The study thus proposes the following hypotheses:

H1: Different levels of intensity in injunctive norms have different influence on individual PEBs.

H2: Different degrees of punishment probability make the impact of injunctive norms on PEB different.

### **2.3 Injunctive Norms and Descriptive Norms**

Due to the influence of social and cultural backgrounds, individuals primarily rely on social norms rather than rational or complex economic activities during the consumption process [19]. Therefore, individuals depend on social norms when making consumption decisions. When making behavioral decisions, people may consider what they believe is the correct choice based on social expectations, while also taking note of the decisions that others have made.

Injunctive norms inform people about what should be done, but sometimes descriptive norms conflict with injunctive norms. As a result, descriptive norms can potentially affect the effectiveness of injunctive norms in promoting PEBs. According to the normative focus theory [14], individual normative focus may shift towards descriptive norms, meaning that descriptive norms have a greater influence on PEBs. Schultz et al.(2007) confirmed this classic “boomerang effect” through relevant experiments on energy-saving behaviors. Therefore, descriptive norms and injunctive norms do not influence individual behavior severally; there is also an interaction between them. Based on this, we propose the following hypothesis:

H3: Descriptive norms have impact on individual PEBs in the process that injunctive norms influence individual PEBs, descriptive norms influence the degree of function of injunctive norms

## **3 Methodology**

### **3.1 The Participants**

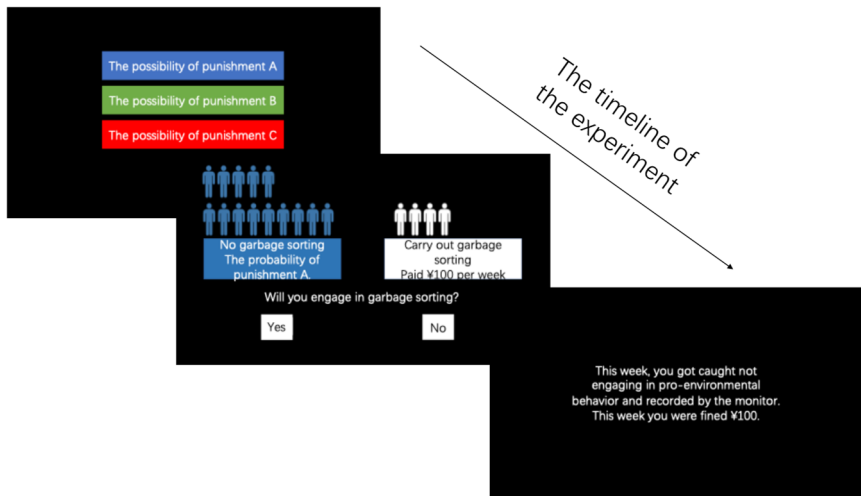
The present study implemented a within-subjects design. We used G\*Power 3.1 software [21] to estimate our priori sample size. The results indicated that a minimum of 88 participants were required to attain a statistical power of 0.80, with an anticipated effect size of 0.05. 94 healthy, right-handed volunteers were invited to participate in the experiments for monetary reward. Four of the original participants chose to leave the study early, exercising their right to stop taking part. The final sample consisted of 90 eligible individuals. All participants in both studies signed consent for confirmation before the experiment. Internal Review Board of Management of Harbin Institute of Technology approved the experiment.

### **3.2 Experiment Design and Procedure**

In our experiments, there were eight PEBs, which were water conservation, electricity conservation, recycling, green consumption, garbage sorting, towel re-use, using eco-

friendly shopping bags, green transportation. Before the formal experiments began, each participant was required to choose two behaviors out of the eight PEBs. One of these two PEBs was that people consider to be the most important and helpful for the environment and they hoped others do it. The other PEB was that they believe others do not pay much attention to. The two PEBs chosen by the participants constitute the injunctive norms (strong vs. weak) they are subjected to. After making their choices, the participants would proceed with the formal experiment.

In the formal experiment, the screen displays three possibilities of being punished for not engaging in PEBs, differentiated by three colors. The participants used their own strategies and made judgments according to the punishment probabilities and others decision on the screen. The punishment probabilities for A, B, and C were 0.25, 0.5, and 0.75, respectively.



**Fig. 1.** The timeline of the formal experiment.

In the subsequent experiments, participants decide whether to engage in the two types of behavior with different injunctive norms selected earlier. If they engage in the PEB, they will incur a cost of 50 CNY per week. If they choose not to engage in the PEB, they face two scenarios: either no punishment, saving 50 CNY, or being penalized 100 CNY by the environmental supervisor. If a participant was caught not engaging in PEBs, the screen would display a notification of their punishment. There was no cost if the participants escaped the punishment, and the experiment would proceed directly to the next trial. These costs were communicated to the participants at the beginning of the experiment when explaining the procedure. Additionally, the screen shows a total of 18 images of virtual individuals. The choices of the 18 people varied randomly in each trial. The colors of the individual images matching the current punishment probability represent those currently choosing not to engage in this PEB, while white images represent those opting to pay for the PEB. The participants know that these 18 people were virtual people and could represent anyone in their lives. Our experiments had no

deception. The choices of the 18 people can only represent themselves. The fact that more of these 18 people choosing to engage in paid PEB did not mean it was the more correct or better choice, nor did it mean that the punishment was stricter at that moment. In this context, the participants were required to focus on all the information presented on the screen and made their behavioral decisions. Each participant needed to make 48 decisions for each behavior they selected. The punishment probabilities appeared randomly. The experimental process is shown in Fig. 1.

## 4 Results

Under two different levels of injunctive norms, we recorded the choices of engaging in PEB, and tested whether injunctive norms influenced individual PEBs through comparing their choices. The results show in Table 1. As the injunctive norms had two modes (strong vs. weak) and the choice had two categories (yes or no), we use a linear mixed-effects model to analyze the data. This model takes into account the heterogeneity among different participants. In Table 1, the intercept represents the average value of participants' choices (0.466). Under the weak injunctive norm, the value is the change in choice relative to the intercept. The negative coefficient indicates that, compared to the first level, the average value of choice decreases by 0.06 units. The t-value and extreme small p-value indicate that this coefficient is statistically significant. The results of this model point that injunctive norms significantly contribute to the differences in individual PEB, and these differences are unlikely to be due to random error. Therefore, the H1 has been confirmed that different levels of injunctive norms indeed have a significant effect on individual PEB choice, with strong injunctive norms being more capable of promoting PEBs.

**Table 1.** The result of multilevel logistic regression

	Value	Std. Error	DF	t-value	p-value
Intercept	0.446	0.017	11185	26.839	< .001***
Weak injunctive norm	-0.060	0.009	11185	-6.764	< .001***

Our results confirm hypothesis 2: Different degrees of punishment probability make the impact of injunctive norms on PEB different. Through logistic regression analysis, we obtained the results shown in Table 2. Higher probability values are associated with a lower probability of choosing 1, indicating a lower likelihood of engaging in PEB (0 represents doing PEB, and 1 represents not doing PEB). The high absolute values of the z-statistics and the very small p-values indicate that this coefficient is highly significant statistically. It implies that as the probability of punishment increases, individuals are more likely to engage in PEBs.

**Table 2.** The result of multilevel logistic regression.

	Estimate	Std. Error	z-value	Pr(> z )
Intercept	-0.172	0.082	-2.083	0.037*
Punishment	-0.123	0.008	-16.064	< .001***

Thirdly, we examined the function of descriptive norms in the process of injunctive norms influencing individual PEB decisions. The results indicate that the descriptive norms of the virtual people significantly affect participants' PEBs. We utilized a logistic regression model to fit the data. The results reveal a significant positive effect of descriptive on choices.

If the number of virtual people engaging in PEBs increases, participants' PEB decisions become more consistent with the behavior choices of others. The high absolute values of the z-statistics and the extreme small p-values indicate that this coefficient is highly significant statistically. The results are presented in Table 3.

**Table 3.** The result of multilevel logistic regression.

	Estimate	Std. Error	z-value	Pr(> z )
Intercept	-1.430	0.094	-15.17	<2e-16***
Descriptive norms	0.115	0.004	28.70	< 2e-16***

To further examine the role of descriptive norms and punishments in influencing individual PEBs, we employed a logistic regression model to test the interaction between punishment and descriptive norms.

The intercept represents the baseline log-odds of choice being 1 when all independent variables are set to 0. Since this value ( $p < 2e-16$ ) is significantly different from 0, there exists a non-zero baseline log-odds. Without considering the influence of descriptive norms, holding other conditions constant, for each unit increase in the probability of punishment, the log-odds of choice being 1 decrease by 0.065 units. This effect is also statistically significant ( $p = 6.67e-06$ ). It means that when probability and other variables remain constant, for each unit increase in descriptive norms, the log-odds of choice being 1 increase by 0.110 units. This indicates that as the level of descriptive norms decreases, and individual choice becomes more certain. This effect is highly significant ( $p < 2e-16$ ).

When the descriptive norm increases by one unit and the probability of punishment also increases by one unit, the log-odds of choice being 1 would decrease by 0.005 units compared to considering these two variables independently. This suggests a negative interaction between the two variables. It indicates that the impact of one variable on the log-odds of choice being 1 is weakened when the other variable increases. This interaction effect is statistically significant ( $p = 0.00057$ ). Namely, when other conditions are held constant, descriptive norms influence the effect of punishment probability on individual PEBs.

The results of the experiments prove that injunctive norms, punishments, and descriptive norms all have significant effects on individual PEB decision, and there is a significant interaction between punishment and descriptive norm. These findings provide support for our H3.

## 5 Discussion

Social norms are highly effective policy tools for influencing individual PEBs. In our study, we employed a “multi-stage group decision task” paradigm to conduct a detailed



investigation, allowing us to further understand the mechanisms through which social norms influence PEBs. Our research indicates that injunctive norms can effectively promote individual PEBs. Additionally, specific punishments play a significant role in this process. Furthermore, the positivity or negativity of descriptive norms also influences PEBs in the context of injunctive norms. Our study clarifies key factors and specific measures for changing normative focuses in situations involving decisions about PEBs. Unlike many previous studies, we utilized behavioral experiments to support our hypotheses. This approach supplements behavioral research in this field, enabling us to directly manipulate and observe the impact of social norms on individual PEBs.

Firstly, many classic studies have demonstrated that when individuals think about social norms, these norms can effectively influence behavior [20,22]. The different choices made by the participants regarding these two behaviors demonstrate the influence of varying intensities of injunctive norms on individuals' pro-environmental decision-making. Previous research has extensively confirmed the role of injunctive norms in promoting environmental behaviors. Our findings are consistent with previous studies, such as Thøgersen (2006), Nolan et al. (2011) and Kurisu (2015) [23,24,25].

In addition, when Cialdini et al. (1990) introduced the focus theory of normative conduct, they also mentioned that if people can be made aware of the implicit injunctive norms in information, individuals may be more likely to shift their focus onto these injunctive norms and consequently cease or engage in certain behaviors. However, many studies have found that in reality, descriptive norms have a greater impact on behavior in everyday life. Bertoldo and Castro (2016) argued that descriptive norms often have a stronger impact on promoting PEBs than injunctive norms. Helferich et al. (2023) explored the advantages of descriptive norms in driving energy-saving behaviors, indicating that their influence is greater than that of injunctive norms [26]. The descriptive norms of others' actions convey a more detailed guidance that can be emulated, making it more beneficial for individuals to mimic others [27]. In this process, the punishments associated with injunctive norms should be noticed. To incentivize behavior change, it is crucial for injunctive norm information to be explicit [28]. Our study supports this viewpoint. Highlighting the specific content of injunctive norms with punitive measures can have a more significant impact on individual PEBs. Higher punishment probability enhances individual PEBs effectively. Furthermore, environment resembles a public good, so public participation is crucial for effective environmental protection [29]. The collaboration with others and the punishment of free riders are two key elements of public good [30]. These factors are associated with descriptive norms and injunctive norms, respectively. Similar to the punishments implemented in PGGs, punishments in social norms can also be used to uphold social norms and prevent their deterioration [31]. Compared to other prosocial behaviors, punishment has a more direct impact on the relationship between social norms and individual PEBs. Mulder (2008) argues that punishment conveys a sense of obligation in behavior and can effectively promote individual cooperation [32]. The imposition of fines has been found to promote PEBs due to the alteration of the social interaction payoff structure [33]. The current study results extend this viewpoint by incorporating punishment into the impact of injunctive norms on promoting PEBs.

Last, in the process of norms acting on PEBs, positive descriptive norms have positive effects on individual behaviors. However, other's negative normative behavior descriptions weaken the role of injunctive norms. Bonan (2020) contends in their study on encouraging energy conservation that there is no superior sort of social norm over another, but rather complementarity between different types of normative information [34]. Our research findings partly support the conclusions of Bonan (2020).

## 6 Conclusion

This study explores the influence of punishment on individual PEBs within the framework of social norms theory. The results demonstrate that punishment can effectively influence the effect of injunctive norms on individual PEBs. A higher probability of punishment significantly increases the facilitating effect of injunctive norms on individual PEBs. Importantly, the behavioral outcomes of others, namely the descriptive norms also have impact in this context. There is an interaction between punishments and descriptive norms, leading to changes in participants' decisions regarding PEBs.

This study not only provides empirical evidence for the influence of injunctive norms on individual PEBs, but also introduces new variables such as punishment, expanding the framework and application of the normative focus theory. In terms of policy implications, the research results offer an important policy tool for promoting individual PEB and provide valuable guidance for the development of PEB-related policies. Policy-makers can consider the reasonable application of punishment policies when formulating plans.

While this study has filled some gaps in the field, it does have certain limitations. The amount of the fine could also influence individual decision-making and further detailed study should be undertaken in this regard. Therefore, we intend to continue researching these specific elements by integrating psychology, sociology, and economics. Further research is necessary to establish concrete system frameworks and implementation guidelines.

## References

1. Wyss, A.M.; Knoch, D.; Berger, S. When and How Pro-Environmental Attitudes Turn into Behavior: The Role of Costs, Benefits, and Self-Control. *J. Environ. Psychol.* **2022**, *79*, 101748.
2. Przygoda, M.; Misevic, P.; Machrafi, M. Economic and Social Development: 48th International Scientific Conference on Economic and Social Development-" Managerial Issues in Modern Business": Book of Proceedings: Warsaw, 25-26 November 2019. In Proceedings of the Economic and social development: 48th International Scientific Conference on Economic and Social Development-" Managerial Issues in Modern Business": book of proceedings: Warsaw, 25-26 November 2019; Varazdin, Croatia: Varazdin Development and Entrepreneurship Agency, 2019.
3. Ling, M.; Xu, L.; Yang, H. Direct and Spillover Effects of Social Norm Nudges for Household Recycling: A Longitudinal Field Experiment. *Sustainable Production and Consumption* **2023**, *42*, 423–433.

4. de Groot, J.I.M.; Bondy, K.; Schuitema, G. Listen to Others or Yourself? The Role of Personal Norms on the Effectiveness of Social Norm Interventions to Change pro-Environmental Behavior. *Journal of Environmental Psychology* **2021**, *78*, 101688.
5. *China Statistical Yearbook 2022*; 2022;
6. Xu, M. Study on the influencing factors and mechanism of residents' pro-environment behavior. *Innovative Thinking* **2018**.
7. Wolske, K.S.; Gillingham, K.T.; Schultz, P.W. Peer Influence on Household Energy Behaviours. *Nat Energy* **2020**, *5*, 202–212, doi:10.1038/s41560-019-0541-9.
8. Farrow, K.; Grolleau, G.; Ibanez, L. Social Norms and Pro-Environmental Behavior: A Review of the Evidence. *Ecological Economics* **2017**, *140*, 1–13.
9. Ajzen, I. The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes* **1991**, *50*, 179–211.
10. Li, D.; Zhao, L.; Ma, S.; Shao, S.; Zhang, L. What Influences an Individual's pro-Environmental Behavior? A Literature Review. *Resources, Conservation and Recycling* **2019**, *146*, 28–34.
11. López-Mosquera, N.; Lera-López, F.; Sánchez, M. Key Factors to Explain Recycling, Car Use and Environmentally Responsible Purchase Behaviors: A Comparative Perspective. *Resources, Conservation and Recycling* **2015**, *99*, 29–39.
12. Singh, M.P.; Chakraborty, A.; Roy, M. Developing an Extended Theory of Planned Behavior Model to Explore Circular Economy Readiness in Manufacturing MSMEs, India. *Resources, Conservation and Recycling* **2018**, *135*, 313–322.
13. Lizin, S.; Van Dael, M.; Van Passel, S. Battery Pack Recycling: Behaviour Change Interventions Derived from an Integrative Theory of Planned Behaviour Study. *Resources, Conservation and Recycling* **2017**, *122*, 66–82.
14. Cialdini, R.B.; Reno, R.R.; Kallgren, C.A. A Focus Theory of Normative Conduct: Recycling the Concept of Norms to Reduce Littering in Public Places. *Journal of Personality and Social Psychology* **1990**, *58*, 1015–1026.
15. Hage, O.; Söderholm, P.; Berglund, C. Norms and Economic Motivation in Household Recycling: Empirical Evidence from Sweden. *Resources, Conservation and Recycling* **2009**, *53*, 155–165.
16. Fan, C.; Fan, S.-K.S.; Wang, C.-S.; Tsai, W.-P. Modeling Computer Recycling in Taiwan Using System Dynamics. *Resour. Conserv. Recycl.* **2018**, *128*, 167–175.
17. Bicchieri, C. *The Grammar of Society: The Nature and Dynamics of Social Norms*; Cambridge University Press, 2005;
18. Bertoldo, R.; Castro, P. The Outer Influence inside Us: Exploring the Relation between Social and Personal Norms. *Resources, Conservation and Recycling* **2016**, *112*, 45–53.
19. Menz, J.-O. Uncertainty, Social Norms and Consumption Theory: Post and New Keynesian Approaches. *European Journal of Economics and Economic Policies: Intervention* **2010**, *7*, 125–146.
20. Schultz, P.W.; Nolan, J.M.; Cialdini, R.B.; Goldstein, N.J.; Griskevicius, V. The Constructive, Destructive, and Reconstructive Power of Social Norms. *Psychol Sci* **2007**, *18*, 429–434.
21. Faul, F.; Erdfelder, E.; Buchner, A.; Lang, A.-G. Statistical Power Analyses Using G\*Power 3.1: Tests for Correlation and Regression Analyses. *Behav. Res. Methods* **2009**, *41*, 1149–1160.
22. Goldstein, N.J.; Cialdini, R.B.; Griskevicius, V. A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels. *Journal of Consumer Research* **2008**, *35*, 472–482.

23. Thøgersen, J. Norms for Environmentally Responsible Behaviour: An Extended Taxonomy. *Journal of Environmental Psychology* **2006**, *26*, 247–261.
24. Nolan, J.M.; Kenefick, J.; Schultz, P.W. Normative Messages Promoting Energy Conservation Will Be Underestimated by Experts ... Unless You Show Them the Data. *SOCIAL INFLUENCE* **2011**, *6*, 169–180.
25. Kurisu, K. Influential Factors on PEBs. In *Pro-environmental Behaviors*; Kurisu, K., Ed.; Springer Japan: Tokyo, 2015; pp. 27–46 ISBN 978-4-431-55834-7.
26. Helferich, M.; Thøgersen, J.; Bergquist, M. Direct and Mediated Impacts of Social Norms on Pro-Environmental Behavior. *Global Environmental Change* **2023**, *80*, 102680.
27. Curtius, H.C.; Hille, S.L.; Berger, C.; Hahnel, U.J.J.; Wüstenhagen, R. Shotgun or Snowball Approach? Accelerating the Diffusion of Rooftop Solar Photovoltaics through Peer Effects and Social Norms. *Energy Policy* **2018**, *118*, 596–602.
28. Lawrence, N.K. Highlighting the Injunctive Norm to Reduce Phone-Related Distracted Driving. *Social Influence* **2015**, *10*, 109–118.
29. Liao, Y.; Yang, W. The Determinants of Different Types of Private-Sphere pro-Environmental Behaviour: An Integrating Framework. *Environ Dev Sustain* **2022**, *24*, 8566–8592.
30. Dercole, F.; De Carli, M.; Della Rossa, F.; Papadopoulos, A.V. Overpunishing Is Not Necessary to Fix Cooperation in Voluntary Public Goods Games. *Journal of Theoretical Biology* **2013**, *326*, 70–81.
31. Sasaki, T.; Uchida, S.; Chen, X. Voluntary Rewards Mediate the Evolution of Pool Punishment for Maintaining Public Goods in Large Populations. *Sci Rep* **2015**, *5*, 8917.
32. Mulder, L.B. The Difference between Punishments and Rewards in Fostering Moral Concerns in Social Decision Making. *J. Exp. Soc. Psychol.* **2008**, *44*, 1436–1443.
33. Wu, J.; Luan, S.; Raihani, N. Reward, Punishment, and Prosocial Behavior: Recent Developments and Implications. *Current Opinion in Psychology* **2022**, *44*, 117–123.
34. Bonan, J.; Cattaneo, C.; d'Adda, G.; Tavoni, M. The Interaction of Descriptive and Injunctive Social Norms in Promoting Energy Conservation. *Nat Energy* **2020**, *5*, 900–909.

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